



UNIVERSAL DESTINATIONS & EXPERIENCES UK PROJECT

Former Kempston Hardwick Brickworks
and adjoining land, Bedford

Appendix 5.1 Transport Assessment

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1 Introduction

- 1.1 This Transport Assessment Report has been prepared on behalf of Universal Destinations & Experiences (UDX) which is seeking planning permission for the construction and operation of a Universal Entertainment Resort Complex (ERC), and associated development, in Bedford. The proposal is sponsored by the Department for Culture Media and Sport (DCMS). The Department for Transport (DfT) and its associated arm's-length bodies have assisted in the development of the highways and rail related elements of the proposal with Bedford Borough Council (Bedford BC). The proposal intends to provide sufficient information to enable the Secretary of State for Housing, Communities and Local Government (MHCLG) to consult on and consider making a planning decision.
- 1.2 The Site is located south-west of Bedford, Bedfordshire and is broadly to the east of the A421 and west of the Midland Main Line and is on the former Kempston Hardwick brickworks and agricultural land. The Site is divided into four main land areas referred to in the planning proposal as the Core Zone, Lake Zone, West Gateway Zone, and East Gateway Zone. The proposed ERC lying within these zones would allow a theme park and associated uses including retail, dining, entertainment; visitor accommodation; sport, recreation, leisure and spa facilities; venues with conference and convention spaces; associated services and uses for any operational or administrative functions; utilities generation, storage, collection, treatment, and processing facilities associated with the ERC; vehicle and cycle parking, maintenance and servicing, and transportation hubs; access routes and circulation spaces; landscaping; utility infrastructure; and use of land necessary to support construction.
- 1.3 The planning proposal also includes road and rail-related development including:
 - a. a new A421 Junction;
 - b. an expanded railway station on the Thameslink/Midland Main Line at Wixams;
 - c. improvements to Manor Road; and
 - d. improvements to certain other local roads.
- 1.4 It also safeguards land for a potential new railway station on the proposed East West Rail (EWR) Bletchley to Bedford line, should this come forward in the future.
- 1.5 At the time of writing, the EWR project has consent to deliver new rail services between Oxford and Milton Keynes. UDX are aware of further expansion plans by EWR Co including the provision of EWR services to Bedford and then Cambridge, with the possibility of a new Stewartby Station which would have the potential to serve the Proposed Development. Such a new station serving the Site on an expanded EWR service would bring benefits in terms of non-car accessibility to the Proposed Development. However, these further improvements are not committed. Therefore, the Proposed Development does not rely on the line continuing further, and it does not rely on a new EWR Station at the Site. However, it strongly supports an extension of EWR beyond Milton Keynes, and the delivery of a new East West Rail Station at the Site through the safeguarding of land.

- 1.6 The Proposed Development includes four distinct Zones of land, which comprise:
- a. Core Zone - located east of the MVL broadly between Broadmead Road to the south and Manor Road to the north;
 - b. Lake Zone – located to the east of the MVL, north of Manor Road, towards the A421 but without frontage on the A421, and with a short frontage on the B530 Ampthill Road to the northeast;
 - c. West Gateway Zone – located to the west of the MVL with some frontage onto the C94 Bedford Road to the west, with Broadmead Road forming the southern boundary of the Zone;
 - d. East Gateway Zone – located around the location of the Full Wixams Station on the western side of the MMRL.
- 1.7 A Zonal Plan for the Proposed Development is provided at **Document Reference 1.08.0**.
- 1.8 The Proposed Development is described in **Chapter 2: Description of the Proposed Development (Volume 1)** of the Environmental Statement (ES).

Why Here?

- 1.9 The Site has been identified as a suitable location for a new ERC by UDX as a result of its excellent accessibility at international, national, regional and local levels.
- 1.10 The MMRL runs to the east of the Site, from London to the south, to key destinations to the north (therefore providing a radial connection to/from London). Bedford BC are currently delivering a new station on this mainline railway at Wixams, a strategic residential-led development and new community of circa 5,000 homes. This new station, with further upgrades, provides an important rail access opportunity for the Proposed Development, with connections to London St Pancras, London's Eurostar terminal, Luton Airport and stations to the north. The Proposed Development's strategy includes the provision of a high frequency system of shuttle buses linking the Site to the Wixams Station, which will be expanded through the Development Proposals, delivering last mile connectivity along this other important public transport access route.
- 1.11 Importantly, current rail services on the MMRL in the vicinity of the Site accommodate tidal flows with trains busy in the morning peak towards London and in the evening peak from London. As a result, trains are currently relatively empty in counter-cyclical directions, i.e. from London in the morning peak and to London in the evening peak. The Proposed Development can therefore make use of this 'spare' capacity on the rail network and fill trains that are currently running empty to the benefit of the operation of the railway and to the benefit of the environment as this makes use of existing available resources.
- 1.12 The MVL runs along an existing rail corridor that is situated between the West Gateway Zone, and the Core Zone and the Lake Zone. It currently provides a local, low frequency rail service between Bletchley and Bedford, but it does form a central section of the EWR project. The EWR project aims to deliver a high quality, high frequency rail service between Oxford and Cambridge (therefore orbital to London) and forms the main public transport infrastructure investment within the Oxford to Cambridge Arc.

- 1.13 EWR are developing proposals which may include a new modern railway station between the existing Stewartby Station and Kempston Hardwick Station. A new station on a high quality, modern, regional rail connection, would form an additional opportunity to enhance the Proposed Development's accessibility by non-car modes. The Proposed Development does not rely on the delivery of future phases of the EWR project or an EWR station within the Site. However, the Proposed Development does not preclude the delivery of future phases of EWR and safeguards land within the Site for a potential EWR station in the future.
- 1.14 The counter-cyclical flows which benefit the rail network, and the fact that peak demands will occur outside traditional peaks, can also benefit the road network. The opening/closing hours of the Theme Park and the various Theme Park stay packages that can be offered can dictate arrivals to the Theme Park and departures from the Theme Park that are outside the typical weekday peak periods on the road network. This is also valid when considering seasonality across the year, with peak attendance likely to occur during holiday periods when background traffic on the strategic and local highway network would typically be lower.
- 1.15 The Proposed Development benefits from close proximity to the trunk road network with the A421 running to the west and north of the Site. The A421 is a 2-lane dual carriageway road with grade separated junctions, connecting the M1 at Junction 13 to the southwest of the Site with the A1 Black Cat junction to the northeast of the Site. The M1 and A1 provide the road links to London to the south and Leeds to the north, and connections to the rest of the country from these two principal routes. M1 J13 is a central node within the Strategic Road Network (SRN). The M1 also provides a connection to London Luton Airport, located about 25 miles to the south of the Site. The M1 connects to the M25 and from there to all other London Airports.
- 1.16 The A421 runs along the Marston Vale linking locally Milton Keynes and Bedford, and it forms a key road connection between Cambridge and Oxford.
- 1.17 The Site therefore is well connected to London, including its main transport hubs (mainline stations and airports), and the rest of the UK. It is estimated that 31 million people live within 2 hours travel of the Site and 50 million (about $\frac{3}{4}$ of the UK population) within 3 hours.

Vision Led Planning

- 1.18 The aim for the Proposed Development is to create a world-class visitor attraction that has sustainability at its heart and will be encouraging visitors to travel to the Site by non-car modes. This ambition also extends to staff travel.
- 1.19 To achieve this, a Vision Led Planning approach to transport planning has been adopted within this Transport Assessment. A Vision Led Planning approach seeks to establish a vision for a Proposed Development. Then, the approach works towards ensuring that the vision becomes a reality. Adopting a Vision Led Planning approach at the Site will have a number of benefits.
- 1.20 A Vision Led Planning approach prevents transport strategies and proposals from embedding historical trends and outcomes, such as traffic growth, pollution and inaccessibility, which are not consistent with future sustainability ambitions. Setting a clear vision at an early stage also makes it much easier to identify opportunities when they arise and to spot early signs of progress to be built upon.

- 1.21 Additionally, the world is ever-increasingly uncertain, with rapid changes to technology and human behaviour, and unpredictable events caused by climate change and other incidents such as the COVID-19 pandemic. A Vision Led Planning approach enables a pre-emptive approach to managing uncertainty about the future. By setting an overall vision, there is no limit to how that vision is achieved, only that we should progress towards achieving that vision, which inherently permits flexibility to adjust course as necessary if the circumstances change significantly.
- 1.22 The Transport Vision for the Proposed Development is therefore set as follows:
- a. The Proposed Development will be a world-class visitor attraction that will be among the industry-leaders for sustainable and integrated transport and which will deliver a step-change in local connectivity and environmental quality that offers a high-quality, reliable, safe and accessible transport network.
- 1.23 To make the Vision a reality, the aim will be to encourage the majority of people travelling to and from the Proposed Development to do so sustainably. The Vision therefore focuses on a set split between travel modes used by people accessing the Proposed Development, building on the excellent accessibility of the Site and the mutually beneficial opportunities that the Proposed Development and planned transport infrastructure improvements within the area around the Site represent.
- 1.24 The Transport Vision is to be implemented through a Transport Strategy that promotes the delivery of a range of transport modes and services, that are easy to use, convenient and attractive being fully integrated within the Proposed Development's layout, so that visitors have a real choice between modes, including the use of realistic sustainable means of travel over the use of low occupancy private car.
- 1.25 Once operational, and to check the Vision is coming forward in the manner anticipated, a Monitor and Manage Plan will be put in place, with regular monitoring of peak period traffic. In the event that the peak period vehicle demand is not in line with the Vision, steps will be taken to address this.

Collaborative Working

- 1.26 The UDX team is working collaboratively with a number of key stakeholders and government agencies to ensure that the transport infrastructure necessary for the Proposed Development can be delivered. United Kingdom Central Government, Department for Transport (DfT), National Highways (NH), Network Rail (NR), Bedford Borough Council (Bedford BC), Central Bedfordshire Council (CBC), Milton Keynes Council, Local Community, and Neighbours/Local Residents, are all stakeholders that are effectively partners in supporting the delivery of the Proposed Development, and all have a role to play in making sure that the right transport infrastructure is in place at the right time so that the Proposed Development can become a reality.

A Catalyst for Further Growth

- 1.27 The Proposed Development represents a significant investment within the Oxford to Cambridge Arc, which will deliver a step change in infrastructure locally (Full Wixams Station, new local transport hubs, new road infrastructure across the Marston Vale and across the MVL, new access onto the trunk road network) as well as supporting more regional strategic infrastructure projects by creating a new focus for activity. The Proposed Development has the ability to deliver a key new nucleus of investment connected and complementary to other existing and future centres of excellence (Cambridge Biomedical Campus, motor racing hub around Milton Keynes) therefore creating the conditions for a multiplying effect for investment. It creates another reason for the Oxford to Cambridge Arc to be a world leading location for investment.
- 1.28 As such the Proposed Development is considered a catalyst for further investment in a key economic region in the UK, cementing its place as a world-wide destination.

This Transport Assessment

- 1.29 This Transport Assessment has been prepared in order to support the Proposed Development through the planning process. Using the Proposed Development as described in **Chapter 2: Description of the Proposed Development (Volume 1)** of the ES, it sets out the considerations made in defining an interpretation of the Proposed Development and its operation in order to undertake a cautious worst case assessment, with the aim to quantify the transport implications of the Proposed Development, including its impacts on the operation of the local and strategic road network in its vicinity in a robust manner. Ultimately, the traffic impact of the Proposed Development is controlled by the Monitor and Manage Plan, ensuring that once operational the impacts of the Proposed Development will remain within the envelop of the cautious worst case assessed in this report.
- 1.30 The Transport Assessment has been prepared in line with relevant guidance and policies applicable to the Proposed Development. A review of the planning policy context for the Proposed Development is provided in **Annex 1**.
- 1.31 Following this introductory section, the remainder of this report is structured as follows:
- a. Section 2: The Opportunity
 - b. Section 3: Existing Transport Conditions
 - c. Section 4: Proposed Development and Basis for a Cautious Worst Case
 - d. Section 5: Transport Vision
 - e. Section 6: Assessment Tools and Scenarios
 - f. Section 7: The Trip Forecast
 - g. Section 8: Traffic Analysis – Construction Scenarios
 - h. Section 9: Traffic Analysis – Primary Opening Year Scenarios

- i. Section 10: Traffic Analysis – Future Year Scenarios
- j. Section 11: Proposed Access Junctions
- k. Section 12: Rail Network Implications
- l. Section 13: Summary and Conclusions.

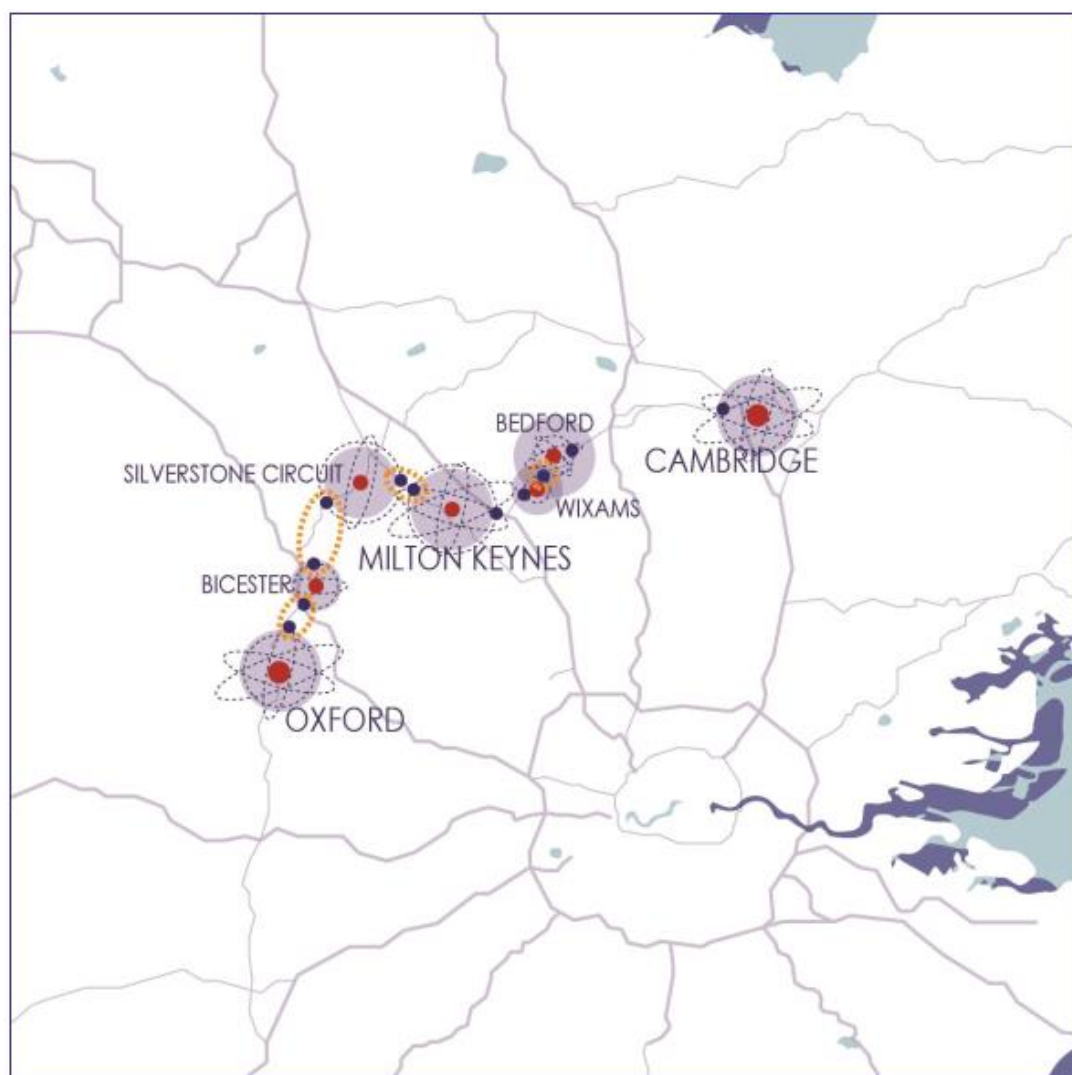
2 The Opportunity

- 2.1 The Site has been identified by UDX as a suitable location for delivering a new ERC due to its excellent location and accessibility. This section of the report sets out the opportunity that the Site represents as context for the assessment of the transport implications of the Proposed Development.

International

- 2.2 The Proposed Development is to attract visitors from all around the world and therefore requires excellent international transport connections. The Site benefits from close proximity to strategic road and rail links, with the potential to connect it to key airports and gateways in the UK, including the Eurostar terminal at London St Pancras and the Euro Tunnel terminal in Folkestone.
- 2.3 The Proposed Development will form an additional nucleus of activity within the Oxford and Cambridge Arc, connected and complementary to existing and future centres of excellence such as the Cambridge Biomedical Campus or the motor racing hub around Milton Keynes. As such it is considered a catalyst for further investment within the Arc, cementing the Arc as a world-wide destination for investment.

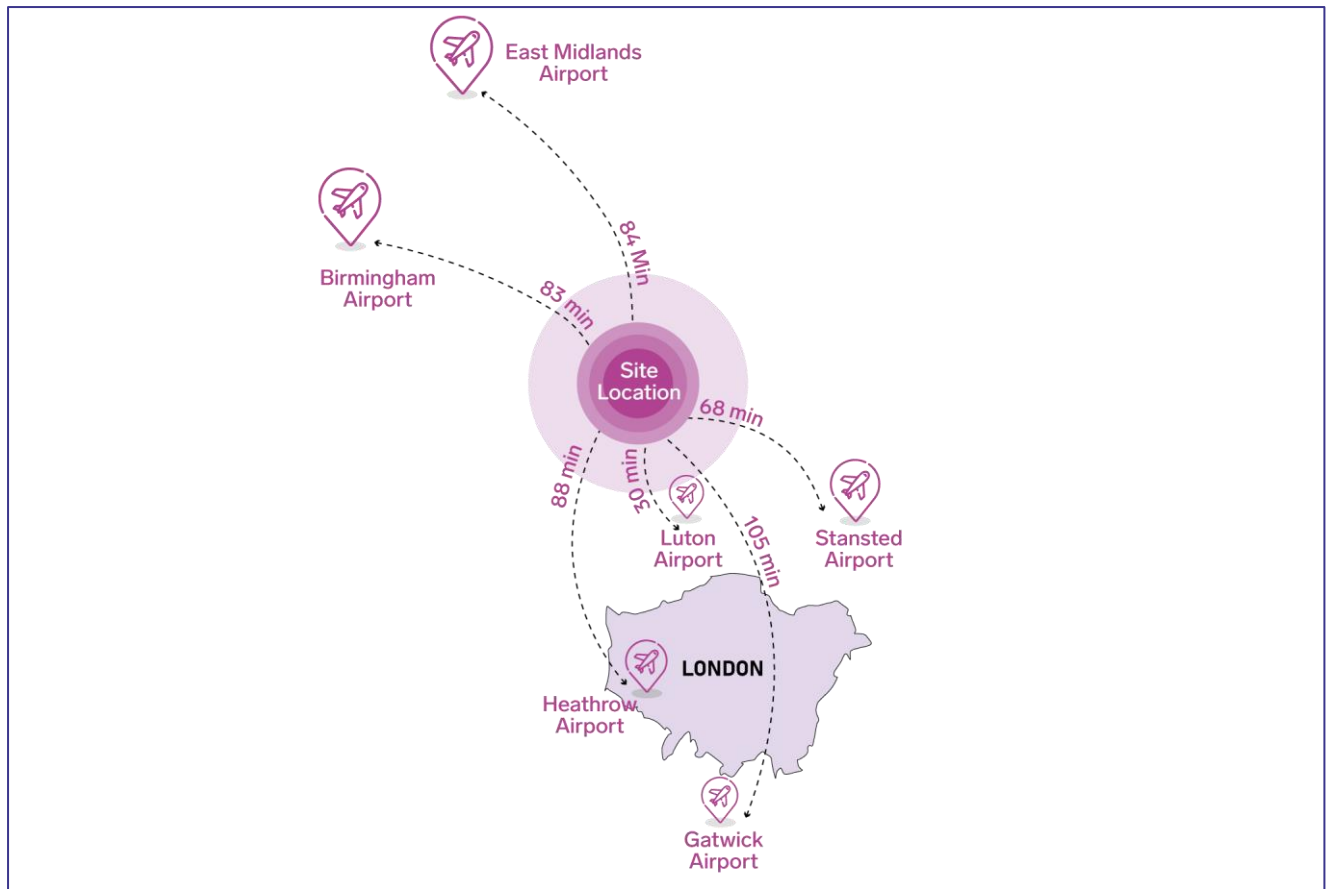
Figure 2-1: An Additional Nucleus of Activity in the Oxford and Cambridge Arc



Connections to Major UK Airports

- 2.4 London has five major airports, all easily accessible via the SRN except for City Airport which is in London itself. London Luton Airport is a major short haul airport, with about 125 destinations throughout Europe, and is located about 25 miles away from the Site along the M1 corridor, roughly between London and the Site. This airport also benefits from a new mass transit system (DART) that connects it to the MMRL at Luton Airport Parkway station. The Site is well positioned in terms of access from the MMRL making rail access to London Luton Airport a key opportunity.
- 2.5 Gatwick Airport, serving 45m passengers per year, and destinations all around the world, also benefits from direct access to the MMRL with existing rail services having the potential to link the airport to the Site directly through London. Rail journey time from Gatwick Airport to Bedford is in the order of 1 hour and 45 minutes (two trains an hour). Heathrow Airport is London's biggest airport, connecting to destinations worldwide. It would be accessible to the Site by rail, using connecting services in London. Finally, Stansted Airport, serving 35m passengers per year, is approximately 52 miles away.
- 2.6 All London Airports have long-running plans for expansion that are at various stages of development. Although these further airport expansion plans benefit its accessibility, the Proposed Development does not rely on or is the trigger for any of these expansion plans.
- 2.7 The Site is also accessible from regional airports such as Birmingham Airport (via the M1/M6) and East Midlands Airport (near Derby) via the M1, offering alternative services to international destinations.
- 2.8 **Figure 2-2** illustrates the Site's location in relation to these major airports.

Figure 2-2: Connectivity by Air



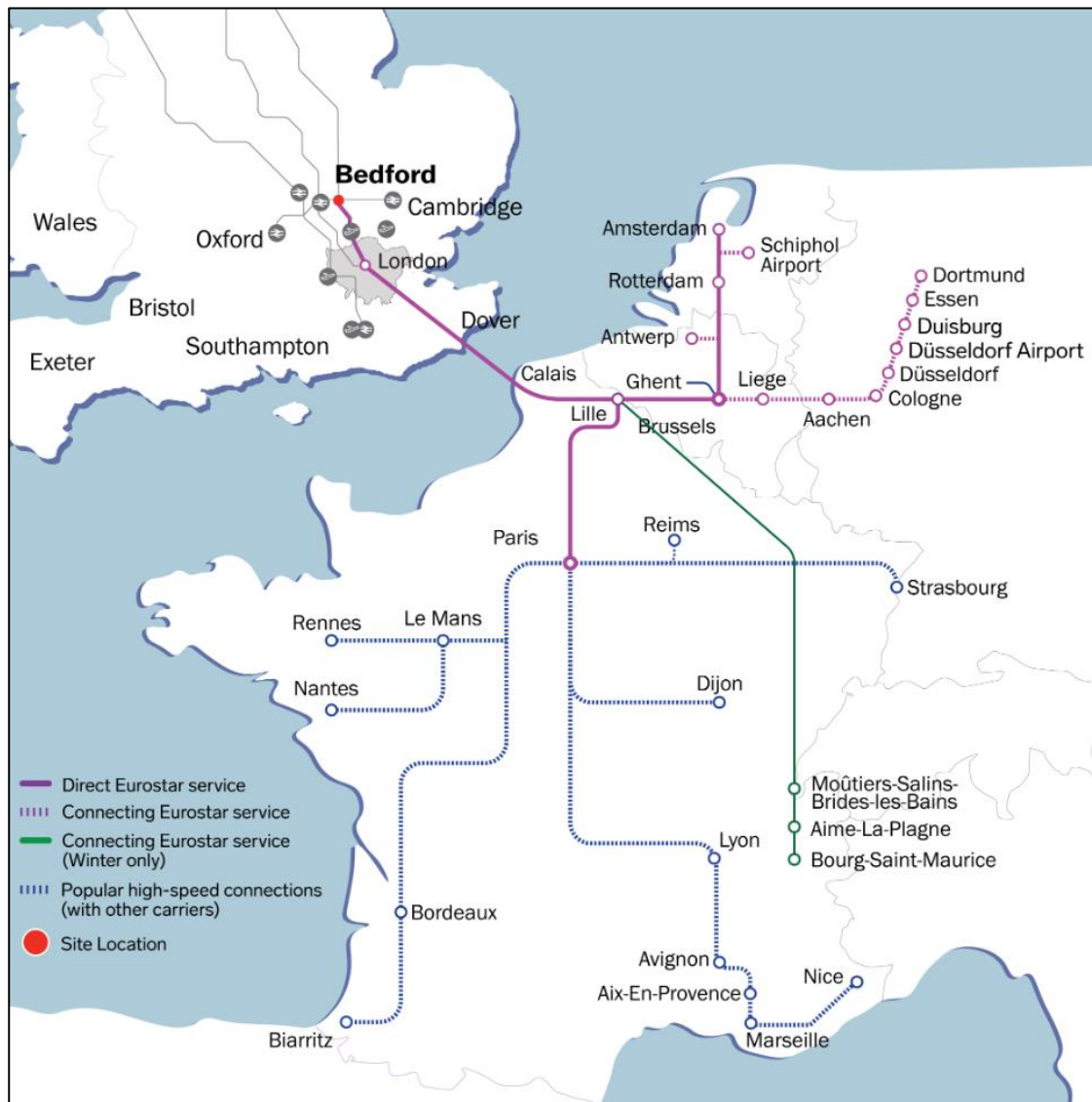
Connections to Eurostar

2.9 Eurostar provides high speed rail services to a number of European capitals and destinations, linking with Europe's main high speed rail networks (in France, Germany, and the Netherlands). Eurostar's London terminal is London St Pancras, which is also the London terminal for the MMRL, locating the Site ideally for connections via Eurostar to Europe. Eurostar provides a direct connection to key international destinations including (all to London):

- a. Paris – France – 2 hrs 15 mins
- b. Brussels – Belgium – 2 hrs
- c. Amsterdam – Netherlands – 4 hrs.

2.10 **Figure 2-3** illustrates the Eurostar routes from London St Pancras.

Figure 2-3: Connectivity by Rail to Mainland Europe



(source: [Eurostar.com: Book Europe train tickets and holidays](https://www.eurostar.com))

National and Regional

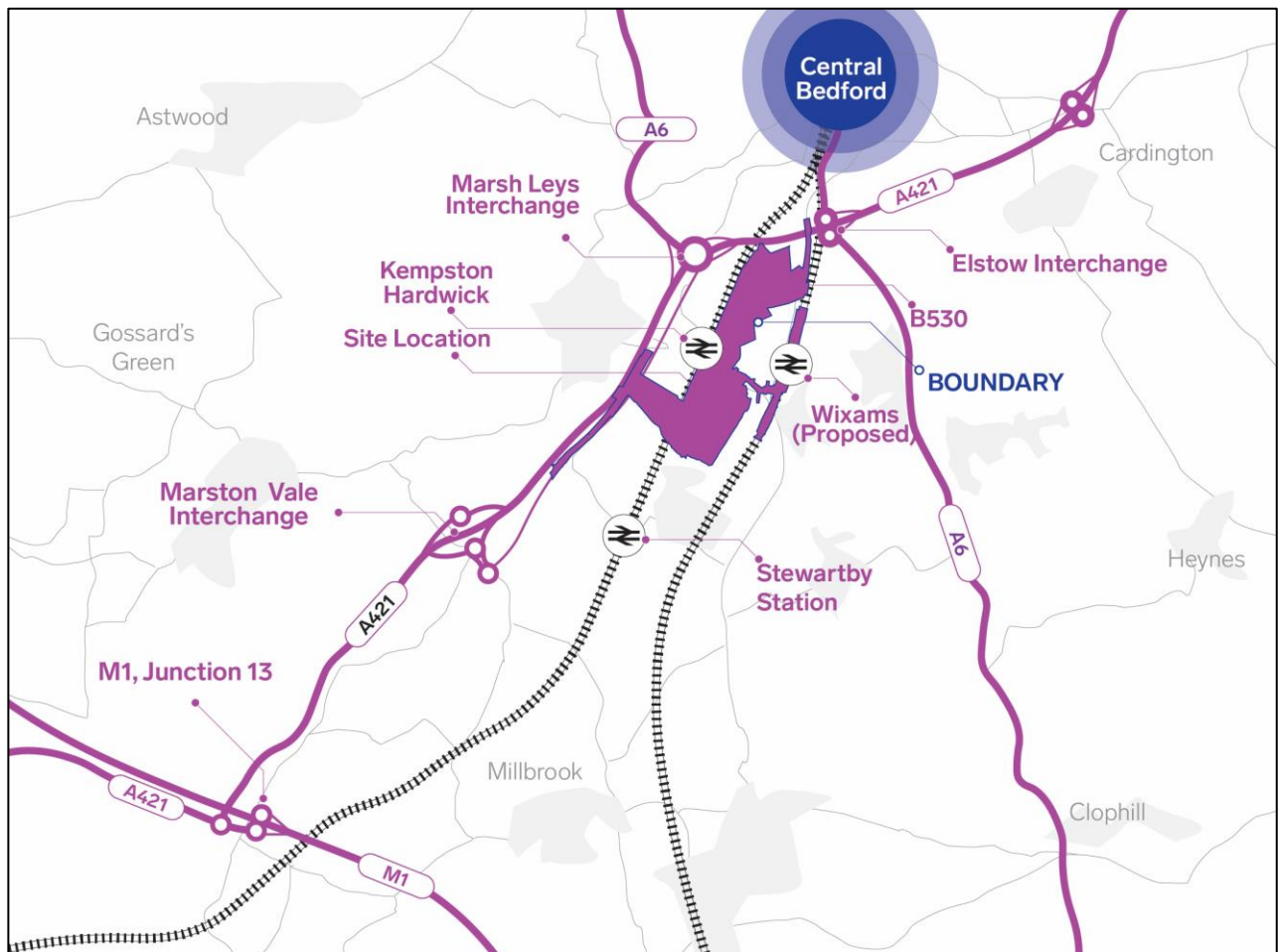
Location in Relation to National Road and Rail Links

- 2.11 The Site benefits from excellent accessibility by rail and road, in a central location on both networks to establish connections with the whole of the UK:
- The MVL between Bletchley (near Milton Keynes) and Bedford runs through the Site. Kempston Hardwick Station, on this line, is located between the Lake Zone and the Core Zone.
 - The MMRL runs about 1km to the east of the Site.

- c. The A421 is a dual carriageway road with grade separated junctions and runs in close proximity to the north and west of the Site, accessed locally via the A421/A6 Elstow Interchange, the A421/A428 Marsh Leys Interchange, and slightly further afield the Marston Moretaine Interchange. The A421 forms part of the SRN and provides strategic connection to the M1 at J13 to the southwest and to the A1 corridor at the Black Cat junction to the northeast.

2.12 **Figure 2-4** illustrates the Site in its local context.

Figure 2-4: Local Context



Location in Relation to UK's Main Population Centres

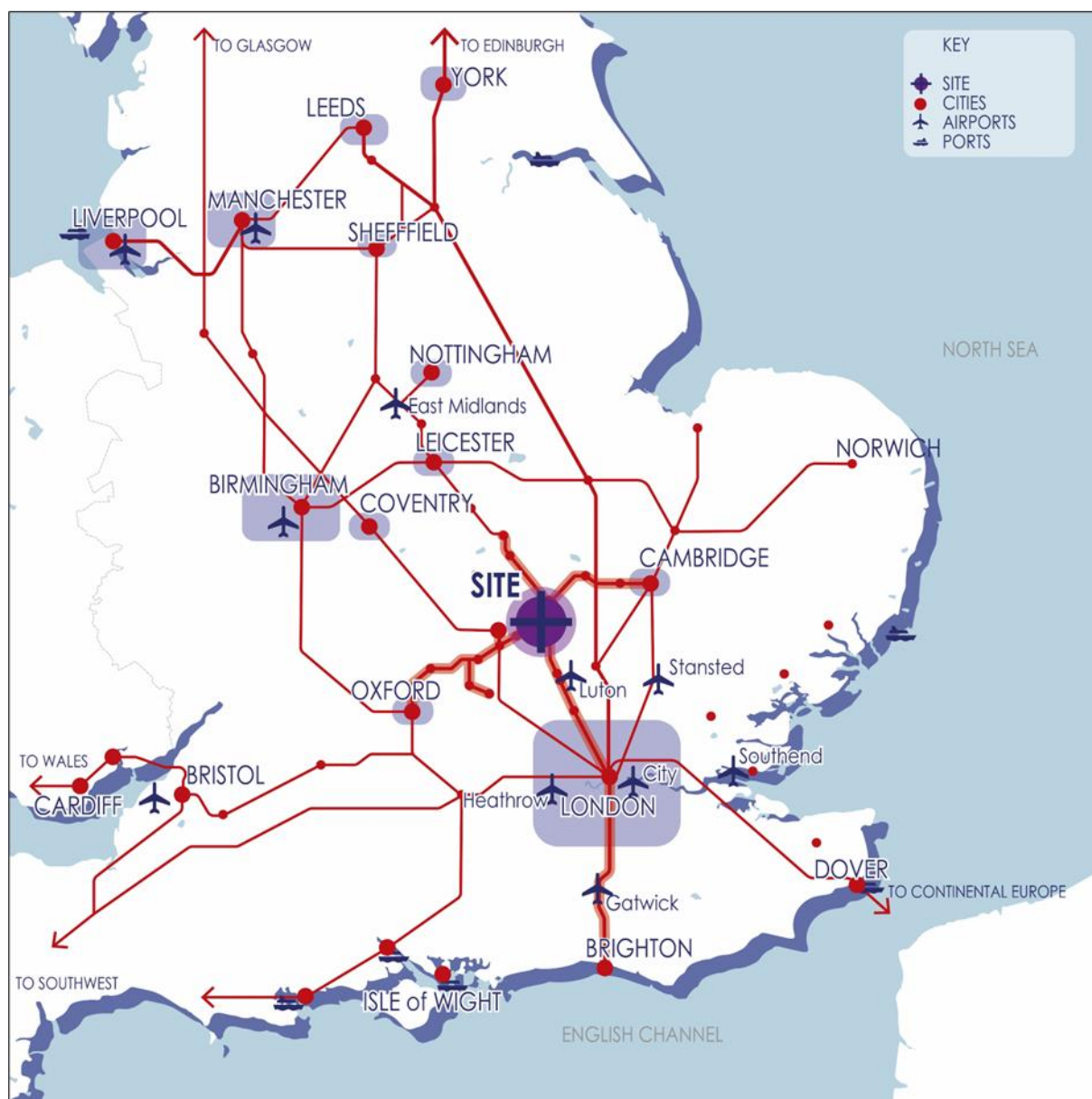
2.13 The Site is in an excellent location for access from the high population areas of the UK. The high population density areas in the UK are in the southeast of England, including London, and in the northwest of England, notably in the Liverpool, Manchester and Sheffield belt. Within Scotland, the majority of the population spreads from Glasgow in the west, to Edinburgh in the east known as the Central Belt. There is strategic transport infrastructure already in place connecting the Site to these locations:

- a. The Site is in a central position within the UK's motorway network, with 31 million people within a 2-hour journey from the Site and 50 million within a 3-hour journey.

- b. The MMRL provides a rail connection from London to the north up to Derby where it meets the Cross Country Line running further north to Leeds.
- c. The West Coast Main Line can be accessed from Bletchley and Milton Keynes via the MVL connecting to Birmingham, Liverpool, Carlisle and then on to Scotland.
- d. The A421 is the key strategic route providing access to the Site. It runs from the M1 J13 to the A1 at the Black Cat junction.
- e. The M1 J13 is a central node within the SRN. The M1 runs from London to Leeds in the north through the centre of England. It links up with a number of orbital motorways connecting to Manchester and Liverpool.
- f. The A1 is a trunk road running north, to the east of England and providing a connection to Newcastle, with onward connections to Scotland.
- g. Both the M1 and A1 link to the M25 orbital motorway around London from which all population centres in southern England can be accessed.

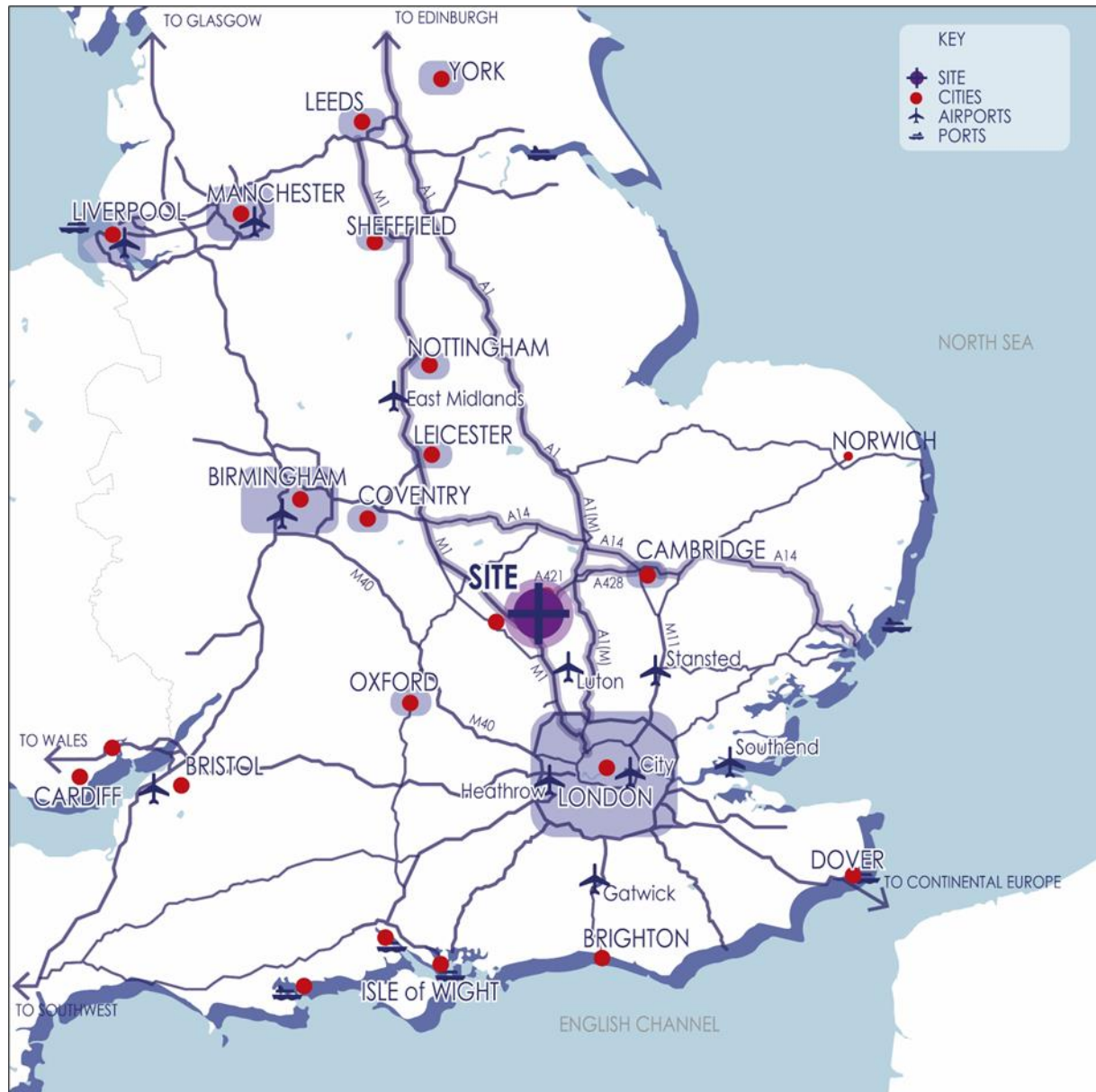
2.14 The Site's connectivity by rail to all major population centres in the UK is illustrated in **Figure 2-5**.

Figure 2-5: National Site Context Plan – Rail



2.15 Figure 2-6 illustrates the Site's connectivity by road.

Figure 2-6: National Site Context Plan – Road



EWR Proposals

2.16 EWR is a nationally significant railway project which would deliver a rail connection between Oxford and Cambridge.

2.17 To deliver this, the following stages of the project have been identified:

- a. Upgrade of existing railway infrastructure between Oxford and Bicester - This was delivered in 2016.
- b. Upgrade and re-entry into service of the Varsity Line between Bicester and Bletchley – Construction work is underway with the goal of introducing two new Oxford to Milton Keynes (via Bletchley) services per hour during 2025.

- c. Upgrade of the MVL between Bletchley and Bedford – Upgrade of this line, which currently supports one 2-car train service per hour, is anticipated in two phases:
 - i. Putting into service a new Oxford to Bedford (via Bletchley) service by the end of the 2020s.
 - ii. EWR Co is developing proposals for the further upgrade of this line to support additional services, including some connecting Oxford, Bedford and Cambridge directly. These services are not anticipated to be entered into service until the mid-2030s and as yet are not consented.
- d. Construction of new railway infrastructure between Bedford and Cambridge - EWR Co is developing its proposals for this infrastructure with the aim of gaining necessary planning consents and enabling services from the mid-2030s.

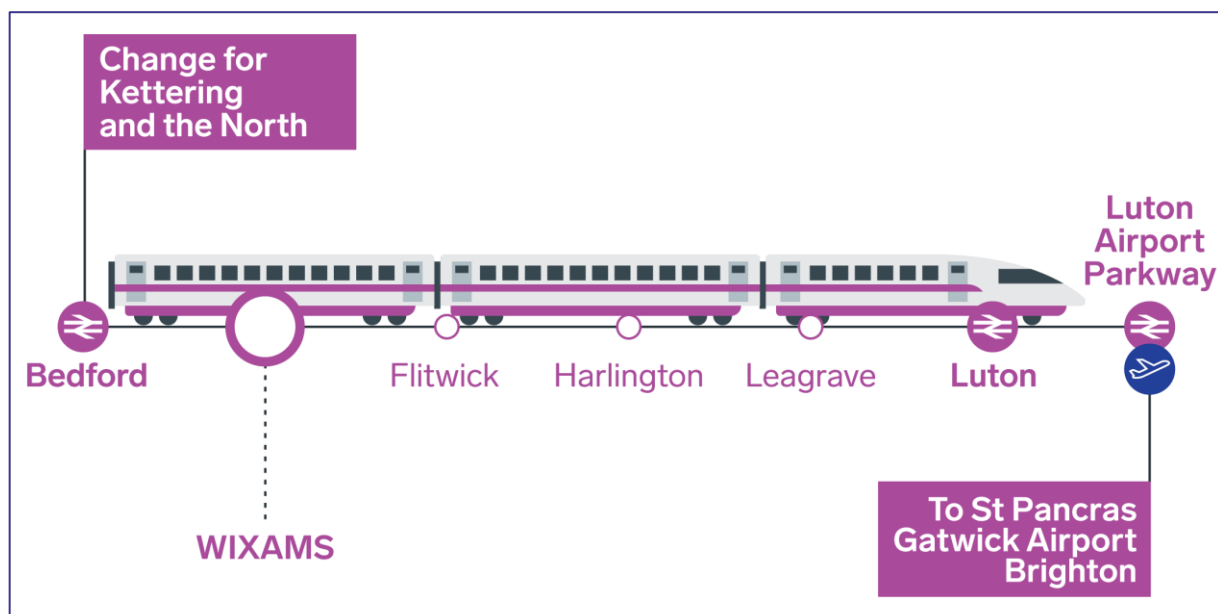
2.18 At this stage, EWR is committed between Oxford and Milton Keynes. Any future phases of the EWR project are not. The Proposed Development does not rely on the delivery of future phases of the EWR project but does not prejudice these future phases of the EWR project. The Proposed Development safeguards land for a potential future EWR station on the Site.

Wixams Station

- 2.19 Wixams East Station is part of the original masterplan for the Wixams garden village, which has been under construction since 2007.
- 2.20 Wixams East Station received reserved matters approval from Bedford BC in March 2024 under planning application reference 23/02136/M73.
- 2.21 The station is situated on the MMRL between Bedford Station and Flitwick Station and, appropriately designed, has the potential to open up the Site to local and national rail services on the MMRL.

Figure 2.7 illustrates the location of the Wixams East Station on the MMRL.

Figure 2-7: Wixams Rail Network Plan



- 2.22 At this stage, the Bedford BC scheme expects that Wixams East Station will be served by up to four Thameslink trains per hour in each direction, likely to be the trains operating between Bedford and Brighton via London, stopping at many local stations en-route. The current approved railway station will provide two platforms both with seating and shelters, a station building with toilets, waiting rooms and café, parking for all vehicle types and cycles, passenger drop-off/pick-up areas, bus stops and taxi ranks and ticket machines and real-time information boards.
- 2.23 A plan showing the layout of the approved railway station is presented at **Figure 2-8**.

Figure 2-8: Proposed Wixams East Railway Station Layout



- 2.24 Having only two platforms, the current design cannot allow for continuous operation. Maintenance of the MMRL involves shutting down two lines at a time, which will mean that when the two lines serving the two platforms are closed for maintenance purposes no trains can stop at Wixams.

Summary

2.25 In summary, the Site benefits from excellent accessibility:

- a. It is within easy reach of most international London airports as well as regional airports in Birmingham and East Midlands Airport. It also has the potential to be well connected with the Eurostar services with a connection at London St Pancras opening up the Site to rail links with Europe.
- b. It is a key location within the rail network. A suitably designed Wixams Station creates opportunities, to serve the Proposed Development and deliver direct access to the railway network capturing major radial rail routes in and out of London. There is the potential to deliver easy rail access from most large population centres in the UK.
- c. The Site is proximate to the Strategic Road network, and when connected to it will give access to all main population centres in the UK. This opportunity can be captured by the delivery of appropriate road access from the Site to the SRN.
- d. The Site is in a central position within the UK's railway and motorway network, with 31 million people within a 2-hour journey from the Site and 50 million within a 3-hour journey.

2.26 The Site is ideally placed in the UK from a transport perspective to serve the largest possible number of people in the most convenient and sustainable way.

3 Existing Transport Conditions

Site Location

- 3.1 The Site is located in a strategic location to the south of Bedford. **Document Reference 1.06.0** illustrates the Site's location.

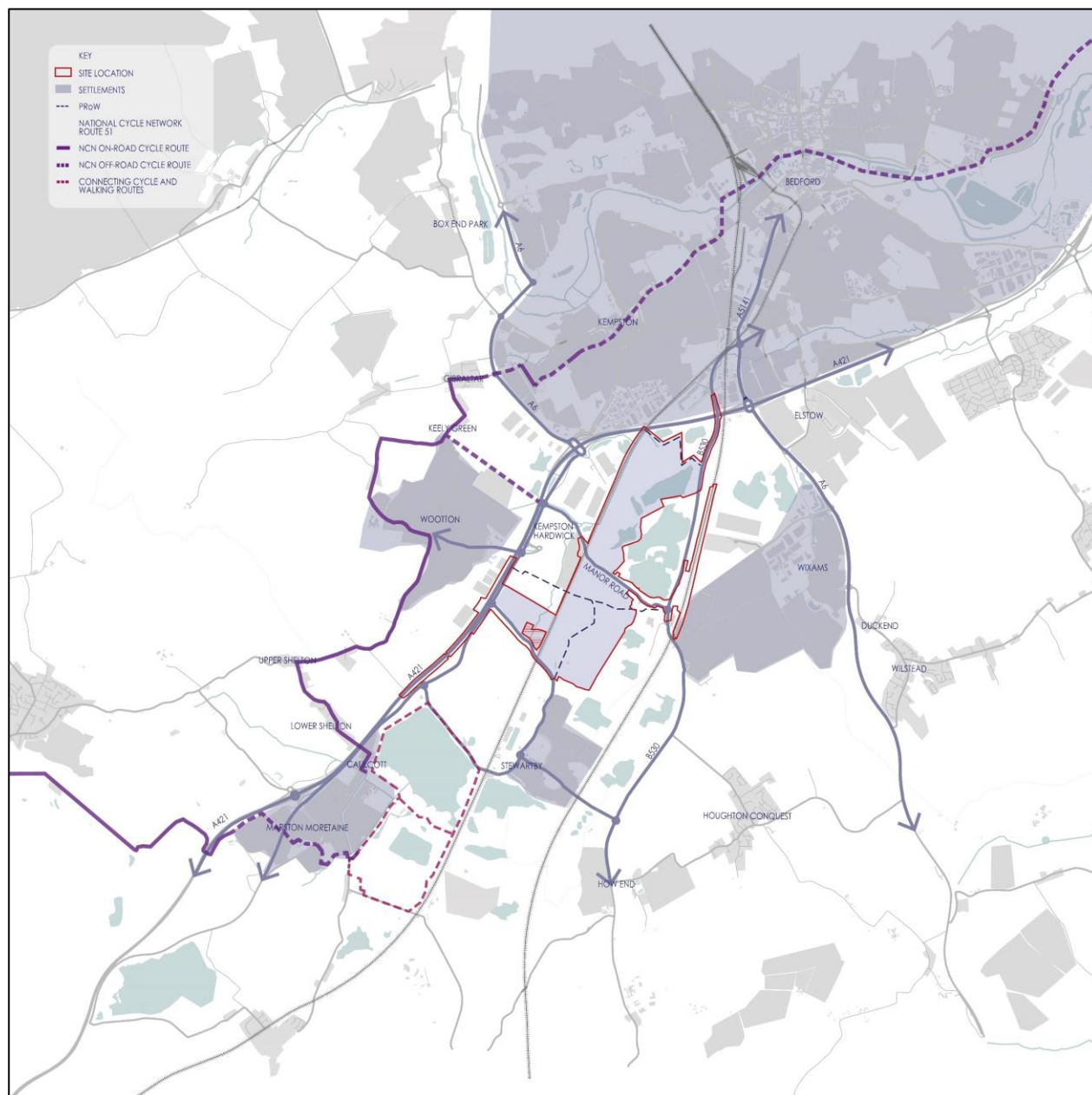
Pedestrian and Cycle Accessibility

- 3.2 The Site forms part of a former brickworks that used to stretch the length of the Marston Vale, together with some agricultural fields and the Wixams Rail Station development site. The general environment in and around the Site is a mix of open brownfield land, some agricultural land, a few residential properties, mixed with some smaller industrial uses. Provisions for pedestrians in and around the Site are limited and lack continuity, reflecting the use of the land in 'pockets' of development and land uses.
- 3.3 Manor Road provides an east-west corridor across the northern parts of the Site, but is not provided with continuous facilities for pedestrians, with only intermittent footways on the side of the carriageway in a few locations along its length. At the western end of Manor Road, towards the junction with the C94 Woburn Road, there is a footway/cycleway provided on the northern side of the road segregated from the carriageway. This facility stops however about 135m to the west of the level crossing across the MVL. This facility links to an informal crossing of the C94 Woburn Road connecting to a bridleway bridge over the dualled A421 into Wootton (Bridleway 23). There are no pedestrian or cycle facilities on the approach to Kempston Hardwick Station, located adjacent to the level crossing on Manor Road. On the eastern side of the railway, there is a short section of footway along the frontage of residential properties on Manor Road. Another short section of footway is then provided at the eastern end of Manor Road from the junction with the B530 over about 200m.
- 3.4 A drawing of the existing active travel routes across the Site is provided in **Annex 2**.
- 3.5 Pedestrians are well catered for along the B530 going south from Manor Road, with a wide footway present on at least one side of the road through to the crossing under the MMRL, and crossing points marked by tactile paving.
- 3.6 Broadmead Road runs along the southern boundary of the Site and does not provide any pedestrian facilities for most of its length, until it reaches the built-up area of the village of Stewartby. Then pedestrian facilities are provided along Broadmead Road connecting with the village's network of residential streets. Stewartby is well provided for in terms of pedestrian facilities. The network of residential roads throughout the village provides connection to permissive cycling and walking routes and Public Rights of Way (PRoWs) south of Stewartby, across the Marston Vale Millennium Country Park.
- 3.7 There are three PRoW footpaths crossing the Site:
- a. PRoW 1 links up the eastern end of Manor Road to the C94 Woburn Road just south of the CP Farm site. This PRoW crosses the MVL at a footpath level crossing near the centre of the Site (Wootton Village level crossing).

- b. PRow 2 runs in a north-south direction between PRow 1 and Broadmead Farm, linking back to Broadmead Road.
- c. PRow A1/8 runs along the northern boundary of the Site connecting the B530 Ampthill Road to the Woburn Road Industrial Park, under the A421 and across the MVL.

- 3.8 Parts of Bedford and the villages of Stewartby, Wixams and Wootton are all within a reasonable able bodied walking distance of the Site.
- 3.9 There is a network of traffic free cycle routes through the Marston Vale Millennium Park, south of Stewartby, which provides a connection to the National Cycle Route (NCR) 51 at Marston Moretaine. The NCR 51 also runs through Wootton, about 2km as the crow flies from the western boundary of the Site.
- 3.10 There are a number of settlements and residential areas within a reasonable cycling distance of the Proposed Development, including Wootton, Marston Moretaine, Stewartby, Houghton Conquest, Wixams. Ampthill and Bedford.
- 3.11 **Figure 3-1** provides a summary of the Site's current and local facilities for walking and cycling.

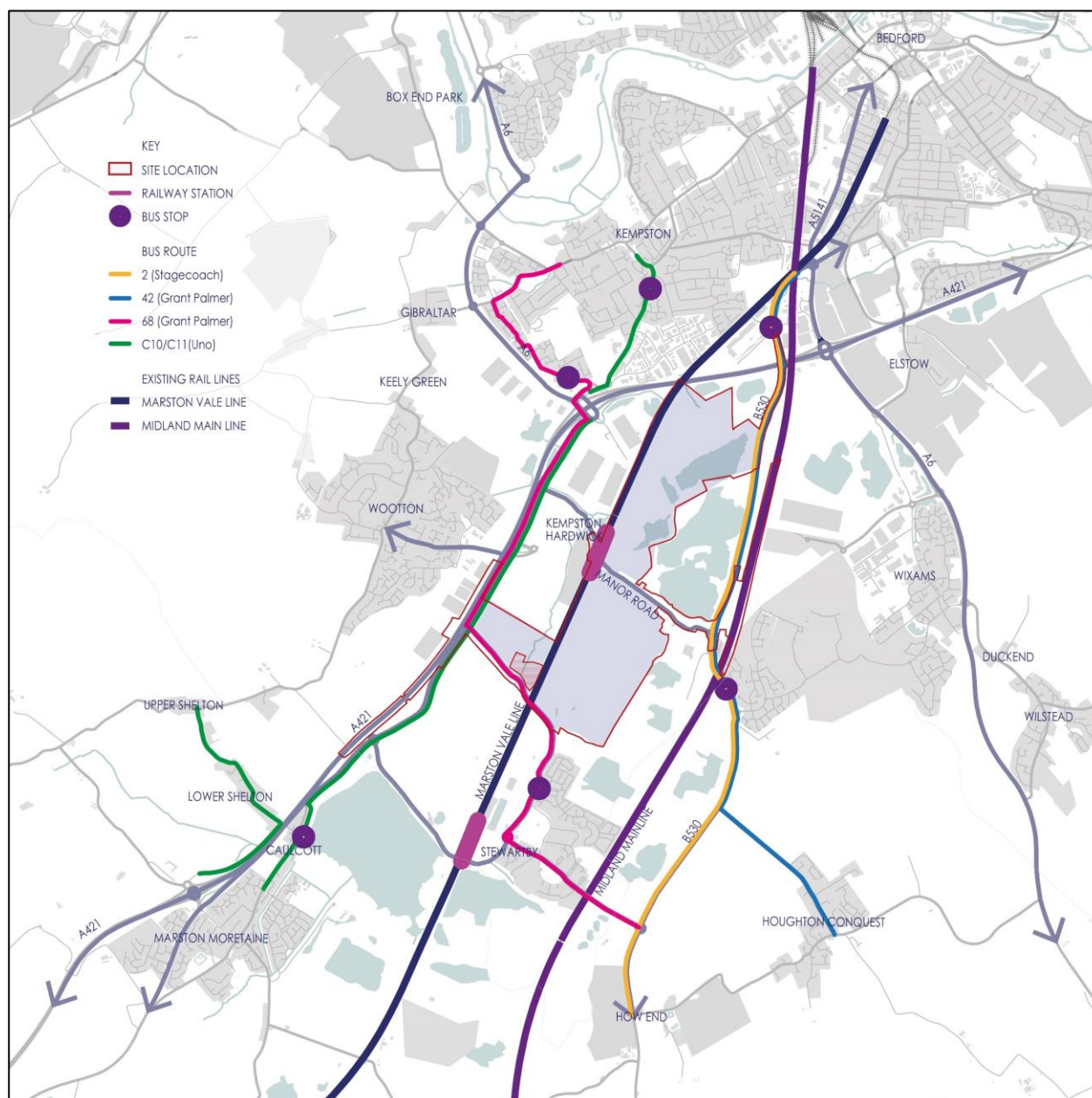
Figure 3-1: Accessibility by Walking and Cycling



Public Transport Services

- 3.12 A plan indicating the locations of existing and committed public transport infrastructure and services is shown as **Figure 3-2**.

Figure 3-2: Existing and Committed Public Transport Plan



Bus Services

3.13 The bus services currently running within the Site and its vicinity are detailed in **Table 3-1**.

Table 3-1: Current Bus Service in the Vicinity of the Site

Service	Operator	Route	Frequency
68	Grant Palmer	Bedford - C94 Woburn Road - Broadmead Road -Stewartby Way - B530 south to Ampthill.	Hourly Monday to Saturday No service on Sunday
42	Grant Palmer	Bedford - B530 - Houghton Conquest - Ampthill – Flitwick – Toddington (Dunstable)	Hourly Monday to Saturday No service on Sunday
2	Stagecoach	Bedford – B530 - Flitwick	Hourly Monday to Saturday Hourly on Sunday (Bedford to Interchange Retail Park)
C10/C11	Uno	Bedford – C94 – Cranfield – Milton Keynes	Hourly Monday to Friday 2 hourly Saturday and Sunday

Rail Services

- 3.14 Kempston Hardwick Station is located on the western edge of the Site and is served by an hourly service that runs between Bedford and Bletchley on the MVL. Stewartby Station is also located on the MVL about 2km south of the Site, served by the same hourly services as Kempston Hardwick. The nearest main station serving the Site is Bedford Station on the MMRL, about 5km north of the Site.

Highway Network

Local Road Network

- 3.15 The Site benefits from frontage onto the C94 Woburn Road to the west, Broadmead Road to the south and the B530 Ampthill Road to the northeast. It is also bisected by Manor Road roughly in the middle, which creates further vehicular access opportunity into the Site.
- 3.16 The C94 Woburn Road to the west and B530 to the east form the two key north-south routes along the Marston Vale, either side of the MVL. The C94 Woburn Road is the 'old' A421 trunk road running between Bedford and the M1 J13. A new dualled A421 was delivered in the early 2010's, with grade separated junctions connecting back to the C94 Woburn Road at Marston Moretaine to the south-west of the Site and Marsh Leys (A421/A428) to the north-west. In the vicinity of the Site, the C94 Woburn Road is a single carriageway road, generally wide (around 10m wide), straight and is subject to a 50mph speed limit south of Broadmead Road and national speed limit north of it. It connects with Green Lane (linking to Stewartby), Broadmead Road (linking to Stewartby) and Manor Road. It also connects with Fields Road at two roundabouts, with Fields Road running on a bridge over the A421 into Wootton.
- 3.17 The B530 runs from Bedford to M1 J12 via Ampthill and Flitwick. In the vicinity of the Site, it is a single carriageway road and is subject to the national speed limit. It runs on a bridge over the A421 as it enters Bedford through Interchange Retail Park. It then connects with the A5141 that links the A421/A6 Elstow Interchange to the south with Bedford town centre to the north. Further south, the B530 connects with Manor Road then provides access to the BCA Bedford site before running under the MMRL to connect with the western access road into the Wixams development.

- 3.18 Broadmead Road forms part of the southern boundary of the Site linking with Green Lane to the south via a double roundabout. The section of Broadmead Road that borders the south of the Site is a single carriageway and is subject to 60mph restriction as it extends north then west across a level crossing across the MVL before connecting with the C94 Woburn Road.
- 3.19 Manor Road bisects the centre of the Site linking with the C94 Woburn Road to the west and with the B530 Ampthill Road to the east. The section of Manor Road that is within the Site is a single carriageway 30mph road until west of the level crossing where it becomes 60mph. East of Kempston Hardwick, Manor Road remains single carriageway and subject to 60mph restriction as it extends east.

Strategic Road Network

- 3.20 The A421 is the main strategic road in the immediate vicinity of the Site and is a 2-lane dual carriageway road with grade separated junctions. It links the Site to the M1 corridor to the southwest at M1 J13, and to the A1 corridor to the northeast at Black Cat junction. The A421 can currently be accessed from the Site to the north via the C94 at the A421/A428 Marsh Leys Interchange and to the south at the A421 Marston Moretaine Interchange. The A421 can also be joined from the A421/A6 Elstow Interchange, via the B530, running north into the southern outskirts of Bedford before linking the A5141 to the Elstow Interchange.
- 3.21 The M1 runs to the southwest of the Site and is a major motorway corridor linking London (and the M25) to the north of the UK, to Leeds, via Leicester, Nottingham, Sheffield, branching out to routes to Birmingham. The A1 is another trunk road corridor running to the northeast of the Site area. It forms an alternative strategic route to the north of the country from London (and the M25) serving Peterborough, Leeds and Newcastle-upon-Tyne.
- 3.22 There is currently a DfT funded scheme on-site in the east, upgrading the A421/A1 interchange, and providing the 'missing link' dual carriageway to Cambridge and beyond (A428 Black Cat to Caxton Gibbet). This is due to complete in 2027.

Traffic Flows

- 3.23 Baseline traffic flows have been obtained for the local highway network using Automatic Traffic Counters (ATC) placed at 23 locations between March 7, 2023 and March 16, 2023. Webtris data has also been used in this assessment for the SRN. This information is available on request. This information also forms the basis of the traffic modelling work used for the purpose of this Transport Assessment.
- 3.24 **Table 3-2** provides average weekday 24h traffic flows as well as traffic levels observed in the traditional 08.00-09.00 AM peak and 17.00-18.00 PM peak hours on the key links in the immediate vicinity of the Site.

Table 3-2: 2023 Observed Weekday Traffic Flows on Local Roads (Veh)

Link	AM Peak	PM Peak	24h
Manor Rd N/WB	166	202	2,418
Manor Rd S/EB	208	208	2,388
B530 Ampthill Rd N/WB	456	459	5,160
B530 Ampthill Rd S/EB	318	458	5,370
Broadmead Rd N/WB	225	170	1,872
Broadmead Rd S/EB	187	181	1,903
C94 Woburn Rd N/WB	798	499	8,049
C94 Woburn Rd S/EB	699	797	7,995
A421 N/WB	2,080	2,855	29,096
A421 S/EB	2,503	2,171	29,397

Collision Statistics

- 3.25 Personal Injury Collision (PIC) data has been reviewed for the local road network around the Proposed Development using records obtained from Bedford BC and Central Bedfordshire Council (CBC), covering the five-year period (60 months) between September 27th 2018 and September 26th 2023. The details of the review are provided in **Annex 3**.
- 3.26 The PIC data obtained from Bedford BC and CBC (Crashmap) revealed that there has been a total of 176 collisions that occurred in clusters at 9 locations, and including: 156 slight injury collisions, 19 serious injury collisions and one collision resulting in a fatality.
- 3.27 Across these 9 locations of interest, the records do not point to any obvious highway safety concerns within the local highway network around the Site which would be exacerbated by the Proposed Development.

Summary

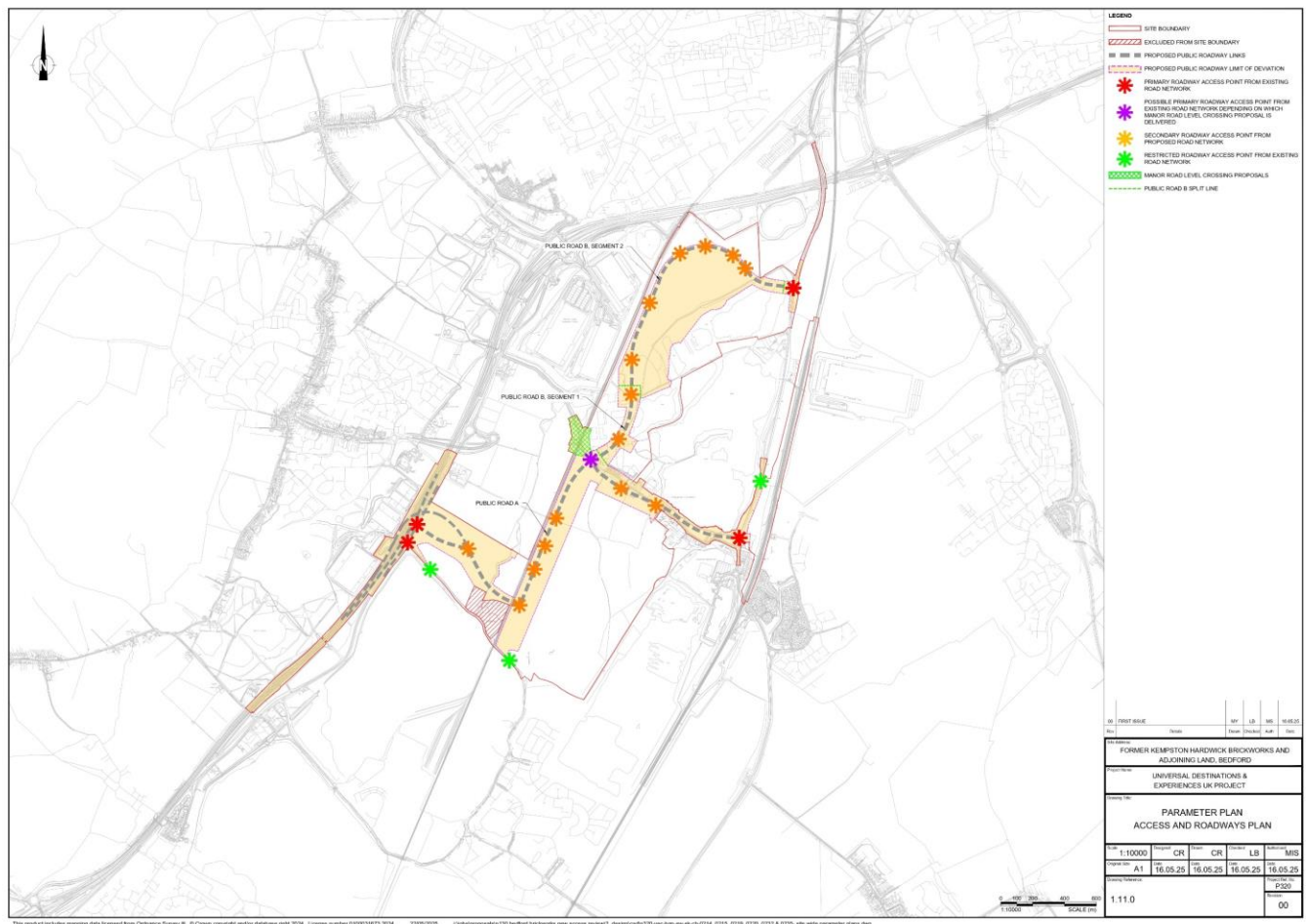
- 3.28 The local infrastructure available for active travel reflects the current nature of the Site. There is some walking and cycling infrastructure available in and around the Site area, but there is a lack of a coherent network through the Site. Similarly, the existing bus network around the Site focuses on connecting existing small settlements to Bedford.
- 3.29 However, the Site is located within walking and cycling distance of all adjacent settlements (Bedford, Wootton, Stewartby and Wixams). It is well located in terms of rail access, with Kempston Hardwick Station on the MVL located along the western boundary of the Core Zone.
- 3.30 The road network in and around the Site provides a number of north-south and east-west links linking to the A421 and the SRN, with the A421/A428 Marsh Leys Interchange and the A421/A6 Elstow Interchange the main current gateways available to the Site. The A421 connects with the M1 at J13 and the A1 at Black Cat junction.

4 Proposed Development and Basis for a Cautious Worst Case

Proposed Development

- 4.1 UDX is proposing to build a new world class ERC. This would form the first Universal ERC in Europe and is to be conceived as a destination of international as well as national importance. The Proposed Development would represent a significant opportunity for the UK attracting visitors from around the world and in particular from Europe, boosting the UK's tourism industry. The Proposed Development would be of such a scale that it would create a step change in the local economy as well as the local transport infrastructure.
- 4.2 The Site for the Proposed Development comprises the land shown within the Site presented in **Image 1-2 (in Chapter 1)** and described in **Chapter 1: Introduction and Site Description (Volume 1)**. The Site is divided into four main zones referred to as the Core Zone, Lake Zone, West Gateway Zone, and East Gateway Zone as shown in **Image 1-1 in Chapter 1**, and which have been used in this Environmental Statement (ES).
- 4.3 The Description of Development by Land Use (**Appendix 2.4: Description of Development by Land Use (Volume 3)**) sets out in detail the variety of uses and infrastructure that will be delivered as part of the Proposed Development.
- 4.4 The Theme Park will, along with a broad range of other uses, be located within the Core Zone. The West Gateway Zone and Lake Zone will also provide a flexible range of complementary mixed uses. The East and West Gateway zones provide for the Full Wixams Railway Station and safeguarded land for a new East West Rail Station respectively, along with other uses and transportation hubs. **Figure 4-1** presents an access plan for the Proposed Development.

Figure 4-1: Parameter Access Plan



Key Considerations in Forming a Cautious Worst-Case

- 4.5 This section of the report details the key considerations in relation to forming a cautious worst case for the purpose of undertaking an assessment of the transport implications of the Proposed Development. As set out in **Chapter 2: Description of the Proposed Development (Volume 1)** of the ES, given the nature of the Proposed Development, flexibility is required in the consent to allow for the Site to evolve and expand over time. As such the Transport Assessment reflects development parameters rather than a fixed design. The basis of the cautious worst case for the purpose of the transport assessment presented in this report considers development aspects including land use mix and quantum and transport infrastructure that fall within the envelope of the development parameters.
- 4.6 The aim is for the ERC to open in 2031 (Primary Opening Year). However, this Transport Assessment also considers a long-term operation scenario of the entire Proposed Development (Future Year) of 2051.

Land Use

- 4.7 The assessment presented in this report considers a particular set of land use types, locations and quantum distributed across the Proposed Development, within the envelope of the development parameters. The distribution and quantum of land uses considered for the purpose of assessment do not tie the specific land use and its quantum to any specific part of the Proposed Development. This is the case as the Proposed Development delivers full permeability for trip making across the Site in all key directions to the strategic road network. As such, land uses proposed can be located anywhere within the Proposed Development and land uses are interchangeable across the Site.
- 4.8 The Transport Assessment has been based on a reasonable case in relation to how each facility proposed on Site comes forward and is delivered. It is likely and expected that delivery of individual aspects (hotels/retail) will be subject to the evolution of the project on the ground as the market demands. The approach taken in terms of transport and highways is to ensure that the maximum parameters assessed allow for the flexibility for individual aspects to come forward within the envelope of movements assessed on the transport network. As long as the envelope of movements assessed within the Transport Assessment from both a construction and operational perspective, which will be managed by the Monitor and Manage Plan, is not exceeded, then from a traffic assessment standpoint, the development can come forward in any order.
- 4.9 The distribution of land uses across the three main zones within the Proposed Development (Core Zone, Lake Zone and West Gateway Zone) forming the basis of the transport assessment is as follows:
- a. Core Zone:
 - i. Theme Park and Entertainment Resort Complex Support
 - ii. Entry Plaza
 - iii. Theme Park car park and coach park
 - iv. 'UDX' hotel including allocated car parking
 - v. Valet parking service area
 - vi. Transport hub
 - vii. Team Member car park.
 - b. Lake Zone:
 - i. Convention Centre with a gross external area (GEA) of 55,000sqm
 - ii. Business/Flagship hotels
 - iii. Hotels/accommodation directly related to the Theme Park ('UDX' hotels)
 - iv. Entertainment Resort Complex Support.

c. West Gateway Zone:

- i. Highway Service Area (16 pumps) with associated retail
- ii. Restaurants (up to 5,866sqm)
- iii. Budget hotel
- iv. Entertainment Resort Complex Support.

4.10 For clarity, the Theme Park comes accompanied by supporting uses (warehouses, workshops, offices) that could be located within the Core Zone but also on the Lake Zone and West Gateway Zone. These supporting uses do not generate additional trips in themselves. Trip making to from these supporting uses is included within the assessment as part of the Theme Park staff (TMs) trip generation and the Theme Park associated servicing trips. These supporting uses are part and parcel of the operation of the Theme Park.

4.11 In relation to the hotel facilities provision across the site, assumed for the purpose of the transport assessment, different types of hotels have been considered (Budget, Business/Flagship, and 'themed' 'UDX' hotels/accommodation for the sole use of visitors to the Theme Park). For clarity, the Transport Assessment refers to 'hotel' to encompass all accommodation types to be available to visitors. The following has been assumed as part of the assessment:

- a. 'UDX' hotels/accommodation – 3,370 bedrooms in the Lake Zone and 500 bedrooms in the Core Zone
- b. Business/Flagship hotels – 2,000 bedrooms in the Lake Zone – In all likelihood, a significant proportion of these bedrooms would be used by visitors to the park, but some would also be used by other customers. The assessment considers a split of 700 bedrooms associated to visitors and 1,300 bedrooms associated to other guests, related to the convention centre.
- c. Budget hotel – 200 bedrooms in the West Gateway Zone – In all likelihood, a significant proportion of these bedrooms would be used by visitors to the park, but some would also be used by other customers. The assessment considers a split of 150 bedrooms associated to visitors and 50 bedrooms associated to other guests.

Visitors

4.12 The Proposed Development is designed to deliver a new world-class ERC, attracting visitors from all around the world. It is expected that the UK market will initially form a significant share of the annual numbers of visitors, but as the Proposed Development matures, the international share of visitors is anticipated to increase.

Annual Number of Visitors

- 4.13 The cautious worst case for the purpose of the Transport Assessment is based on the number of annual visitors to the Theme Park set out in **Table 4-1**. These numbers form the basis for the derivation of trip forecasts for the Theme Park. It is noted that the figures presented in the ES (**Appendix 2.1: Environmental Statement Basis of Assessment**) are lower in the future year; however, this simply ensures the assessment presented in this Transport Assessment is robust.

Table 4-1: Visitor Numbers – Annual Visitors

Forecast Year	Domestic Visitors	International Visitors	Total
Primary Opening Year	5,950,000 (70%)	2,550,000 (30%)	8,500,000
Future Year	6,500,000 (52%)	6,000,000 (48%)	12,500,000

- 4.14 The annual number of visitors to the Theme Park forming the basis for the Transport Assessment has been based on attendance at other Universal destinations as reported in The Global Attractions Attendance Report published by Themed Entertainment Association (TEA) taking into account the scope and size of the Proposed Development.
- 4.15 **Table 4-2** provides visitor numbers for the earliest data available and for the last full year of operation (2023) of other UDX destinations. This information validates the visitor numbers forming the basis of the Transport Assessment.

Table 4-2: Annual Visitor Numbers – Other Universal Destinations

UDX destinations	Earliest available	2023
Islands of Adventure – Universal Orlando	5,300,000 (2006)	10,000,000
Universal Studios Orlando	6,000,000 (2006)	9,750,000
Universal Studios Hollywood	4,700,000 (2006)	9,660,000
Universal Studios Japan	8,160,000 (2010)	16,000,000

(source – teaconnect.org/tea-theme-museum-index and TEA/AECOM 2023 Theme Index and Museum Index: Global Attractions Attendance Report, published by the Themed Entertainment Association, (2024))

Daily Number of Visitors - Seasonality

- 4.16 Daily attendance at Theme Parks is seasonal based on attendance data from comparable parks. For the purpose of assessment, four levels of attendance have been identified. **Table 4-3** details these four levels of daily attendance.

Table 4-3: Daily Attendance – Seasonality

Levels of attendance	Primary Opening Year (days/annum)	Future Year (days/annum)
Low attendance	10,000 (80 days/year)	18,750 (50 days/year)
Average attendance	23,000 (230 days/year)	31,250 (265 days/year)
Busy attendance	40,000 (40 days/year)	60,417 (35 days/year)
Peak attendance	55,000 (15 days/year)	81,250 (15 days/year)

- 4.17 The same domestic/international split is applied to the daily attendance figures as part of this assessment. **Tables 4-4** and **4-5** provide the forecast daily attendance by domestic visitors and by international visitors, respectively, forming the basis of the Transport Assessment.

Table 4-4: Domestic Visitors – Daily Attendance – Seasonality

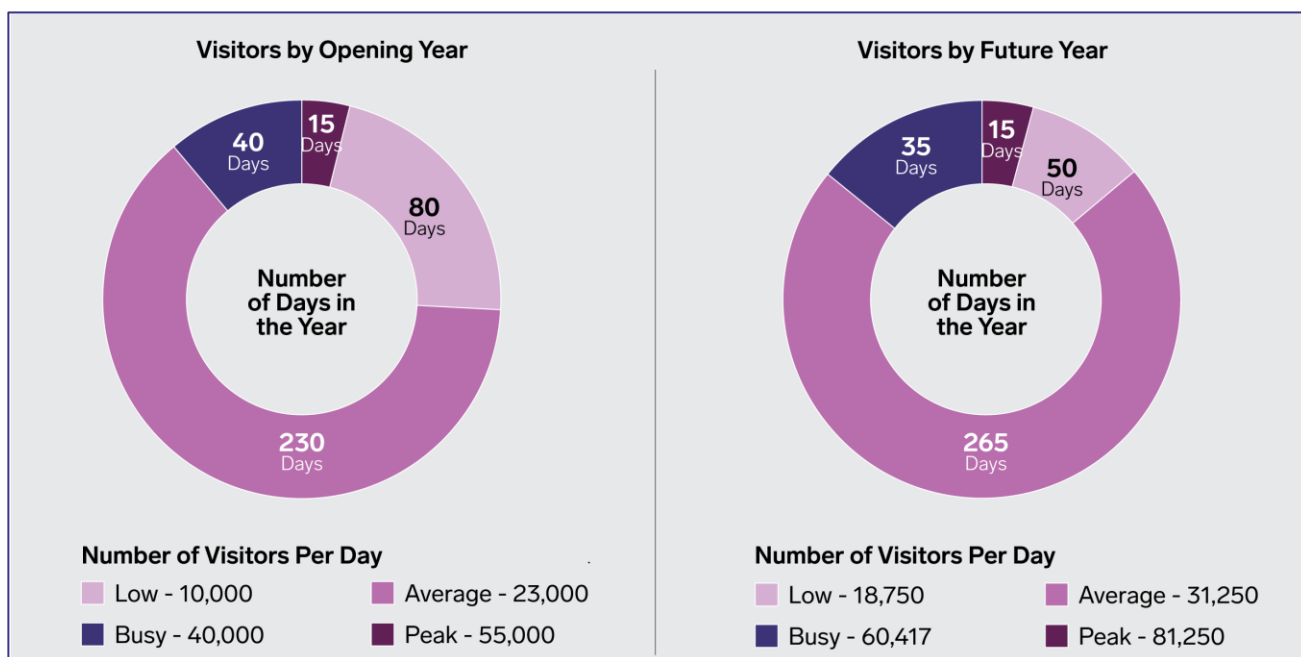
Levels of attendance	Primary Opening Year (days/annum)	Future Year (days/annum)
Low attendance	7,000 (80 days/year)	9,750 (50 days/year)
Average attendance	16,100 (230 days/year)	16,250 (265 days/year)
Busy attendance	28,000 (40 days/year)	31,417 (35 days/year)
Peak attendance	38,500 (15 days/year)	42,250 (15 days/year)

Table 4-5: International Visitors – Daily Attendance – Seasonality

Levels of attendance	Primary Opening Year (days/annum)	Future Year (days/annum)
Low attendance	3,000 (80 days/year)	9,000 (50 days/year)
Average attendance	6,900 (230 days/year)	15,000 (265 days/year)
Busy attendance	12,000 (40 days/year)	29,000 (35 days/year)
Peak attendance	16,500 (15 days/year)	39,000 (15 days/year)

- 4.18 There will be a number of events held throughout the year. Not all event days will be peak days and correspondingly not all peak days will be event days. Further details on event days are provided at paragraph 6.47 of this report.
- 4.19 **Figure 4-2** illustrates the seasonality in daily attendance at the Theme Park, used as a basis for assessment. It is worth noting that for the vast majority of the year, the proposed Theme Park would operate at Low or Average attendance, with Busy and Peak attendance representing only 50 to 55 days across the year. This is representative of the operation of other similar Theme Parks of a similar nature around the world.

Figure 4-2: Daily Attendance – Seasonality



Team Members (Staff)

- 4.20 In relation to Team Members travel, the Transport Assessment is based on the Theme Park providing employment for a total of 8,050 people in the Primary Opening Year and for a total of 10,000 people in the Future Year. The maximum number of Team Members (TMs) required on-site on Peak Attendance days is 78% - 80% of this total. For the purposes of assessment, the number of TMs on Peak Attendance days has been set at 6,360 TMs. In the Future Year assessment, the total number of TMs has been set at 8,000 TMs required on-site on Peak Attendance days.
- 4.21 Based on the operation of other Universal destinations, the Transport Assessment considers that these TMs would work in three shifts. **Table 4-6** details the proportion of TMs for each of the three shifts.

Table 4-6: Shift Patterns

Shift	Arrivals	Departures	% of Daily TM Number
Shift 1	04.00-12.00	10.00-18.00	48%
Shift 2	09.00-17.00	18.00-24.00	42%
Shift 3	19.00-22.00	05.00-08.00	10%

Operation of the Theme Park

- 4.22 For the purpose of undertaking a cautious worst-case assessment and referring to the operation of other Universal destinations in the world, the Transport Assessment is based on an opening time for the Theme Park of 09:00 and a closing time of 21:00. Some visitors would arrive at the Site in advance of the Theme Park's opening time, as they would have the opportunity to use food and beverage (F&B) and retail outlets at the Entry Plaza area. The Theme Park's car park would open 2 to 3 hours in advance of the Theme Park's opening time. Closing time would depend on the day visited, but would generally be 21:00, although, again, visitors would be able to stay on-site longer using the F&B and retail outlets at the Entry Plaza, and for event days the closing time would be later than this. Basing the Transport Assessment on opening/closing times of 09.00-21.00 forms a robust basis for assessment. The actual opening times of the Theme Park may vary across the year and could extend beyond the 09.00-21.00 period used as a basis for assessment, spreading any impact identified across a longer time period.
- 4.23 For the purposes of assessment, the trips associated with the Entry Plaza are included in the overall demand forecasts for the Theme Park. The overall demand forecasts considered in this Transport Assessment are based on the expected number of visitors to the Theme Park as set out in **Table 4-1** (i.e. 8.5 million visitors in the Primary Opening Year and 12.5 million visitors in the future year). The Entry Plaza demands are allowed for within this, both in terms of trip demand and parking demand. The Transport Assessment is based on people using the Entry Plaza and when travelling by car parking at the TP-visitor car park. Hence, from the point of view of car use and the TA, the Entry Plaza is encompassed within the Theme Park Visitor trip pattern predictions. In practice, the Entry Plaza would be open to all and members of the public without a ticket would be able to access the facilities at the Entry Plaza. However, it is likely that non-Theme Park ticket holders would form a minority of the visitors to the Entry Plaza. The only car park available to people visiting Entry Plaza would be the Theme Park visitor car park with a £35 cost, therefore discouraging car use for non-ticket holders. For the purpose of assessment, a professional judgement has been made that the provision of the Entry Plaza facilities will not add to the Proposed Development's overall impacts.
- 4.24 Full details of the trip forecasting methodology for the Theme Park are set out in the Trip Forecasting Note – Theme Park at **Annex 4**.
- 4.25 It must be noted that the trip forecast methodology for the Theme Park visitors as set out in **Annex 4** considers trip making associated with all visitors to the Theme Park, and therefore including visitors using accommodation available on site. The 'Theme Park visitor' accommodation considered within the trip forecast methodology for the Theme Park includes the hotel allowed for in the Core Zone, the 'UDX' hotel/accommodation allowed for in the Lake Zone, as well as a proportion of the Business/Flagship hotel bedrooms allowed for in the Lake Zone and a proportion of the budget hotel bedrooms allowed for in the West Gateway Zone. In total the trip forecast methodology for the Theme Park visitor considers that visitors will use a total of 4,720 bedrooms across the site, in the Future Year.

- 4.26 The trip forecast methodology for the Theme Park visitors allocates visitors to the ‘visitor’ bedrooms/accommodation available in each scenario tested. The arrival/departure profile for these visitors using an overnight stay would differ from the arrival/departure profile of visitors not staying overnight and this is considered within the visitor trip forecast. The forecast also details different modes of travel for those visitors staying overnight but off-site as they may use a different mode to access the Theme Park to the mode they used to get to their overnight hotel/accommodation.
- 4.27 This leaves some bedrooms/accommodation on-site available for non-Theme Park visitors (associated with the Convention Centre allowed for in the Lake Zone and general hotel customers for the budget hotel allowed for in the West Gateway Zone). Trip forecast for these bedrooms/accommodation is dealt with outside the trip forecast methodology for the Theme Park visitors. This is set out in **Annex 5**.
- 4.28 Ultimately, the trip forecast for the Proposed Development is controlled by the Monitor and Manage Plan (included within the Travel Plan (**Appendix 5.6: Travel Plan of the ES (Volume 3)**)), that sets out trip generation thresholds for the entire Proposed Development including for the Core Zone.

Other Land Uses

- 4.29 The Theme Park is to be accompanied by other land uses across the Proposed Development. For the purpose of undertaking a cautious worst case assessment, the Transport Assessment considers the following additional land uses on site:
- a. Convention Centre – 55,000sqm GEA;
 - b. Business and Flagship hotels;
 - i. ‘UDX’ hotels/accommodation – Hotel by the Theme Park entrance, plus up to 3,370 bedrooms in the rest of the ERC;
 - ii. ‘Roadway’ services:
 - 1. Highway Service Area (16 pumps) including associated retails outlets;
 - 2. restaurant site (5,866sqm GIA); and
 - 3. Budget hotel.
- 4.30 This combination of additional land uses falls within the envelope of parameters for the Proposed Development. This combination of land uses has been chosen as a representation of the potential development proposals within the Lake Zone and West Gateway Zone that forms a cautious worst case basis for the purpose of the Transport Assessment, in that they capture the way land uses in the Lake Zone and the West Gateway Zone can interact with the Core Zone’s Theme Park:
- a. Some of the land uses in the Lake Zone and West Gateway Zone are likely to be ancillary to the Core Zone and as such generate a significant proportion of linked trips with the Core Zone, potentially affecting arrival/departure profiles for the Theme Park. This is captured by the assumed hotel bedroom/accommodation offer considered within the Lake Zone and West Gateway Zone.

- b. Some other uses could be more independent in the way they are used (although benefitting from collocation with the Core Zone) and therefore generate their own trip generation in addition to the trip generation of the Theme Park. This is captured with the Convention Centre use and associated hotel provision as well as the roadway services offer. In particular, the assessment takes into account the trips generated by an event at the Convention Centre attracting about 3,000 delegates. The assessment also accounts for additional staff trips associated with the additional uses in the Lake Zone and West Gateway Zone.

- 4.31 Ultimately, the trip generation for the Proposed Development is controlled by the Monitor and Manage Plan (included within the Travel Plan (**Appendix 5.6: Travel Plan of the ES (Volume 3)**)), that sets out trip generation thresholds for the entire Proposed Development including for the Lake Zone and the West Gateway Zone.
- 4.32 Full details of trip forecasting methodology for the Lake Zone and the West Gateway Zone are set out in the Trip Forecasting Note – Lake Zone and West Gateway Zone at **Annex 5**.

5 Transport Vision

Securing the Site's Strategic Advantage

- 5.1 As set out in Section 2 of this report, the Proposed Development benefits from a highly accessible location at a strategic level being in close proximity to major road and rail infrastructure, putting the Site within easy reach of a large proportion of the UK population and within reach of the main UK international airports and an international rail terminal.
- 5.2 In order to secure this significant advantage in strategic accessibility, the Proposed Development will be supported by two main pieces of strategic access infrastructure:
 - a. A new station at Wixams, that enlarges the currently planned and consented new station at Wixams which itself serves the new Wixams settlement of circa 5,000 homes. The larger station includes two additional platforms and a western plaza to serve the Proposed Development, in addition to the currently planned settlement-facing eastern plaza.
 - b. A new road junction on the A421, including a new eastbound off slip into the Site, a new westbound off slip into the Site and a new westbound on slip away from the Site.
- 5.3 The planning proposals include the safeguarding of land within the Site for the potential delivery of a new station on what would be the new EWR line. A new station in broadly this location, on what the EWR Company (EWR Co) expects is the new EWR line, is an aspiration of EWR Co. The Proposed Development does not rely upon this station or this line coming forward. However, if EWR Co is successful in its aspiration to provide both the line and the station then UDX will work closely with it on delivery. Therefore, the Proposed Development facilitates this by including safeguarded land for a new station within its proposal.
- 5.4 The Proposed Development will be supported by new proposed transport infrastructure as detailed in this section. The combination of the transport infrastructure proposals and proposed land uses form the basis for the derivation of a cautious worst case trip generation for the Proposed Development. This cautious worst case trip generation is enshrined within a Monitor and Manage Plan (included within the Travel Plan (**Appendix 5.6: Travel Plan of the ES (Volume 3)**)), which ultimately provides the control mechanism pertaining to the traffic impacts of the Proposed Development.

Figure 5-1: Proposed New Strategic Transport Infrastructure



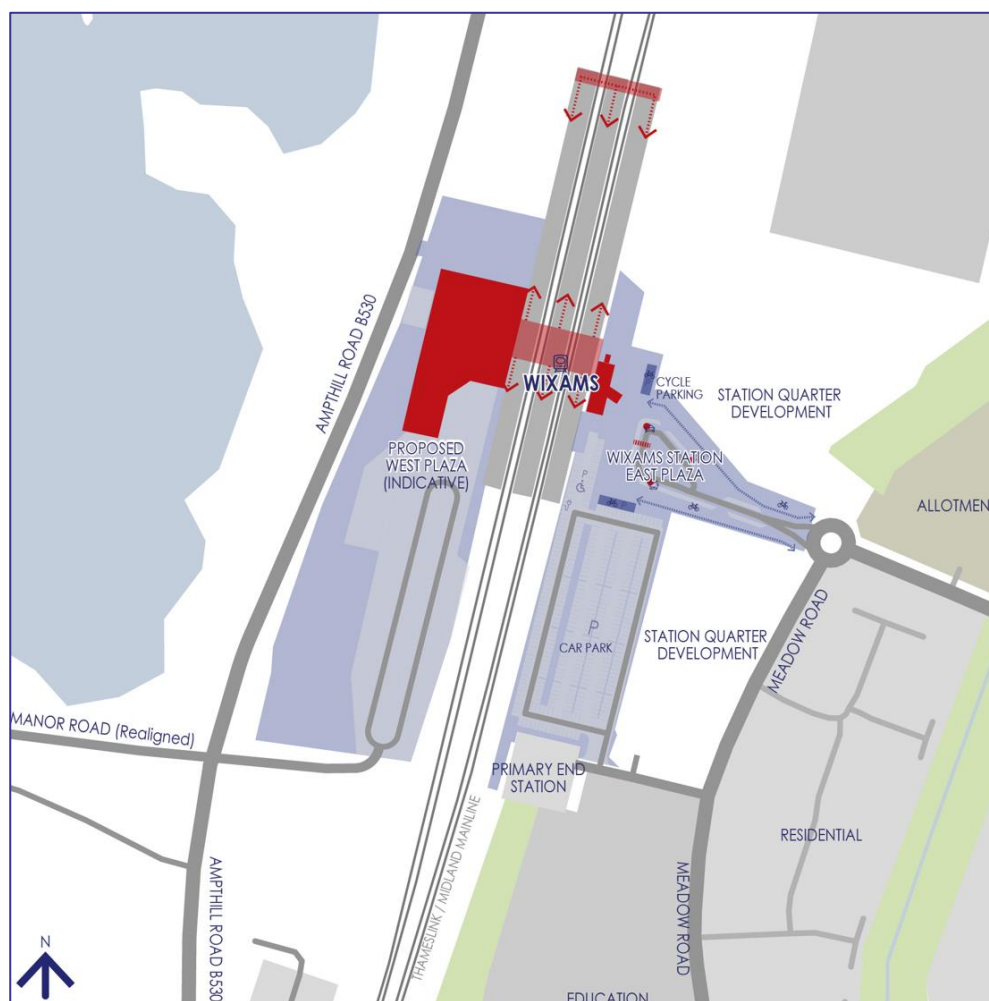
Wixams Rail Station

- 5.5 The Transport Vision for the Proposed Development also includes an expanded railway station at Wixams. The MMRL in the vicinity of the Wixams garden village includes four rail lines, two 'fast' lines and two 'slow'. The current approved plans for the Wixams East Station only consider the need of the new Wixams garden village and plans for a new stop on the 'slow' lines along the MMRL, providing access to the GTR services. The current approved station is east facing only (facing Wixams garden village) and designed to accommodate commuter trips to and from this new settlement.

- 5.6 The Proposed Development will significantly change the level of demand at Wixams Station, and this therefore is the reason for its proposed expansion. The expansion of the station would create a western plaza on the western side of the station for the use of visitors to the Proposed Development. This western plaza would be the location where visitors can catch a shuttle service taking them to the Theme Park's front door. The western plaza would be accessed from the B530 Ampthill Road. A fourth arm would be created at the B530/Manor Rd junction and the junction upgraded to traffic signal operation to deliver priority to the shuttle service to and from the station.
- 5.7 **Section 12** of this report outlines a study undertaken to demonstrate that it would be possible to identify combinations of EMR and GTR services able to accommodate the Proposed Development, as set out in paragraph 2.3.6 of the Summary of Agreed Position with the Department for Transport (Appendix 4 of the Planning Statement (**Doc Ref 6.1.0**)).
- 5.8 The eastern side of the station would remain for the use of passengers to/from Wixams garden village although the range of services available to these passengers would greatly increase as a result of the station expansion and added connection to EMR services.
- 5.9 The Full Wixams Station is located about 1km to the east of the Core Zone and the approach is to deliver a shuttle service between the Full Wixams Station and the Core Zone to create a convenient last mile connection. The Wixams shuttle service would be frequent enough to deliver a turn up and go service and therefore a seamless last mile journey on arrival to the Theme Park. The shuttle journey to the Theme Park is estimated to be between 8 to 10 minutes (with approximately 3 minutes loading/unloading at each end).
- 5.10 To provide appropriate comfort and journey times to the local community, including the Proposed Development, a four-platform station that will serve both fast and slow tracks has been developed. The four-platform station concept comprises of a central island platform and two outer single faced platforms, which will require modifications to the existing track alignment. The design of the track has taken into consideration the two main requirements that have been agreed in discussions with stakeholders: maintaining existing line speeds of 125mph and not affecting the Bedford BC consented two-platform scheme to the east of the Site boundary.
- 5.11 Heading towards Bedford from the Ampthill Road beyond underbridge SPC/176 (A530) it is feasible to diverge the four-track railway at their current line speeds (fast lines 125mph, slow lines 90mph) into separate twin tracks, consisting of a pair of fast lines and a pair of slow lines. The existing track curvature of the fasts could be marginally tightened just beyond the underbridge, to begin to move the alignment over towards the western platforms before straightening through the station itself. The slow lines would also require a slight tightening of the existing curvature beyond the underbridge, to pull the alignment westwards to accommodate the eastern outer platform but remaining on the existing track footprint.

- 5.12 The proposed four-platform station is the main station rail passengers will use from the south and north to access the ERC and has focused on providing a spatial arrangement that will allow comfortable alighting, boarding and station experience for the tidal peak hour AM and PM demand whilst being a 'transit' hub for the shuttle buses that will take the majority of the demand to the ERC. The platforms are approximately 275m long and 12.8m wide which will be sufficient to accommodate the peak hour demand during operational and perturbed scenarios. The station will provide a large, covered overbridge to both the eastern and western plaza for both local residents and customers to the ERC. The western plaza will have ample waiting areas, retail and station customers/staff facilities. A covered secondary bridge with lifts will also be provided to allow for alternative egress during normal and perturbed operation. This secondary bridge could also double as a public link across the MMRL for pedestrians to the benefit of residents at Wixams to the east of the railway, connecting to the Proposed Development area to the west of the railway.
- 5.13 Beyond the station the fast lines would follow a right hand curve before reversing and passing through the western redundant span of overbridge SPC1/178 (Hardwick) and rejoining the existing fasts to the north of the overbridge. The slow lines follow flatter reversing geometry, passing through the main span of overbridge SPC1/178 and rejoining the existing alignment. The track alignment and associated infrastructure all remains within the NR Ownership boundary.

Figure 5-2: Full Wixams Station



A421 Access

- 5.14 Though details and fixed locations are not yet known for buildings and Theme Park structures, initial engineering design has been undertaken for the A421 Junction and other public road infrastructure to be delivered as part of the Proposed Development. A technically acceptable solution is achievable within the limits of deviation shown on the Access Parameter Plan (**Parameter Plans - Access and Roadways (Document Reference 1.11.0)**). This work identified highway access arrangements which have been deemed to be suitable and deliverable with the relevant highway authorities (National Highways and Bedford Borough Council) and illustrative highway arrangement drawings are provided in **Annex 6**. A condition has been proposed which requires further design detail to be submitted for the proposed highway works in accordance with the post decision approval process as set out in the Design and Access Statement (DAS). If the detailed design varies from the illustrative highway arrangement drawings, sensitivity testing would be carried out as required to demonstrate that the impact on the highway network is acceptable and that the alternative design would not result in greater significant effects.

Internal Road Network

- 5.15 The Access Parameter Plan (**Parameter Plans - Access and Roadways (Document Reference 1.11.0)**) shows the proposed access routes within the Site boundary, which are described below.
- 5.16 The main access routes for visitors and staff travelling to the Proposed Development by car will be from the A421 to the west of the Site, via the new A421 Junction and dual carriageway access road through the West Gateway Zone. The road will cross the Marston Vale Railway line by bridge into the Core Zone. Visitors and staff departing the Proposed Development and heading south will join the A421 via a new southbound slip road at the new A421 Junction. Those heading north or east will use the existing Woburn Road and Marsh Leys interchange with the A421.
- 5.17 Local vehicular access to the Proposed Development will also be possible via Manor Road which will be realigned and upgraded to a dualled access between Ampthill Road and the MVL.
- 5.18 A new dualled access road “Public Road A” will be built within the Core Zone parallel to the MVL. This will connect the new access from A421 to Manor Road.
- 5.19 A new access road “Public Road B” will be built within the Lake Zone connecting Manor Road to Ampthill Road (B530).
- 5.20 A new junction will be created at the intersection of the realigned Manor Road, Public Road A and Public Road B.
- 5.21 Separate to the Proposed Development, Network Rail proposes to replace the Manor Road level crossing of the Martson Vale Line with a grade separated crossing (i.e. a road bridge over the railway). It is not yet definite that the grade separated crossing will be delivered and therefore the Proposed Development includes three options to retain flexibility to adapt to Network Rail’s proposals, with Option B the preferred option:
- a. Option A includes elevated highways east of the MVL to tie in to the new grade separated crossing to be delivered by Network Rail;

- b. Option B recognises that Network Rail may close the level crossing and Manor Road, and instead provides a pedestrian and cycle bridge to connect the platforms at Kempston Hardwick Station. The Proposed Development would therefore provide active travel connections to the new pedestrian and cycle bridge, while the highways to east of the MVL would be delivered at grade; and
- c. Option C recognises that the level crossing may be retained. This option therefore retains the at grade highway connection to the level crossing and provides a new pedestrian/cyclist bridge over the MVL.

5.22 The three options would have varying degrees of impact on the assignment of traffic in and around the Proposed Development. The assessment presented in this report focuses on Option A, as a cautious worst case. Option B where part of Manor Rd and the MVL level crossing is closed will result in reassignment of some traffic. The implications of Option B are considered in **Annex 7** of this report. Option C has not been tested as a sensitivity test, as it is no worse than the assessment for Option A in terms of accessibility and pattern of movements.

5.23 All new roads provided as part of the Proposed Development will accord with standards agreed with the overseeing highway authority.

Broadmead Road/Woburn Road

5.24 The Proposed Development will route construction vehicles via Woburn Road and Broadmead Road to access the West Gateway Zone and the Core Zone. To accommodate this the junction of Broadmead Road/Woburn Road will be ungraded from a priority junction to signal control to facilitate the Construction Phase. The junction will remain signal controlled during the Operational Phase to alleviate local concerns about the future operation of this junction with the Proposed Development in place.

EWR Provision

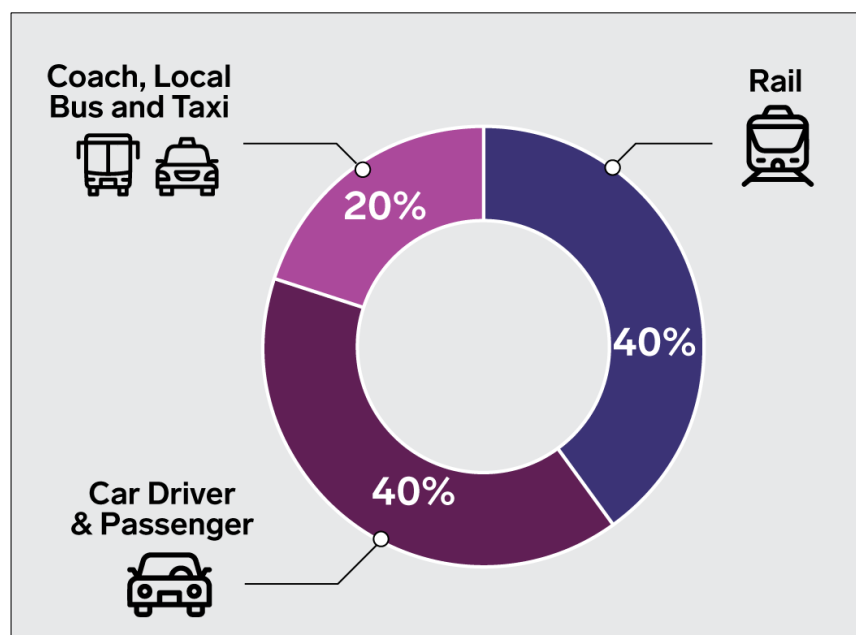
5.25 The Proposed Development safeguards an area of land for a new EWR Station on the MVL between the West Gateway and Core Zones. Visitors arriving via the EWR Station would be provided direct access to the Core Zone via a pedestrian/cycle bridge over the railway, access would then be provided from the footbridge down to ground levels. Within the Core Zone, the at-grade ground level connection between the rail station and Theme Park entry would pass beneath the elevated Public Road A preventing the need for signalised crossing of the road and ensuring a safe and efficient means of separating modes of transportation. If the EWR Station does not come forward in the West Gateway Zone, it is assumed that the EWR line is completed from Oxford to Milton Keynes by Opening Day and buses accommodate the demand for rail-based movement from Milton Keynes station to and from the Site.

- 5.26 The Proposed Development recognises the benefit that a new EWR station serving the Site and a new EWR service would represent in terms of non-car accessibility. However, it is for EWR to potentially deliver a station and such a service in the future. As confirmed in the Summary of Agreed Position with the Department for Transport (Appendix 4 of the Planning Statement (Doc Ref 6.1.0)) at paragraph 2.4.3, the stations and level of service on the railway line between Bletchley and Bedford are subject to further consultation by EWR Co.
- 5.27 In this context, this Transport Assessment assumes a robust position with only EWR delivered as per current committed plans, i.e. with services up to Milton Keynes to/from Oxford. A cautious worst case for the purpose of the Transport Assessment considers that, in the absence of an EWR station serving the Site, visitors using the EWR line up to Milton Keynes as part of their journey to the Theme Park, would then transfer onto shuttle coach services that would take them between Milton Keynes Central Station and the Theme Park entrance. **Paragraph 5.37** sets out how this shuttle service would be delivered. This would discourage rail use when compared to a situation where the expanded EWR service, as demonstrated later in this report (Scenario 5 versus Scenario 5a) and therefore would lead to a slightly higher car trip generation for the Proposed Development.
- 5.28 Ultimately, the trip generation for the Proposed Development is controlled by the Monitor and Manage Plan (included within the Travel Plan (**Appendix 5.6: Travel Plan of the ES (Volume 3)**)), that sets out trip generation thresholds for the entire Proposed Development taking into account EWR passengers accessing the Site through a shuttle service.

40/40/20 Vision

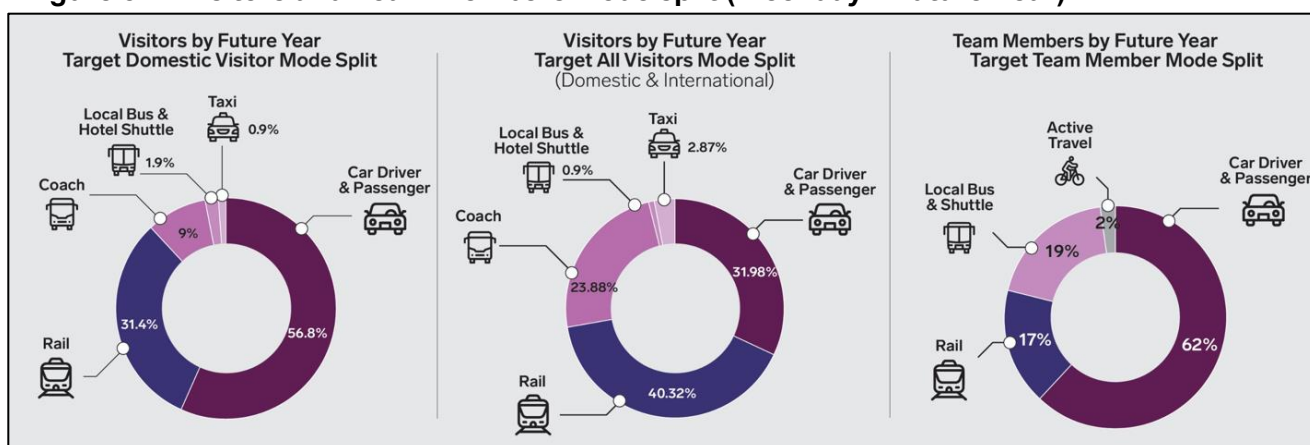
- 5.29 The Vision is that, for UK travel, it is reasonable to design for a 40:40:20 split of visitor movement between road, rail and 'other' modes, where 'other' modes include dedicated coach travel, local bus and taxi travel. **Figure 5-3** illustrates this Vision.

Figure 5-3: The 40/40/20 Vision



- 5.30 Armed with this Vision as the starting point, a more sophisticated assessment of demand was developed using a logit model, essentially estimating the likelihood of people travelling by a particular mode given certain criteria. Details of the trip forecast model and trip forecast used as part of this transport assessment are provided in Section 6 and Section 7 of the report.
- 5.31 The outcome of this sophisticated assessment is outlined in **Figure 5-4** which presents the overall mode share for visitors and Team Members to the Theme Park.

Figure 5-4: Visitors and Team Members Mode split (Weekday – Future Year)



Coach and Shuttle Services

- 5.32 In addition to road and rail, coach would form an important contribution to the accessibility of the Proposed Development for visitors to the ERC. The Vision considers as highly likely that a range of coach services either on a scheduled timetable or specifically chartered would be operated by commercial operators linking to the Proposed Development from a range of destinations locally and across the UK. Coaches running from locations around the UK which are less accessible by rail but with good road connection would form a suitable sustainable alternative to the use of the private car, and the provision of such services with realistic pricing as part of an integrated ticketing strategy to match is a reasonable expectation of the Transport Vision for the Proposed Development.
- 5.33 On that basis, the Transport Vision also expects scheduled coaches to be operated by commercial operators to/from Luton, Stansted and Heathrow airports. Equally, coach services to/from other major touristic destinations around the Proposed Development including London, Cambridge and Oxford commercially operated are a realistic prospect.
- 5.34 The Proposed Development would create a significant travel demand to/from the Site, in turn creating a significant opportunity for commercially run services to be delivered by local operators. Therefore, the coach services considered by the Transport Vision are expected to become a reality through commercial endeavour. There is a real opportunity for these services to be delivered through market forces and these services are considered highly likely to materialise by the time the ERC opens.

- 5.35 Finally, the Transport Vision expects that a number of shuttle services offering ‘last mile’ connection to the Theme Park, would be operated with or without the support of UDX:
- a. The Wixams shuttle will form an integral part of the arrival experience to the Theme Park and is likely to be operated with direct support from UDX, in conjunction with the proposed Full Wixams Station forming an integral part of the Proposed Development. The Wixams shuttle service will be in operation at the time of opening of the Theme Park. The delivery of the Wixams shuttle service is controlled by the Travel Plan (**Appendix 5.6: Travel Plan of the ES (Volume 3)**).
 - b. As set out in 5.28 above, in the absence of an EWR station on the Site, a cautious worst case for the purpose of the Transport Assessment is based on the availability of shuttle services between Milton Keynes Central Station of the Proposed Development taking visitors on this last leg of their journey. The expectation is that the Proposed Development will create a strong demand for shuttle travel services between Milton Keynes Central Station and the Theme Park. It is therefore likely that local operators will seize this commercial opportunity and deliver the services. The delivery of shuttle bus services between Milton Keynes Central Station and the Theme Park is controlled by the Travel Plan (**Appendix 5.6: Travel Plan of the ES (Volume 3)**). This document states that, in summary: either the railway station on the Marston Vale line in the vicinity of the Order land with the capacity to serve the ERC is operational, or a bus service or services will be in place from the date of Grand Opening of the Theme Park sufficient to typically accommodate the demand for movement by bus between Milton Keynes Central Station and the Theme Park.
 - c. Finally, the Transport Vision envisages that hotel operators serving the Theme Park will provide as part of their offer shuttle transfer to the Theme Park.

Local Transport Proposals

- 5.36 The Proposed Development would bring with it improvements to the local transport networks that would complement the strategic accessibility to the Proposed Development, and benefit local settlements and movement patterns across the Marston Vale area.

Public Transport

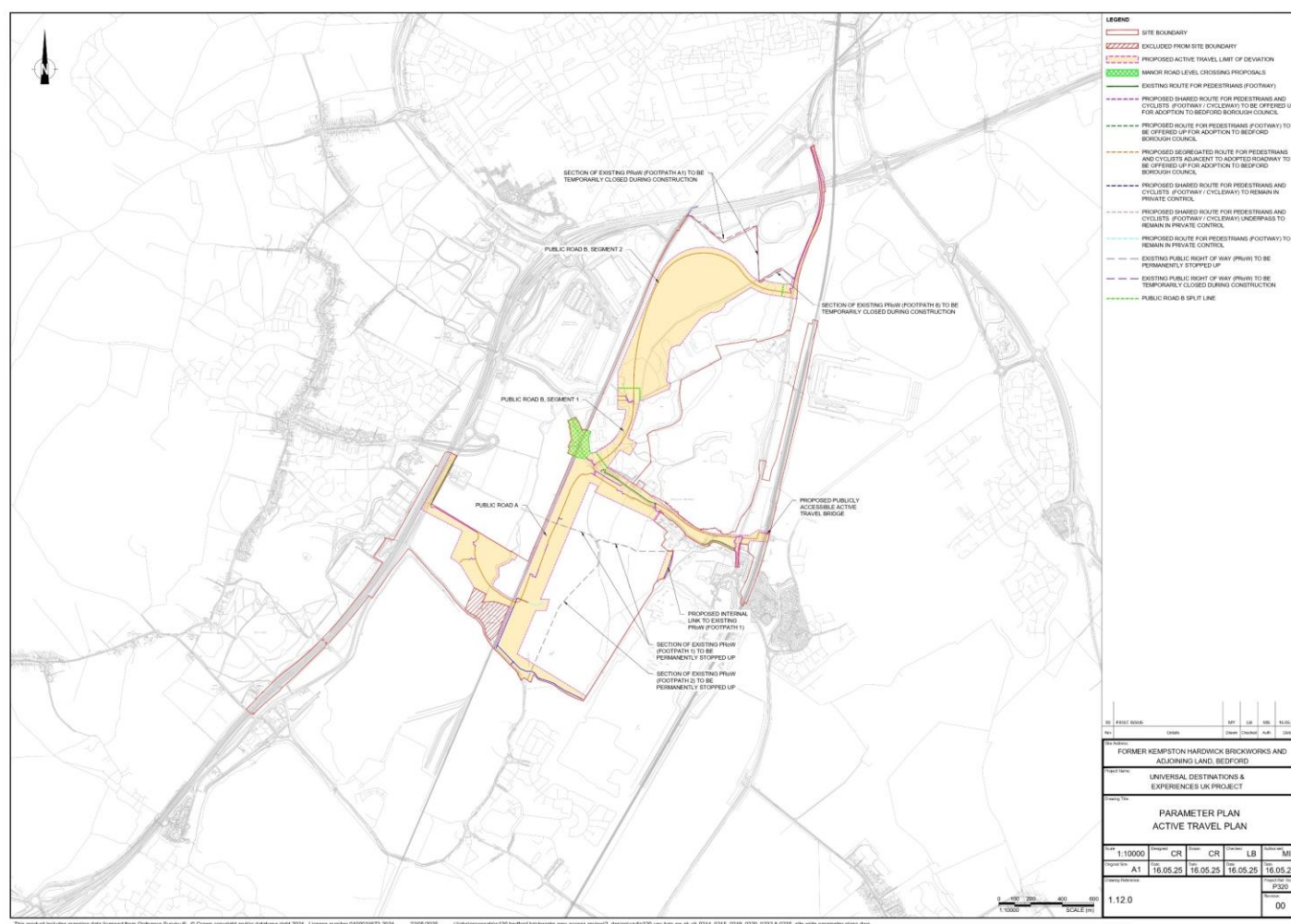
- 5.37 In the Core Zone, the Proposed Development includes the delivery of a local transport hub with:
- a. A bus/coach/shuttle hub – This is where local bus services, scheduled coach services, and local shuttles (either to airports, to hotels or more locally to the Full Wixams Station) would stop. This would allow for all services to integrate, in addition to integrating with a potential future EWR Station.
 - b. A taxi hub, located next to the bus/coach/shuttle hub integrating with other shared transport modes.

- 5.38 The presence of the Proposed Development will deliver a step change in travel demand in the area and it is expected that local public transport operators will seize this opportunity to deliver a range of new routes and services interacting with the rail station(s) and Proposed Development's transport hub. The Proposed Development therefore creates the opportunity for a significant uplift in public transport accessibility for local settlements as well.

Active Travel

- 5.39 Development of the Site opens up opportunity for more local movement by active travel.
- 5.40 Excellent active travel corridors will be provided within the Site. Many of these will segregate cyclists from walkers from vehicles.
- 5.41 There is a core active travel corridor within Bedford connecting the town centre and the hospital, along Ampthill Road, past residential, retail and employment locations, to Interchange Retail Park, just north of the location where the Lake Zone meets Ampthill Road.
- 5.42 When developed, there will be an excellent and segregated active travel corridor through the Lake Zone, connecting in turn with Manor Road, the Core Zone and the West Gateway Zone. The missing link is then the short section of Ampthill Road between the Lake Zone and Interchange Retail Park.
- 5.43 The Red Line has been drawn to include this section of highway. The Proposed Development includes construction of an active travel corridor, within the highway, on Ampthill Road. The consequence will be a joined up active travel corridor connecting from the West Gateway Zone, through the Site into Bedford, from where active travel connections are plentiful, including to key destinations and residential areas.
- 5.44 For clarity, the road through the Lake Zone will be opened when there is sufficient development within the Lake Zone to justify the need for access from two directions. This is likely when the first development happens in the Lake Zone after Theme Park opening. Concurrent with the opening of the road in the Lake Zone, the connection to the Interchange Retail Park will be completed.
- 5.45 In addition, whilst it has been agreed with Bedford BC that it is not necessary for the delivery of the Proposed Development, there is also potential to fill in the current gaps in footway provision for local movement beyond the Red Line Boundary, for example to enable continuous links between Wootton and Stewartby.
- 5.46 Bedford BC has stated its aspiration to provide those local links itself. These opportunities are related to factors beyond the remit of the Proposed Development and are linked in part to the delivery of a potential EWR station in the vicinity of the Site, and progress relating to the consented housing scheme on the Stewartby Brickworks site.
- 5.47 The new network of active travel links across the Site would replace existing PRow footpaths (Footpaths 1 and 2). PRow Footpaths 1 and 2 would be permanently stopped up. Footpath A1/8 will be closed temporarily during construction to maintain public safety. The proposed footpaths which will be stopped up are shown in **Annex 8**.
- 5.48 A plan showing the Active Travel proposals associated with the Proposed Development is provided in **Annex 8. Figure 5-5** illustrates the Active Travel network.

Figure 5-5: Active Travel Networks



5.49 Bedford BC has stated its aspiration to see a comprehensive improvement in active travel in the local area. Whilst not connected directly with the Proposed Development, it has an aspiration to use the Proposed Development as a catalyst for a comprehensive review of local active travel connections in combination with other developments and proposals in the area.

Parking

5.50 The Proposed Development includes a proposed minimum and maximum level of car parking provision. This is summarised in **Table 5-1**, and explained in detail in the Parking Provision Note at **Annex 9**. The proposed approach to EV provision and cycle parking is also set out at **Annex 9**.

Table 5-1: Proposed Minimum and Maximum Parking Provision

	Minimum	Maximum
Site-wide Non-Rail Parking ¹	11,197 spaces	16,661 spaces

- 5.51 The Proposed Development would also include between 100 and 200 coach parking spaces as set out in **Annex 9**.

Level Crossings

- 5.52 The Proposed Development would have limited interactions with the level crossings across the MVL in its vicinity:

Broadmead Road

- a. The Proposed Development would be designed in a way that does not allow development traffic to access directly Broadmead Road. As such it is not expected that the Proposed Development in the operational phase would warrant any changes at the level crossing on Broadmead Road.
 - b. However, during the Construction Phase, the Proposed Development would increase vehicular movements across the MVL at Broadmead Road. The Broadmead Road level crossing is a 'protected crossing'. It will only allow trains to pass when the barriers are down. It is one of the safest forms of level crossing. The characteristic of this type of crossing is 'low risk' in the context of standard risk profile (ALCRM risk profile).
- 5.53 The predicted increase in traffic during the Construction Phase would increase the risk but would not alter the risk characteristic, which would remain low risk. In any event, a mitigation strategy has been identified in collaboration with NR.
- c. If a new EWR Station is delivered on land safeguarded within the Planning Proposal, it will do so with associated upgrades to the lines and signalling systems. This is capable of being designed and delivered to suitably safe characteristics for both the Station and the surrounding infrastructure.

¹ Site-wide Non-Rail Parking = Car parking associated with the Core Zone, the Lake Zone and the West Gateway Zone

Manor Road

- d. The proposed junction between Manor Road, Public Road A and Public Road B would either connect to the existing Manor Road or the Manor Road railway bridge that would be delivered by NR. Options have been identified and form part of the Proposed Development in the absence of a road bridge being delivered by NR, which include the provision of an active travel bridge over the MVL.

Wootton Village Footpath Crossing

- 5.54 The Wootton Village footpath crossing is located broadly halfway between Broadmead Road and Manor Road and is part of the Footpath 1 which is to be stopped up on the eastern side of the railway. As part of the Proposed Development, this footpath crossing would be closed, and pedestrians diverted on routes utilising the Proposed Development's internal active travel network. Footpath 1 would be closed at the start of construction. Once the Proposed Development delivered, pedestrians will be able to use the newly created active travel routes delivered through the Proposed Development
- 5.55 The identified mitigation strategy at the Broadmead Road level crossing during the Construction Phase is set out within the OCEMP (**Appendix 2.3: Outline Construction Environmental Management Plan (OCEMP) (Volume 3)**) and includes the following measures:
 - a. provision of a Banksman;
 - b. grading on the approaches to the level crossing;
 - c. Red Light Safety Equipment (Home Office Approved);
 - d. Vehicle Activated Lights showing level crossing ahead; and
 - e. Count Down Marker on the downside approach of the level crossing due to the curve on the road to mitigate such high upsurge in risk.

Transport Management Strategies

- 5.56 Due to the nature and scale of the Proposed Development, there is significant opportunity to influence how and when trip making occurs to and from the Proposed Development and in particular the Theme Park. The Proposed Development's 'buying' power is likely able to influence the price of rail fare for travel to the Site. Visitors will also have access to package deals that may influence the cost of travel to/from the Site, including a range of tickets type to the Theme Park (1-day, 1.5-day and 2-day tickets).
- 5.57 The Proposed Development therefore has the ability to influence trip making through pricing. UDX will work with travel operators to vary the cost of rail and coach travel to/from the Site and can also influence the driving cost to the Proposed Development through varying the car parking charge applied at the Theme Park. A cautious worst case for the purpose of the Transport Assessment considers that some degree of discounting on rail travel can reasonably be expected as well as car parking charges at the Theme Park. The sensitivity of the assessment to rail discounts is assessed in Scenario 5b, which demonstrates that the Proposed Development is not tied to these discounts being in place. As such there is no obligation nor commitment on UDX to obtain rail discounts.

- 5.58 The Proposed Development would include, in addition to the Theme Park, the Entry Plaza, a development of food and beverage as well as retail and entertainment outlets, located at the entrance to the Theme Park. This additional offer would create a reason for visitors to spread their arrival and departure time to/from the Theme Park around the Theme Park's official opening times. Again, through marketing and potential special offers, visitors' arrival and departure times could be varied and spread over a longer period, minimising the Proposed Development's trip impacts on the road and rail network.

- 5.59 The Proposed Development would offer a large number of accommodation options to visitors on-site. Visitors using the on-site visitor accommodation will have different arrival and departure times, which again could help spread demand across the day and minimise trip impacts across the local road and rail networks.

- 5.60 UDX will be keen to optimise their visitors' arrival experience and therefore will manage arrival and departure profiles at the Proposed Development through the mechanisms outlined above so as to limit disruptions to the arrivals and departures to/from the Proposed Development.

- 5.61 The Proposed Development would also become a major employer within Bedfordshire and the surrounding Counties. UDX will commit to a series of Travel Plan measures aimed at minimising the use of single occupancy cars by Team Members when accessing the Site and maximising the uptake of sustainable modes of transport. A Travel Plan is provided at **Appendix 5.6: Travel Plan of the ES (Volume 3)**.

- 5.62 The planning proposal also includes an Outline Construction Environmental Management Plan (OCEMP) (**Appendix 2.3: OCEMP (Volume 3)**) that considers trip making by construction workers and includes a Construction Traffic Management Plan.

6 Assessment Tools and Scenarios

6.1 This section sets out the tools and scenarios adopted to assess the potential transport implications of the Proposed Development. A significant body of work has been carried out with the purpose of understanding and assessing the transport implications of the Proposed Development, including the use of several transport modelling techniques, including:

- a. Spreadsheet based models to derive trip generation and distribution by all modes for the Proposed Development;
- b. A micro-simulation model (Paramics model) to assign Proposed Development vehicle trips to the road network around the Site and understand the traffic implications of the proposals;
- c. Industry standard local junction capacity models to test the operation of the proposed access junctions into the Site; and
- d. Rail service assessment carried out in collaboration with DfT.

Scope of Assessment

6.2 The transport implications of the Proposed Development have been considered in terms of:

- a. Implications for the rail network – The modelling work carried out identifies the likely number of rail trips generated by the Proposed Development, including the routes these trips are likely to take. This information was used to consult and work with DfT in order to identify the level of rail services and associated rail infrastructure improvements which may be required to serve the Proposed Development.
- b. Implications on the wider road network – A micro-simulation model has been used to assess the implications of the Proposed Development on the ‘wider’ road network, i.e. the SRN and local routes outside of the access junctions serving the Proposed Development. This assessment considers outputs from the micro-simulation model including:
 - i. Total Network Statistics – average speed through the network modelled, number of trips accommodated through the network modelled, and latent demand;
 - ii. Journey time on key routes through the network modelled; and
 - iii. Impact on A421 Interchanges – An assessment of predicted maximum queues has been carried out for the main interchanges on the A421 in the vicinity of the Site (Marston Moretaine, Marsh Leys, Elstow), to address potential safety concerns raised by DfT.
- c. Implications on the local road network – Potential access design solutions for the Proposed Development have been identified that are deliverable. Using industry standard local junction capacity models, the operation of these potential Site access junctions has been tested to confirm that there are possible access arrangements that can provide a suitable level of capacity to serve the Proposed Development.

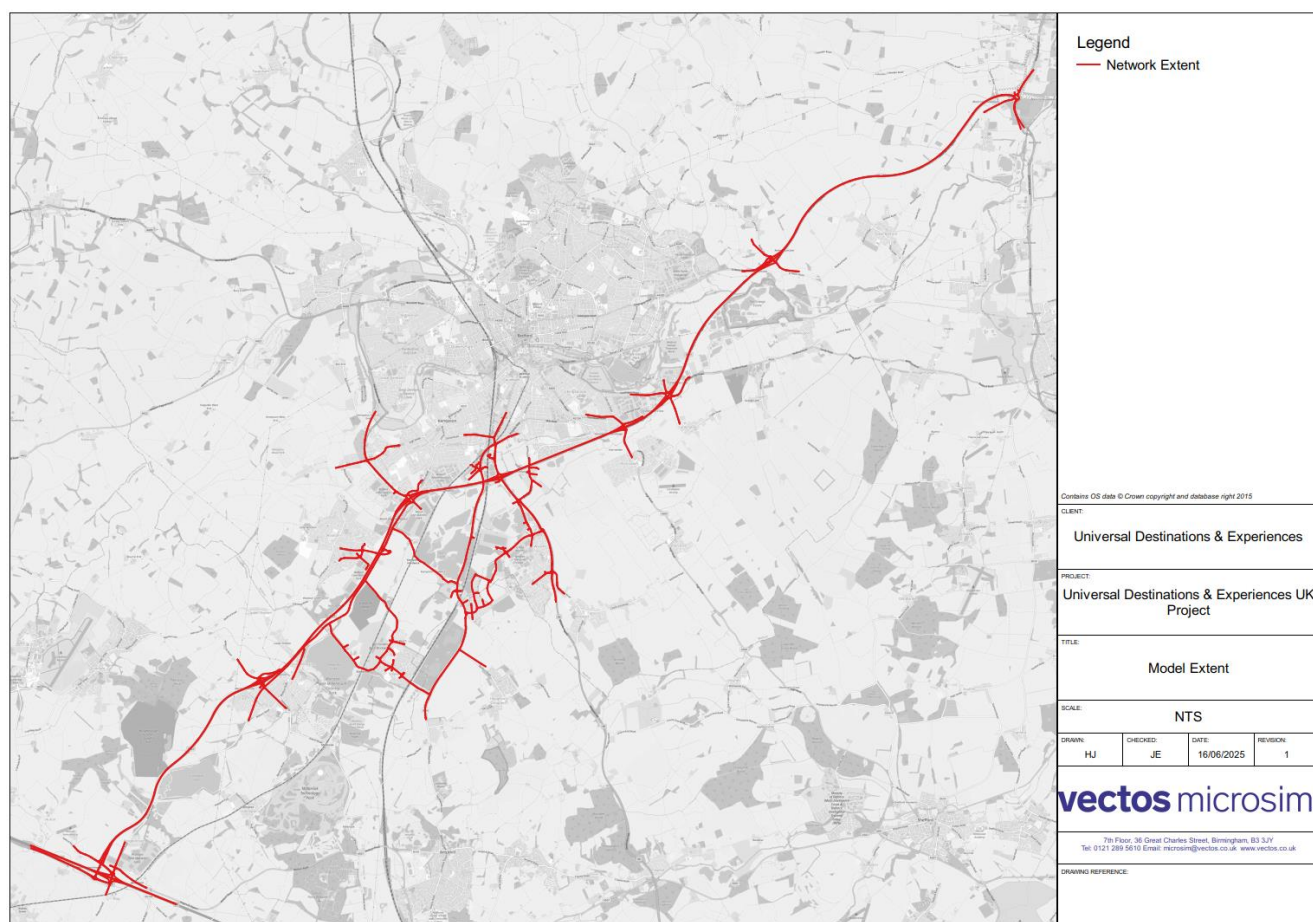
Trip Generation and Distribution

- 6.3 A Logit Model Spreadsheet has been prepared in order to assess the number of trips likely to be generated by Domestic Visitors to the Proposed Development, split by modes of transport. This model considers where Domestic Visitors to the Theme Park are likely to come from and the choices available to them in terms of modes of travel, assessing the likelihood of visitors choosing one mode over another, based on factors such as cost, journey time, group size of visitor 'parties', day of the week, time of the day. Details of the trip generation calculations for the Theme Park are set out in **Annex 4**.
- 6.4 Separate spreadsheet-based models have also been prepared considering trip making by International Visitors as well as to capture trips to/from the land uses in the Lake Zone and the West Gateway Zone. For International Visitors, it is likely that their trip to the UK will be focused on a visit to the Proposed Development, and in some cases in addition to exploring other parts of the UK (London, Oxford, Cambridge). International Visitors are therefore likely to enter the UK at fixed gateways (Airports, Eurostar terminal) and their mode choice to travel to the Proposed Development will be more limited. The travel behaviour of International Visitors will be different to the travel behaviour of Domestic Visitors, hence the different approaches taken. For the other land uses in the Lake Zone and the West Gateway Zone, their use is more 'traditional' and captured in existing UK databases, which have been interrogated. Details of the trip generation calculations for the Lake Zone and the West Gateway Zone are set out in **Annex 5**.

Paramics Model

- 6.5 Once the trip generation and distribution of trips to/from the Proposed Development have been identified, a micro-simulation model (Paramics model) has been used to understand the assignment of the Proposed Development generated vehicle trips onto the road network around the Site. A micro-simulation traffic model considers the layout of the highway network modelled in detail and models each vehicle across the network individually. This provides an understanding of the interactions between vehicles and an understanding of the likely operation of the network under different scenarios.
- 6.6 The network modelled in Paramics is illustrated in **Figure 6-1**.

Figure 6-1: Extent of the Paramics Model



- 6.7 The network modelled focuses on the A421 between the M1 Junction 13 in the south west to the A1 Black Cat Junction in the northeast. It also includes the network of roads surrounding the Site including the A6 to Wixams, the B530 Ampthill Road to south of Stewartby Way, the key roads through the Wixams development between the A6 and the B530, the C94 Woburn Road/Bedford Road between the A421 Marsh Leys Interchange and the A421 Marston Moretaine Interchange, Green Lane, Broadmead Road, Stewartby Way, Manor Road and links into Wooton (Fields Road), Marston Moretaine (Beancroft Road) and into Bedford (the A5141 Ampthill Road, and the A6 Branston Way).
- 6.8 There has been extensive engagement with National Highways and their consultants in the development of the Paramics model. The Paramics model is now in a position where it is agreed that it is correctly calibrated and validated, and the best tool available to assess the impact of the Proposed Development on the highway network.
- 6.9 More detail on how the Paramics model is set up in the Construction Scenarios and the Primary Opening Year and Future Year Scenarios can be found in **Annex 10**.

Scenarios Assessed

- 6.10 The transport modelling work supporting the Proposed Development is based on data collected in 2023. The 2023 data was collected during a neutral period (March 2023) for a weekday and a weekend but outside school holidays, to provide a robust basis for assessment. This neutral data is used throughout the assessment, whether considering non-holiday or holiday periods. This is considered to form a robust basis for the delivery of a cautious worst-case assessment. The modelling suite therefore includes a 2023 Existing scenario. The modelling suite also includes a Reference Case, which considers the existing road network and traffic, plus traffic associated with agreed committed developments.
- 6.11 The Proposed Development is anticipated to open in phases over a number of years. Therefore, the Transport Assessment considers the following additional scenarios. The Transport Assessment identifies a Core Scenario that reflects the cautious worst case considered in this report for the purpose of assessment. For completeness, this cautious worst case considers:
- a. Background traffic demand as per the Reference Case;
 - b. The Black Cat highway improvements are in place – These are committed.
- 6.12 The Proposed Development road infrastructure comprising the new A421 Junction, the road through the Site, Manor Road improvements and realignment and a new junction with Ampthill Road – in line with the description of development, and considering a possible and illustrative general arrangement as shown in **Annex 6**;
- a. Traffic signals at the junction of Broadmead Road with Woburn Road – as an identified embedded mitigation;
 - b. A road bridge is delivered over the MVL in the alignment of Manor Rd, and the Manor Road level crossing closed (Option A – see paragraph 5.23) – DfT have advised that such an option should form the basis of the Reference Case and Core scenario models and considered as committed;
 - c. EWR up to Milton Keynes is in place – This means that the Core Scenarios do not assume any improvements in rail services on the MVL or to stations along the MVL, including at Kempston Hardwick. How this is managed is detailed further below;
 - d. Shuttle buses accommodate the demand for rail-based movement from Milton Keynes station to and from the Site – This forms part of the cautious worst case for purpose of assessment as set out in paragraph 5.35;
 - e. An expanded Wixams Station – as an integral part of the Proposed Development;
 - f. Shuttle buses accommodate the demand for rail-based movement between Wixams Rail Station and the Site – related to the Full Wixams Station;
 - g. All rail fares are discounted fares, and visitor parking charges are £35 per day (at Primary Opening Year) – This forms part of the cautious worst case for the purpose of assessment as set out in paragraph 5.56;

- h. Traffic demands for Primary Opening Year and Future Year scenarios as per the Logit model;
- i. Traffic demands from the Lake Zone and West Gateway Zone (in the Future Year assessment scenario); and
- j. Traffic constraints on the edge of the model at M1 Junction 13 and A6 Ridge Road are released – see below.

- 6.13 The Core Scenario modelling does not consider any changes to rail services or stations along the MVL. The modelling does not account for any visitors using the MVL to access the Site. In practice, the current level of rail service on the MVL is far too limited in terms of frequency and capacity (the size of trains operated on the line forms the main constraint), and Kempston Hardwick and Stewartby stations too remote from the entrance to the TP, for rail travel via Kempston Hardwick or Stewartby stations to form an attractive route for visitors to the TP. It must be noted that the use of the MVL, and Kempston Hardwick or Stewartby stations as a route for visitors to the Theme Park will not be promoted by UDX. If an issue arises at the Kempston Hardwick Station or the Stewartby Station, it will be dealt with through management by NR, either at the station or on-board trains.
- 6.14 In addition, various sensitivity tests have been run, in order to provide further confidence in the cautious worst case identified for the purpose of assessment. They include:
- a. EWR to Cambridge along with a new EWR station at the Site for the Future Year scenario;
 - b. Peak rail fares applied at peak times;
 - c. Average construction phase scenario; and
 - d. Primary Opening Year plus construction scenario.
- 6.15 The implications of simply closing the level crossing on Manor Road (Option B), as an alternative to the committed road bridge, have also been tested, using Scenario 5 below as a basis. This is detailed in **Annex 7**.
- 6.16 **Table 6-1** provides a summary of the key components of the scenarios assessed in the Transport Assessment.

Table 6-1: Scenarios Assessed

Scenario Number	Scenario Name	Test	Description
1	2023 Existing	Core Scenario	This is assessing the existing road network and existing traffic.
2	2023 Existing plus Peak Construction	Core Scenario	This is the existing road network and traffic plus traffic associated with peak construction. The assessment is made against the 2023 Existing traffic flows as this represents the greatest proportional increase in traffic and because peak construction traffic could occur at any time before 2029. In addition, by 2029 other mitigation infrastructure improvements may have come forward which could offset the potential impacts of construction traffic.
2a	2023 Existing plus Average Construction	Core Scenario	This is the existing road network and traffic plus traffic associated with average construction. This has also been assessed against 2023 Existing traffic flows for the reasons set out above.
3	Reference Case	Core Scenario	This is the existing road network and traffic plus traffic associated with agreed committed developments.
4	Primary Opening Year – Reference Case plus Development	Core Scenario	This is the existing road network and traffic plus traffic associated with agreed committed developments plus Primary Opening Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only with a shuttle bus service operating between Milton Keynes and the Site and the new A421 Junction being complete. For clarity this scenario does not include trip generating development on either the Lake Zone or West Gateway Zone (There may be some drainage or other infrastructure works required on the Lake Zone and West Gateway Zone to support the delivery of development on the Core Zone). This is a cautious worst case in terms of the Primary Opening Year, as EWR is assessed to Milton Keynes only, and not to Bedford, as is proposed by EWR.

Scenario Number	Scenario Name	Test	Description
4a	Primary Opening Year – Reference Case plus Development plus Construction	Core Scenario	This is the existing road network and traffic plus traffic associated with agreed committed developments plus Primary Opening Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only with a shuttle bus service operating between Milton Keynes and the Site and the new A421 Junction being complete. For clarity this scenario considers construction activities in the Core Zone, Lake Zone and West Gateway Zone. This represents a cautious worst case in relation to the potential impact on the study area, as it includes operational trips associated with Scenario 4, plus construction traffic. In addition, there would not be any further construction occurring on the Core Zone, Lake Zone and West Gateway Zone, without the Theme Park operating in the Core Zone, and therefore the traffic associated with Scenario 4 forms a reasonable baseline to compare Scenario 4a traffic against. Equally, Scenario 5 represents a position where impacts as well as infrastructure are maximised, and as such forms another relevant Scenario to compare Scenario 4a to. This is because, for the purpose of the Transport Assessment, it is important to confirm that the infrastructure in place at Scenario 4 and Scenario 5 is sufficient to accommodate Scenario 4a conditions.
5	Future Year – Reference Case plus Development	Core Scenario	This is the existing road network and traffic plus traffic associated with agreed committed developments plus Future Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only with a shuttle bus service operating between Milton Keynes and the Site and the new A421 Junction being complete. For clarity this scenario considers full development of the Lake Zone and West Gateway Zone.
5a	Future Year – Reference Case plus Development plus full EWR	Sensitivity Test	This is the existing road network and traffic plus traffic associated with agreed committed developments plus Future Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Cambridge with a new station within the Site and the new A421 Junction being complete. For clarity this scenario considers full development of the Lake Zone and West Gateway Zone. This has been undertaken as a sensitivity test, rather than a core scenario as there is no certainty regarding the completion of EWR.

Scenario Number	Scenario Name	Test	Description
5b	Future Year – Reference Case plus Development plus removal of Rail Discount	Sensitivity Test	This is the existing road network and traffic plus traffic associated with agreed committed developments plus Future Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only with a shuttle bus service operating between Milton Keynes and the Site and the new A421 Junction being complete. For clarity this scenario considers full development of the Lake Zone or West Gateway Zone. In this scenario, there is no rail discount applied for visitors. This has been undertaken as a sensitivity test rather than a core scenario as the high volume of new rail passengers to the network serving the Proposed Development means that assuming a form of rail discount for visitors is a cautious worst-case assessment. Assessing the removal of this discount has simply been undertaken to examine the potential impacts of any resultant mode shift.
5c	Future Year – Reference Case plus Development plus M1 Junction 13 as a constraint	Sensitivity Test	This is the existing road network and traffic plus traffic associated with agreed committed developments plus Future Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only with a shuttle bus service operating between Milton Keynes and the Site and the new A421 Junction being complete. For clarity this scenario considers full development of the Lake Zone or West Gateway Zone. This scenario is based on a version of the micro-simulation model that considers likely suppressed demand that would naturally occur at M1J13 as a response to existing and predicted capacity constraints at the junction.

Cumulative Assessment

- 6.17 The cumulative assessment is an estimate of the character of the transport network in the future based on what happens now and what the changes and effects are ‘likely’ to be between now and then.
- 6.18 There are four major building blocks to this assessment:
- The observed character of the network now (this comes with substantial certainty as it is measured and validated);
 - The ‘likely’ change in traffic demands from developments that are ‘committed’ in planning terms, of which there is some uncertainty;
 - The ‘likely’ change in traffic demands and distributions resulting from ‘likely’ changes in transport infrastructure, of which there is some uncertainty; and
 - The ‘likely’ change in traffic demand as a result of the Proposed Development.
- 6.19 In addition is the effect that each of these have on each other.

- 6.20 The basic premise of UK transport planning policy, and on which it relies, is that traffic volumes and demands are influenced by many factors. The policy basis is a Vision-Led basis, as opposed to what it used to be which was a Predict and Provide basis. In traffic terms it means that demands are affected by road capacity, and changes in convenience or congestion, or put another way, traffic volumes are a function of available road space.
- 6.21 Traffic models in isolation are not always good ways to forecast future reality, and often need a human brain interface in order that appropriate judgements are made. Without this degree of caution, traffic models used inappropriately have the tendency to forecast greater congestion and chaos than will occur in reality. Therefore, any assessment needs to be cognisant of the limitations and make judgements in that context.
- 6.22 Most individual development transport assessments tend to look in greater detail close to the location of the development, and less detail further afield. Therefore, when using individual development transport assessments to look at committed developments (development committed in planning terms) in a wide area it is often the case that traffic demands are overestimated as traffic can be forecast as extending into infinity in the wider network beyond the individual areas of interest, whereas in reality they do have trip ends and 'internalisation' within specific regions.
- 6.23 Furthermore, some developments use what is sometimes referred to as a 'worst case' assessment of demand, which assumes something beyond likely reality in terms of local internalisation in order to test a higher volume of traffic on the network. When taken cumulatively that is unhelpful, as planning policy requires a 'likely' scenario, not a scenario which is in danger of tending towards overestimates on a 'just in case' basis.
- 6.24 Furthermore, any such assessment must be cognisant that it is not a one-way street, in that additional traffic demand is loaded onto the network without either new infrastructure, or that demand is not affected by the constraints of infrastructure.
- 6.25 All of this means that the assessments and models are tools from which judgements should be made, as opposed to mathematical boxes of absolute truth.
- 6.26 This is the way that the cumulative assessment has been approached. The evidential bases have been used, along with checks and balances, to make judgements of likely future character in various scenarios.

Reference Case

- 6.27 The Reference Case considered in this assessment forms the basis against which the transport implications of development proposals can be tested. The details of what constitutes the Reference Case are presented in **Annex 10**.
- 6.28 The process followed in preparing the Reference Case within the Paramics model considers the likelihood of known developments likely to affect the modelled network to be delivered, and therefore the degree to which these developments would be considered committed. The traffic generated by these committed developments was then added to the observed traffic in 2023 to derive a Reference Case scenario. It is worth noting that the 2023 baseline data that forms the basis of the Reference Case was collected during a neutral month, and outside any school holiday period. Therefore, it represents a robust baseline position in terms of existing traffic on the network.

- 6.29 The Transport Assessment adopts the convention that committed development traffic is taken into account for all future year scenarios, which means that this is the additional (over measured) background demand for both the Opening Day scenario and the Future Year scenarios. Background growth is derived from committed development noting that this is greater than the TEMPro derived growth to a notional year of 2030.
- 6.30 This is because:
- a. Looking that far ahead, it is highly uncertain what growth looks like. Policy encourages little growth or in some instances negative growth. It would be unreasonable to fetter this position for something not related to the Proposed Development and which is highly uncertain.
 - b. Allowing for notional additional traffic from unknown sources would prioritize future development over the Proposed Development, which is unreasonable and not sensible.
 - c. Any growth beyond committed would come with its own mitigation. Loading traffic on the network, without the mitigation that comes with it, creates an unreasonable and unlikely position.
- 6.31 The full details of the approach taken to deriving a Reference Case is set out in the Technical Note entitled Transport Assessment - Annex 10c - Forecasting Note, in **Annex 10**.
- 6.32 The Reference Case scenario also makes a series of assumptions in terms of committed transport infrastructure changes. **Table 6-2** provides a summary of the changes incorporated within the Reference Cases.

Table 6-2: Committed Schemes – Reference Case

Ref.	Scheme	Description
1.	Wixams Access	Roundabout access to Wixams extension on the B530 Ampthill Road
2.	Southern Wixams Access	Roundabout access to Southern Wixams site on the B530 Ampthill Road
3.	Black Cat Junction	Upgrade of the junction to three-tier with an additional arm servicing the extension of the A421 eastwards
4.	Stewartby Brickworks Access	Re-arrangement of Green Lane and addition of new link road between Green Lane and Stewartby Way/Broadmead Road inclusive of a new railway bridge

- 6.33 The Black Cat improvement scheme is a National Highways scheme comprising an upgrade to the route between the Black Cat roundabout and Caxton Gibbet. A new 10-mile dual carriageway will connect the Black Cat roundabout and Caxton Gibbet roundabout.
- 6.34 According to the National Highways website, the proposals include:
- a. a new three tier junction at Black Cat roundabout which will allow traffic to flow freely on the A1 by travelling under the junction and on the new dual carriageway over the junction;
 - b. new junctions at Caxton Gibbet and Cambridge Road, connecting the new dual carriageway to the existing A428 and increasing the local road network's ability to cope with unforeseen incidents;

- c. new Roxton Road link to connect Wyboston and Chawston;
- d. new bridges crossing over the new dual carriageway at Roxton Road, Barford Road and Toseland Road;
- e. new bridges over the River Great Ouse and East Coast Main Line railway;
- f. retention of the existing A428 between St Neots and Caxton Gibbet for local traffic and public transport;
- g. retention of existing bus stops on the A1;
- h. all local roads maintained although direct access to the A1 from some roads will be removed for safety reasons; and
- i. safer and alternative access to side roads at Chawston, Wyboston and Eltisley.

6.35 The scheme is due to be complete in 2027.

Constraint Release

- 6.36 In order to maximise the volume of traffic passing into our local network for the purpose of assessment, the constraints on the edge of the model have been released, notably at the A1, the M1 and on the A6 at Ridge Road. This enables us to assess the capacity implications of the proposed new road infrastructure in a reasonable maximum traffic flow scenario.
- 6.37 The way in which this has been achieved is to assume constraint release at the A1, noting that this is already underway in practice with delivery of the Black Cat improvements at the A1. On the A6, modelling adjustments have been made that would have a similar effect to minor amendments to the Ridge Road junction. Likewise, at the M1 Junction 13, capacity release has been included in the model, akin to minor changes to the junction.
- 6.38 The M1 Junction 13 is known to currently experience congestion, particularly in the morning and evening peak commuter periods. The Proposed Development traffic for the main part will avoid these background peak periods. The peak demands are largely outside of the typical background peaks. There will though be some effect. Those effects will not be to a degree that would result in a change to the nature of the existing congestion at the junction or the performance of the junction in those periods.
- 6.39 The Future Year traffic demand at M1 J13 for a weekday and Saturday are presented in **Figure 6-2** and **Figure 6-3**.

Figure 6-2: Future Year Traffic Demand at M1J13 – Weekday

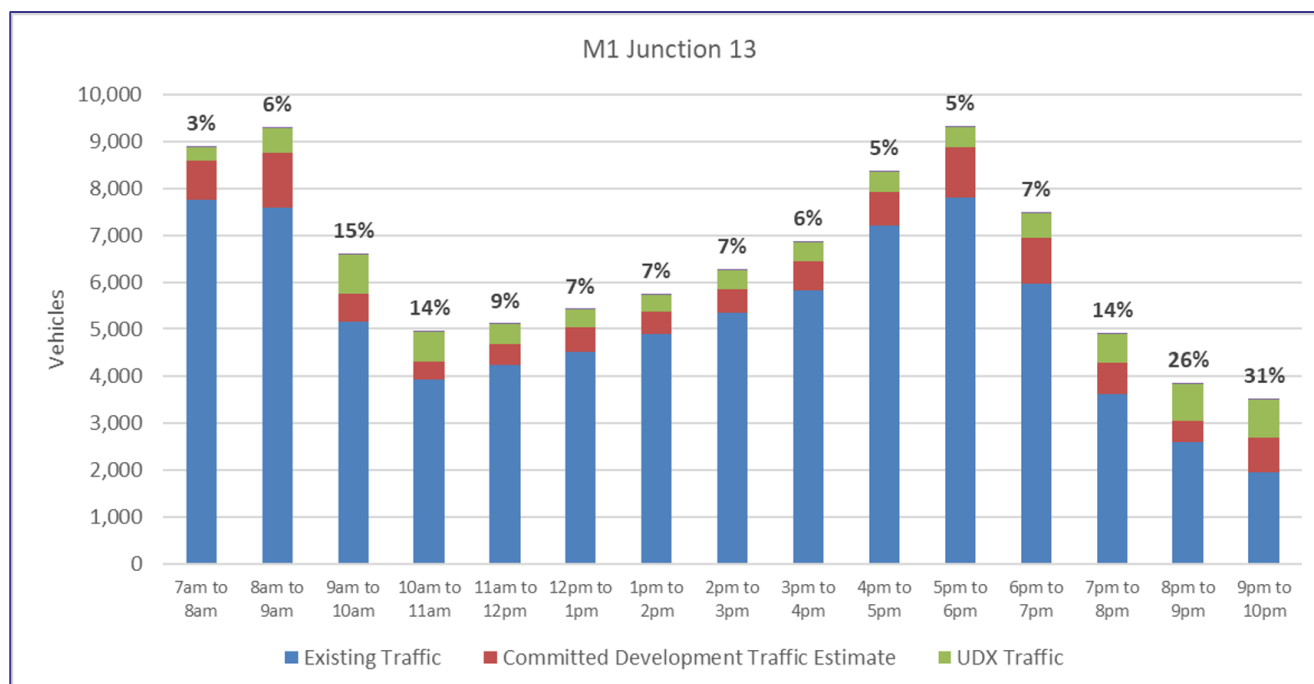
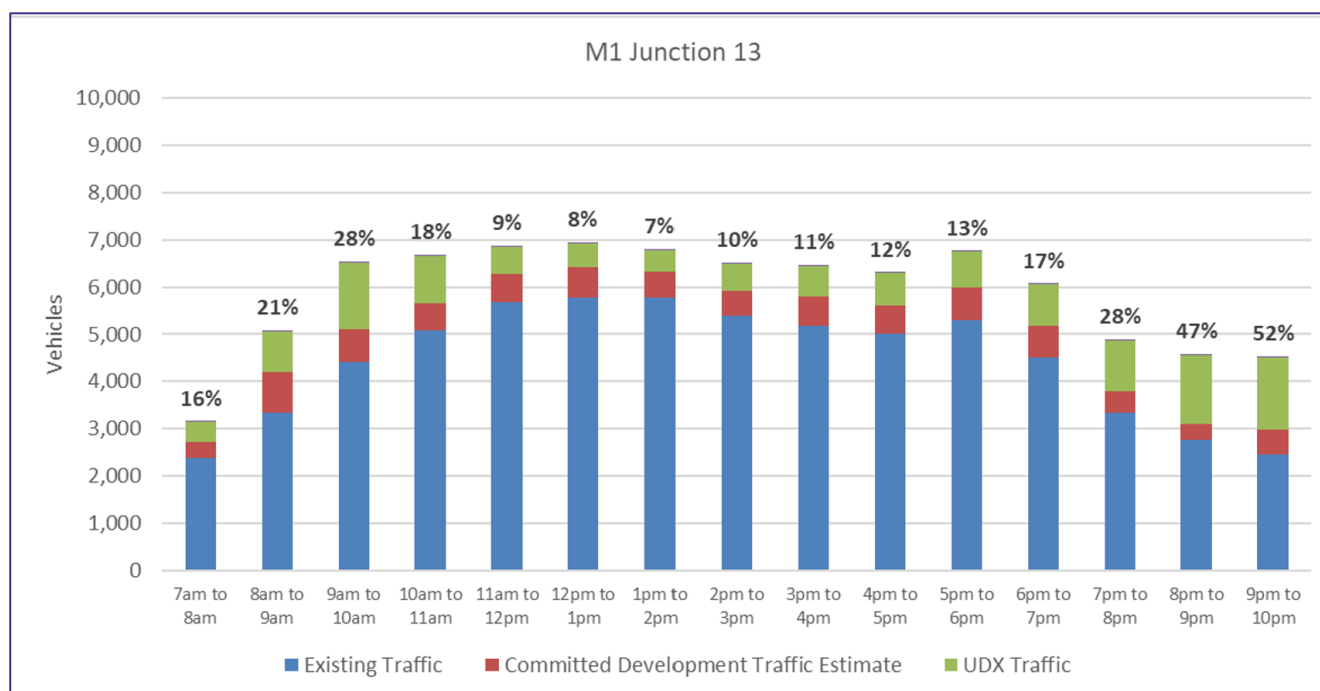


Figure 6-3: Future Year Traffic Demand at M1J13 – Saturday



6.40 Separately, it is understood that the DfT and National Highways are working on identifying capacity improvements at the M1J13 to enable more traffic to pass through the junction. It is not known at this stage precisely what these improvements entail, but there is a reasonable prospect that future improvements will come forward that will allow a greater volume of traffic to pass through the junction and hence into the network local to the Planning Proposal.

- 6.41 It must be noted that the DfT/NH studies at M1J13 are not linked to the Proposed Development. These studies predate any suggestion of a development of the nature proposed at the Site. Furthermore, any capacity improvement schemes at M1J13 are not necessary in National Planning Policy Framework² (NPPF) policy terms to make the Proposed Development acceptable and it is not reliant upon future improvements to M1 J13.
- 6.42 It should be noted that this approach of taking away constraints on the extremity of the modelling network was used for modelling purposes only and developed through discussion with DfT. It demonstrates that the new A421 junction will function at an acceptable level of service should capacity be increased at M1J13.
- 6.43 Further detail is set out in the Development Assumptions Note included at **Annex 10**.
- 6.44 The 2030 Reference Case scenario also considers the future of the three level crossings on the Marston Vale Railway Line included within the modelled area (on Manor Road, on Broadmead Road, on Green Lane). There have been various proposals related to these level crossings and their potential closure/bridging. NR is promoting the delivery of a road bridge over the MVL in the alignment of Manor Road, as a replacement for the level crossing on Manor Road. DfT have indicated that the 2030 Reference Case model should include this bridge, and the delivery of the NR bridge considered as committed. In the Reference Case model, the Broadmead Road and Green Lane level crossings remain in operation.

Seasonality of Demand

- 6.45 As set out in **Section 4** of this report, visitor demand at the Proposed Development would vary across the year. For the majority of the year, the Theme Park would operate at an 'Average' level of demand, with for a few days in a year 'Low' level of demand expected at the Theme Park, and then for another few days/periods in the year 'Busy' and 'Peak' levels of attendance. **Table 6-3** presents the four levels of attendance expected at the Theme Park in terms of percentage number of days in the year and proportion of demand compared to the 'Average' demand.

² Ministry of Housing, Communities and Local Government (2024) National Planning Policy Guidance

Table 6-3: Seasonality at the Theme Park

Levels of attendance	Primary Opening Year	Future Year
'Low' attendance	80 days – 22% of the year 10,000 visitors/day – x0.44 Average	50 days – 14% of the year 18,750 visitors/day – x0.6 Average
'Average' attendance	230 days – 63% of the year 23,000 visitors/day	265 days – 72% of the year 31,250 visitors/day
'Busy' attendance	40 days – 11% of the year 40,000 visitors/day – x1.7 Average	35 days per year – 10% of the year 60,417 visitors/day – x1.9 Average
'Peak' attendance	15 days – 4% of the year 55,000 visitors/day – x2.3 Average	15 days – 4% of the year 81,250 visitors/day – x2.6 Average

- 6.46 The level of attendance described above and expected number of days in the year they relate to must not be confused with 'event days' referred to in other part of the planning submission supporting the Proposed Development. Throughout the year, UDX would organise event days at the Theme Park. These event days would coincide with specific periods during the calendar year such as Easter or Halloween, but also could be related to the promotion of a specific element of the Theme Park. These 'event days' would represent event periods of several days generally around a main 'special day' where attendance may peak. For example, the Halloween event days may run over several weeks either side of Halloween day itself, with Halloween day likely to see a peak in attendance and considered a 'special day'. As such, not all event days will correspond to peak days in attendance at the Theme Park.
- 6.47 It is typical to design transport networks to cope with an 85th percentile level of demand accepting that on the remaining 15% of the time the transport network will be under stress. This same principle has been applied here:
- 6.48 The 'Peak' attendance levels are likely to be reached at key major holiday periods within the year including Christmas/New Year and Easter. These are expected to materialise for only 4% of the year, and therefore it is accepted that for these rare occasions the transport networks would be under stress. However, baseline traffic levels are likely to be lower during these periods than during a neutral month (as per the 2023 Baseline Case), mitigating to some extent the likely implications of this 'Peak' demand. The operation of the Theme Park will allow for the management of and variation in arrival times to make the most of transport capacity available, and influencing mode choice between car and public transport through pricing. This will be particularly pertinent when managing Peak periods at the Theme Park.
- 6.49 The 'Busy' attendance levels are likely to occur at weekends and during the spring/summer months, mainly in the summer holiday period. These are expected to materialise for only 10%/11% of the year and again it is accepted that at these times the transport networks would be under stress. In order to present a robust assessment of the transport implications of the Proposed Development, this report considers a 'Busy' Saturday scenario. This scenario considers a reference case derived from a 'neutral' Saturday to which the 'Busy' attendance level of demand is added. As with the 'Peak' attendance levels, the Transport Strategy for the Proposed Development would allow for managing traffic demand during these 'Busy' periods.

- 6.50 The 'Average' attendance levels are expected to occur for the majority of the year (63% of the year in the Primary Opening Year and 72% of the year in the Future Year) and have been identified as the suitable level of demand to use to identify the implications of the Proposed Development on local transport network as well as the relevant level of demand to use to design the access infrastructure for the Proposed Development for a neutral weekday. The 'Average' attendance levels represent the day-to-day operation of the Proposed Development.
- 6.51 The 'Low' attendance levels are expected to occur during winter months potentially after holiday breaks when people are most likely to be back to daily routines. These are expected to materialise 22% of the year in the Primary Opening Year and 14% of the year in the Future Year. The access infrastructure for the Proposed Development would be designed for a much higher level of demand, and therefore these 'Low' levels of demand would be accommodated. Equally, the implications of the Proposed Development during these 'Low' attendance periods are expected to be less detrimental than assessed in the 'Average' attendance periods.
- 6.52 Therefore, the scenarios set in **Table 6-1** which consider a forecast future demand assess both an 'Average' weekday and a 'Busy' Saturday.

Summary

- 6.53 The assessment of the Construction Scenarios, Scenarios 2/2a and 4a, are included in **Section 8**. The assessment of the Primary Opening Year Scenario, Scenario 4, is included in **Section 9**. The assessment of the Future Year Scenario, Scenario 5 and associated sensitivity tests is included in **Section 10**.

7 The Trip Forecast

- 7.1 Full details of the trip forecast for the Proposed Development across the scenarios considered in this report is set out in **Annex 4** and **Annex 5**. Full details of the trip forecast during the Construction Phase is included at **Section 8**, together with the analysis of the Construction Scenarios.
- 7.2 The analysis of the Construction Phase is included at **Section 8**. The analysis of the Primary Opening Year is included at **Section 9**. The analysis of the Future Year is included at **Section 10**.

Person Trip Forecast

- 7.3 **Tables 7-1 to 7-4** below provide the person trip forecast for the Proposed Development, across all modes, in the case of Scenario 4 and Scenario 5, both for an Average Weekday and a Busy Saturday.

Table 7-1: Proposed Development Person Trips – Average Weekday – Scenario 4

Hour start	Car		Coach		Rail (MMRL) to Wixams Shuttle		Rail (EWR) to MK Shuttle		Local Bus		Hotel Shuttle Bus		Taxi		Active Travel	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	88	0	0	0	20	0	4	0	28	0	0	0	0	0	3	0
5	211	113	0	0	48	25	9	5	67	36	0	0	0	0	7	4
6	300	113	0	0	67	25	13	5	95	36	0	0	0	0	10	4
7	775	116	210	0	426	46	135	15	103	37	53	0	72	0	10	4
8	1611	0	596	0	1075	57	359	28	107	0	150	0	205	0	9	0
9	2642	0	1232	0	2159	124	759	60	144	0	284	0	382	0	10	0
10	1785	88	746	304	1335	94	460	40	139	28	172	0	232	0	11	3
11	911	247	316	0	581	55	161	10	93	78	0	0	31	0	8	8
12	578	365	50	316	332	136	97	38	93	91	0	4	14	8	9	9
13	424	365	328	12	201	136	56	38	89	91	0	4	7	8	9	9
14	562	431	50	328	337	204	100	63	88	87	0	8	14	16	8	9
15	383	462	328	37	200	264	63	87	57	73	0	12	7	24	5	7
16	188	593	12	366	103	401	35	137	18	65	0	20	3	41	2	6
17	138	672	316	87	92	525	33	186	2	41	0	29	3	57	0	3
18	138	866	12	669	92	637	33	213	2	41	0	41	3	82	0	3
19	173	1461	304	604	47	1064	16	354	36	103	0	65	0	131	4	8
20	176	2165	0	946	48	1612	16	539	37	116	0	102	0	204	4	8
21	113	2716	304	1136	25	1961	5	651	36	176	0	123	0	245	4	14
22	0	337	0	0	0	76	0	14	0	107	0	0	0	0	0	11
23	0	84	0	0	0	19	0	4	0	27	0	0	0	0	0	3
Total	11195	11195	4805	4805	7187	7461	2353	2486	1232	1232	660	409	974	816	111	111

Table 7-2: Proposed Development Person Trips – Busy Saturday – Scenario 4

Hour start	Car		Coach		Rail (MMRL) to Wixams Shuttle		Rail (EWR) to MK Shuttle		Local Bus		Hotel Shuttle Bus		Taxi		Active Travel	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	94	0	0	0	21	0	4	0	30	0	0	0	0	0	3	0
5	227	121	0	0	51	27	10	5	72	38	0	0	0	0	7	4
6	321	121	0	0	72	27	14	5	101	38	0	0	0	0	10	4
7	1141	124	440	0	665	52	193	16	115	39	88	0	127	0	10	4
8	2608	0	1247	0	1743	70	519	29	128	0	250	0	360	0	9	0
9	4328	0	2594	0	3560	156	1120	66	187	0	457	0	664	0	10	0
10	2827	94	1556	528	2190	115	682	44	169	30	279	0	405	0	12	3
11	1406	264	653	0	936	59	229	11	108	84	0	0	54	0	9	9
12	823	453	86	550	554	192	152	53	106	99	0	8	24	15	9	10
13	571	453	571	22	307	192	81	53	99	99	0	8	12	15	9	10
14	834	586	86	571	545	313	149	92	100	97	0	16	24	30	9	9
15	579	681	571	65	309	424	87	129	64	82	0	24	12	44	6	7
16	312	946	22	636	159	665	48	207	21	78	0	40	6	74	2	6
17	258	1154	550	151	147	893	45	283	4	55	0	56	6	103	0	3
18	258	1445	22	1302	147	1034	45	305	4	52	0	81	6	148	0	3
19	237	2350	528	1274	53	1724	16	511	38	125	0	129	0	237	4	9
20	241	3552	0	1980	54	2642	16	785	39	147	0	201	0	370	4	9
21	121	4389	528	2376	27	3199	5	947	38	216	0	242	0	444	4	15
22	0	361	0	0	0	81	0	15	0	114	0	0	0	0	0	12
23	0	90	0	0	0	20	0	4	0	29	0	0	0	0	0	3
Total	17186	17186	9453	9453	11542	11886	3415	3560	1422	1422	1073	805	1699	1479	119	119

Table 7-3: Proposed Development Person Trips – Average Weekday – Scenario 5

Hour start	Car		Coach		Rail (MMRL) to Wixams Shuttle		Rail (EWR) to MK Shuttle		Local Bus		Hotel Shuttle Bus		Taxi		Active Travel	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
0	39	65	0	0	10	20	0	0	10	20	0	0	0	0	1	2
1	18	35	0	0	7	13	0	0	7	13	0	0	0	0	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	111	0	0	0	38	0	4	0	48	0	0	0	0	0	5	0
5	339	168	0	0	90	42	11	6	114	55	0	0	0	0	12	6
6	589	266	0	0	137	52	15	6	171	65	0	0	0	0	17	7
7	1133	283	259	0	707	62	149	8	186	71	13	0	57	0	17	7
8	2080	153	735	0	1724	37	392	5	182	27	36	0	161	0	14	1
9	3408	160	1476	0	3390	49	823	12	251	27	67	0	309	0	14	1
10	2391	253	895	660	2110	57	502	11	235	54	41	0	187	0	14	4
11	1328	459	390	0	949	90	205	13	152	118	0	0	68	0	11	10
12	968	691	108	687	532	219	116	42	165	149	0	1	30	9	13	12
13	799	737	714	27	355	239	65	42	187	169	0	1	15	9	17	12
14	943	929	108	714	542	383	115	69	173	208	0	2	30	17	15	14
15	838	883	714	81	347	442	92	94	107	159	0	3	15	26	9	13
16	575	1090	27	795	203	649	61	148	50	157	0	6	8	43	3	11
17	476	1162	687	189	174	817	58	199	15	110	0	8	8	60	0	7
18	474	1364	27	1096	172	1029	58	241	13	87	0	11	8	86	0	6
19	525	2003	660	723	105	1693	38	424	58	142	0	18	0	138	5	11
20	501	2862	0	1131	101	2579	38	649	54	149	0	29	0	215	5	11
21	240	3564	660	1357	49	3136	6	785	62	233	0	34	0	259	6	20
22	122	602	0	0	20	140	0	17	20	178	0	0	0	0	2	19
23	91	253	0	0	20	77	0	4	20	87	0	0	0	0	2	9
Total	17987	17984	7460	7460	11781	11829	2749	2775	2278	2278	157	115	893	862	183	183

Table 7-4: Proposed Development Person Trips – Busy Saturday – Scenario 5

Hour start	Car		Coach		Rail (MMRL) to Wixams Shuttle		Rail (EWR) to MK Shuttle		Local Bus		Hotel Shuttle Bus		Taxi		Active Travel	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
0	39	65	0	0	10	20	0	0	10	20	0	0	0	0	1	2
1	18	35	0	0	7	13	0	0	7	13	0	0	0	0	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	119	0	0	0	40	0	5	0	51	0	0	0	0	0	5	0
5	358	178	0	0	95	44	12	6	120	58	0	0	0	0	12	6
6	616	276	0	0	144	54	16	6	180	68	0	0	0	0	18	7
7	1666	293	568	0	1208	65	237	8	201	74	23	0	110	0	18	7
8	3537	153	1608	0	3134	39	640	6	209	27	66	0	311	0	15	1
9	6037	160	3263	0	6186	53	1324	12	302	27	122	0	597	0	15	1
10	4018	261	1960	1276	3807	62	807	12	270	57	74	0	363	0	15	4
11	2106	481	844	0	1696	95	331	13	170	125	0	0	131	0	11	11
12	1353	829	209	1328	917	318	193	61	180	158	0	2	58	17	14	12
13	1012	875	1380	52	545	338	102	61	198	178	0	2	29	17	18	12
14	1342	1179	209	1380	917	574	188	106	187	219	0	5	58	34	16	15
15	1327	1242	1380	157	546	725	129	150	115	170	0	7	29	51	9	13
16	959	1671	52	1537	308	1116	79	240	53	170	0	12	15	84	3	12
17	856	1962	1328	365	277	1468	76	327	16	124	0	17	15	118	0	7
18	854	2382	52	2235	275	1858	76	384	14	100	0	24	15	169	0	7
19	821	3556	1276	1605	118	3050	39	661	61	168	0	39	0	270	5	12
20	797	5301	0	2486	114	4695	39	1020	57	186	0	60	0	422	5	12
21	250	6501	1276	2983	51	5678	6	1230	65	282	0	72	0	507	6	22
22	122	633	0	0	20	147	0	18	20	188	0	0	0	0	2	20
23	91	261	0	0	20	79	0	5	20	89	0	0	0	0	2	10
Total	28298	28295	15406	15406	20434	20493	4300	4327	2504	2504	286	241	1729	1689	193	193

7.4 The predicted person trip demand generated by the Lake Zone and the West Gateway Zone is set out in **Tables 7-5 to 7-6**. They confirm that the Lake Zone and West Gateway Zone represent a small proportion of the entire Proposed Development trip generation, especially for rail use.

Table 7-5: Lake Zone Person Trips – Busy Saturday/Average Weekday – Scenario 5

Hour start	Car		Coach		Rail (MMRL) to Wixams Shuttle		Rail (EWR) to MK Shuttle		Local Bus		Hotel Shuttle Bus		Taxi		Active Travel	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
0	26	52	0	0	10	20	0	0	10	20	0	0	0	0	1	2
1	17	34	0	0	7	13	0	0	7	13	0	0	0	0	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	67	26	0	0	25	10	0	0	25	10	0	0	0	0	3	1
6	133	52	0	0	51	20	0	0	51	20	0	0	0	0	5	2
7	162	71	0	0	58	25	0	0	58	25	0	0	0	0	5	2
8	179	88	0	0	55	27	0	0	55	27	0	0	0	0	3	1
9	307	95	0	0	87	27	0	0	87	27	0	0	0	0	2	1
10	263	72	0	0	70	19	0	0	70	19	0	0	0	0	0	0
11	148	75	0	0	39	20	0	0	39	20	0	0	0	0	0	0
12	168	130	0	0	51	35	0	0	51	35	0	0	0	0	2	0
13	192	190	0	0	63	51	0	0	63	51	0	0	0	0	4	0
14	184	306	0	0	61	87	0	0	61	87	0	0	0	0	4	2
15	114	215	0	0	36	69	0	0	36	69	0	0	0	0	2	4
16	88	248	0	0	27	78	0	0	27	78	0	0	0	0	1	4
17	49	210	0	0	13	64	0	0	13	64	0	0	0	0	0	3
18	39	126	0	0	11	41	0	0	11	41	0	0	0	0	0	3
19	49	60	0	0	13	19	0	0	13	19	0	0	0	0	0	1
20	30	45	0	0	8	14	0	0	8	14	0	0	0	0	0	1
21	50	67	0	0	16	25	0	0	16	25	0	0	0	0	1	2
22	52	103	0	0	20	39	0	0	20	39	0	0	0	0	2	4
23	52	103	0	0	20	39	0	0	20	39	0	0	0	0	2	4
Total	2368	2368	0	0	741	741	0	0	741	741	0	0	0	0	38	38

Table 7-6: West Gateway Zone Person Trips – Average Weekday/Busy Saturday – Scenario 5

Hour start	Car		Coach		Rail (MMRL) to Wixams Shuttle		Rail (EWR) to MK Shuttle		Local Bus		Hotel Shuttle Bus		Taxi		Active Travel	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
0	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	13	0	0	0	13	0	0	0	0	0	1	0
5	6	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0
6	78	72	0	0	1	0	0	0	1	0	0	0	0	0	0	0
7	64	66	0	0	1	0	0	0	1	0	0	0	0	0	0	0
8	66	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	69	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	68	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	73	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	99	98	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	87	84	0	0	13	4	0	0	13	4	0	0	0	0	1	0
14	80	75	0	0	5	13	0	0	5	13	0	0	0	0	1	1
15	74	77	0	0	0	1	0	0	0	1	0	0	0	0	0	0
16	76	79	0	0	0	1	0	0	0	1	0	0	0	0	0	0
17	81	82	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	88	89	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	78	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	69	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	48	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	70	74	0	0	0	5	0	0	0	5	0	0	0	0	0	1
23	39	43	0	0	0	13	0	0	0	13	0	0	0	0	0	1
Total	1325	1322	0	0	41	41	0	0	41	41	0	0	0	0	4	4

Vehicle Trip Forecast

7.5 Tables 7-7 to 7-10 provide a summary of the vehicular trips considered within the assessment.

Table 7-7: Vehicle Trip Forecast – Average Weekday – Scenario 4

SC 4 WD	TOTAL CORE ZONE		WGZ TOTAL		LZ TOTAL		TOTAL VEH	
Time Period	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
07:00 to 08:00	482	135	0	0	0	0	482	135
08:00 to 09:00	736	91	0	0	0	0	736	91
09:00 to 10:00	1115	166	0	0	0	0	1115	166
10:00 to 11:00	803	187	0	0	0	0	803	187
11:00 to 12:00	440	237	0	0	0	0	440	237
12:00 to 13:00	342	291	0	0	0	0	342	291
13:00 to 14:00	307	280	0	0	0	0	307	280
14:00 to 15:00	306	299	0	0	0	0	306	299
15:00 to 16:00	205	273	0	0	0	0	205	273
16:00 to 17:00	103	309	0	0	0	0	103	309
17:00 to 18:00	82	289	0	0	0	0	82	289
18:00 to 19:00	111	355	0	0	0	0	111	355
19:00 to 20:00	187	633	0	0	0	0	187	633
20:00 to 21:00	216	874	0	0	0	0	216	874
21:00 to 22:00	175	1146	0	0	0	0	175	1146

Table 7-8: Vehicle Trip Forecast – Busy Saturday – Scenario 4

SC 4 SAT	TOTAL CORE ZONE		WGZ TOTAL		LZ TOTAL		TOTAL VEH	
Time Period	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
07:00 to 08:00	638	163	0	0	0	0	638	163
08:00 to 09:00	1109	149	0	0	0	0	1109	149
09:00 to 10:00	1715	273	0	0	0	0	1715	273
10:00 to 11:00	1176	264	0	0	0	0	1176	264
11:00 to 12:00	611	266	0	0	0	0	611	266
12:00 to 13:00	434	342	0	0	0	0	434	342
13:00 to 14:00	372	322	0	0	0	0	372	322
14:00 to 15:00	408	367	0	0	0	0	408	367
15:00 to 16:00	281	353	0	0	0	0	281	353
16:00 to 17:00	157	434	0	0	0	0	157	434
17:00 to 18:00	142	447	0	0	0	0	142	447
18:00 to 19:00	179	564	0	0	0	0	179	564
19:00 to 20:00	260	952	0	0	0	0	260	952
20:00 to 21:00	309	1367	0	0	0	0	309	1367
21:00 to 22:00	248	1747	0	0	0	0	248	1747

Table 7-9: Vehicle Trip Forecast – Average Weekday – Scenario 5

SC 5 WD	TOTAL CORE ZONE		WGZ TOTAL		LZ TOTAL		TOTAL VEH	
Time Period	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
07:00 to 08:00	581	161	82	66	192	72	855	299
08:00 to 09:00	858	89	79	64	199	87	1136	240
09:00 to 10:00	1305	165	86	65	297	94	1688	324
10:00 to 11:00	949	212	80	70	242	72	1271	354
11:00 to 12:00	562	308	77	74	149	74	788	456
12:00 to 13:00	431	377	96	98	171	129	698	604
13:00 to 14:00	391	356	93	84	205	188	689	628
14:00 to 15:00	387	390	79	75	166	303	632	768
15:00 to 16:00	316	354	75	77	108	214	499	645
16:00 to 17:00	183	406	77	79	77	247	337	732
17:00 to 18:00	160	380	83	82	46	209	289	671
18:00 to 19:00	197	480	85	90	41	126	323	696
19:00 to 20:00	293	819	75	79	44	59	412	957
20:00 to 21:00	325	1134	63	67	34	44	422	1245
21:00 to 22:00	223	1484	35	49	37	67	295	1600

Table 7-10: Vehicle Trip Forecast – Busy Saturday – Scenario 5

SC 5 SAT	TOTAL CORE ZONE		WGZ TOTAL		LZ TOTAL		TOTAL VEH	
Time Period	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
07:00 to 08:00	747	171	82	66	192	72	1021	309
08:00 to 09:00	1315	115	79	64	199	87	1593	266
09:00 to 10:00	2112	217	86	65	297	94	2495	376
10:00 to 11:00	1445	243	80	70	242	72	1767	385
11:00 to 12:00	798	322	77	74	149	74	1024	470
12:00 to 13:00	547	418	96	98	171	129	814	645
13:00 to 14:00	453	391	93	84	205	188	751	663
14:00 to 15:00	509	464	79	75	166	303	754	842
15:00 to 16:00	466	458	75	77	108	214	649	749
16:00 to 17:00	308	583	77	79	77	247	462	909
17:00 to 18:00	288	629	83	82	46	209	417	920
18:00 to 19:00	327	809	85	90	41	126	453	1025
19:00 to 20:00	406	1297	75	79	44	59	525	1435
20:00 to 21:00	454	1892	63	67	34	44	551	2003
21:00 to 22:00	271	2393	35	49	37	67	343	2509

7.6 From a vehicular trip generation point of view the highest generation scenario considered in the Transport Assessment is Scenario 5b (no rail discount). **Tables 7-11** and **7-12** set out the forecast vehicular trip generation for this Scenario 5b.

Table 7-11: Vehicle Trip Forecast – Average Weekday – Scenario 5b

SC 5b WD	TOTAL CORE ZONE		WGZ TOTAL		LZ TOTAL		TOTAL VEH	
Time Period	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
07:00 to 08:00	650	159	82	66	192	72	924	297
08:00 to 09:00	1056	86	79	64	199	87	1334	237
09:00 to 10:00	1696	160	86	65	297	94	2079	319
10:00 to 11:00	1030	211	80	70	242	72	1352	353
11:00 to 12:00	585	309	77	74	149	74	811	457
12:00 to 13:00	437	380	96	98	171	129	704	607
13:00 to 14:00	395	359	93	84	205	188	693	631
14:00 to 15:00	393	397	79	75	166	303	638	775
15:00 to 16:00	328	364	75	77	108	214	511	655
16:00 to 17:00	194	426	77	79	77	247	348	752
17:00 to 18:00	170	405	83	82	46	209	299	696
18:00 to 19:00	206	613	85	90	41	126	332	829
19:00 to 20:00	299	1051	75	79	44	59	418	1189
20:00 to 21:00	334	1323	63	67	34	44	431	1434
21:00 to 22:00	219	1709	35	49	37	67	291	1825

Table 7-12: Vehicle Trip Forecast – Busy Saturday – Scenario 5b

SC 5b SAT	TOTAL CORE ZONE		WGZ TOTAL		LZ TOTAL		TOTAL VEH	
Time Period	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
07:00 to 08:00	839	192	82	66	192	72	1113	330
08:00 to 09:00	1505	158	79	64	199	87	1783	309
09:00 to 10:00	2480	295	86	65	297	94	2863	454
10:00 to 11:00	1671	311	80	70	242	72	1993	453
11:00 to 12:00	894	358	77	74	149	74	1120	506
12:00 to 13:00	604	470	96	98	171	129	871	697
13:00 to 14:00	507	427	93	84	205	188	805	699
14:00 to 15:00	566	523	79	75	166	303	811	901
15:00 to 16:00	521	503	75	77	108	214	704	794
16:00 to 17:00	348	655	77	79	77	247	502	981
17:00 to 18:00	338	698	83	82	46	209	467	989
18:00 to 19:00	378	917	85	90	41	126	504	1133
19:00 to 20:00	476	1500	75	79	44	59	595	1638
20:00 to 21:00	536	2188	63	67	34	44	633	2299
21:00 to 22:00	332	2756	35	49	37	67	404	2872

8 Traffic Analysis – Construction Scenarios

Introduction

- 8.1 This section focuses on the assessment of the Construction Scenarios of the Proposed Development.

Outline Construction Programme

- 8.2 The outline construction programme for the Proposed Development is set out in the Construction Phasing and Access Plan (Annex 3 of **Appendix 2.3: Outline Construction Environmental Management Plan (Volume 3)** of the ES).
- 8.3 Construction of the scheme would start in 2025 and continue to the Primary Opening Year. After that construction for the Future Year scenario will be combined with operation of the Site.
- 8.4 The construction of the Proposed Development itself will run in parallel with construction of the road accesses, Wixams Rail Station, and NR's construction of the consented Manor Road railway bridge (if bought forward during this period). The assessment presented here also adds the construction implications of the potential EWR Station on the Site for robustness. The Proposed Development includes the safeguarding of land for a potential new EWR station and there is a potential that this station would be delivered within the Construction Phase of the Proposed Development. In addition, there will be overlap with National Highways' Black Cat scheme, and potentially with National Highways' improvement schemes at Junction 13 of the M1 and at the A6/A421 junctions. This is all allowed for within the assessment.
- 8.5 There will be careful integration between all of these works. An Outline Construction Traffic Management Plan (OCTMP) forms part of the scheme's management documents and is provided as Section 3.3 of the **Appendix 2.3: OCEMP (Volume 3)** of the ES.
- 8.6 Construction of the new A421 Junction, including the roads across the West Gateway Zone and the associated bridge over the railway line, would start in 2026 and access for this would be taken from Woburn Road. At this time, and following some preliminary works taken from Ampthill Road and Manor Road, construction of the Proposed Development itself would be taken via Woburn Road/Bedford Road and Broadmead Road until such time as the new access over the MVL line is in place in 2028. Some local construction team member vehicles would access the area from Ampthill Road and Manor Road.
- 8.7 **Figure 8-1** illustrates the various phases of construction work associated with the Proposed Development. The purpose of **Figure 8-1** is to show the likely sequencing of the construction phases of the Proposed Development based on current assumptions. It is indicative and is not submitted for approval. In addition, the specific dates shown in the timeline are also indicative and not submitted for approval.

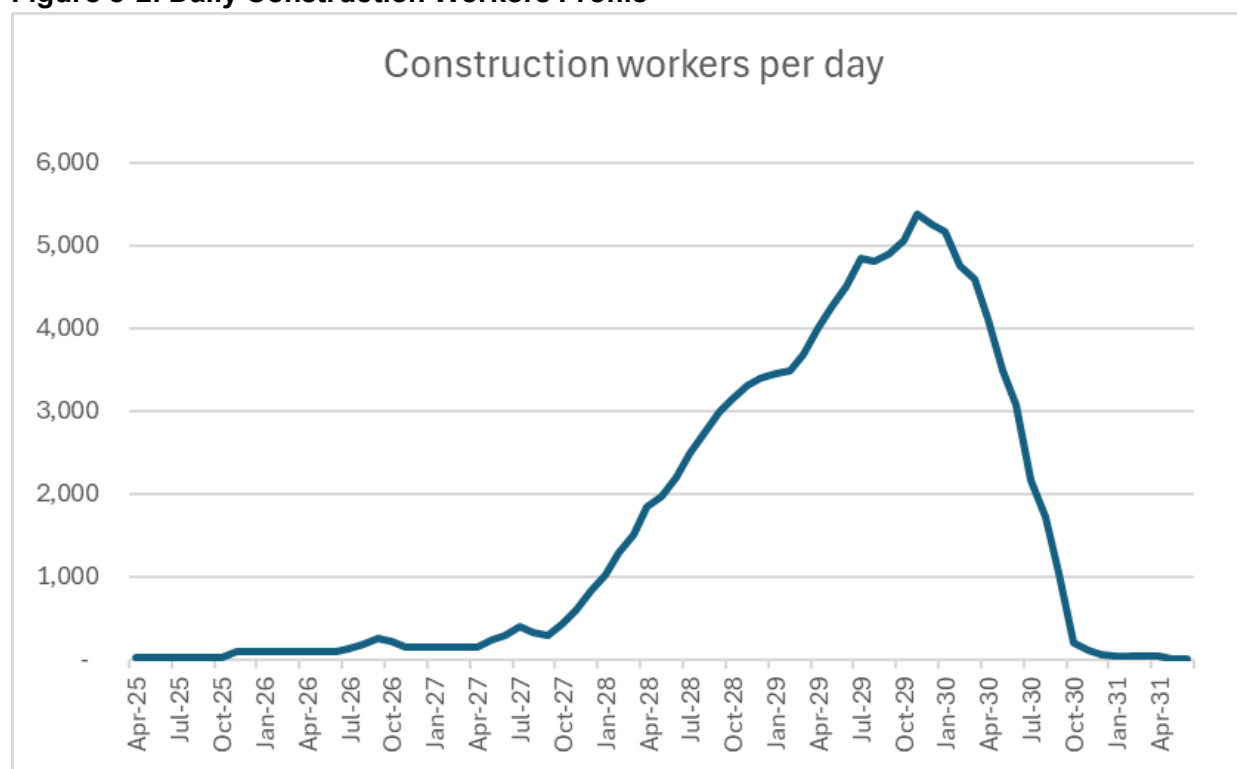
Figure 8-1: Construction Programme



8.8 The Transport Assessment considers a profile of expected construction workers across each phase and a cumulative total, as well as a profile of HDV and LGV deliveries and associated movements, consistent with the construction programme and taking into account UDX's experience of delivering similar destinations elsewhere in the world, and the UDX team's knowledge of the delivery of access infrastructure.

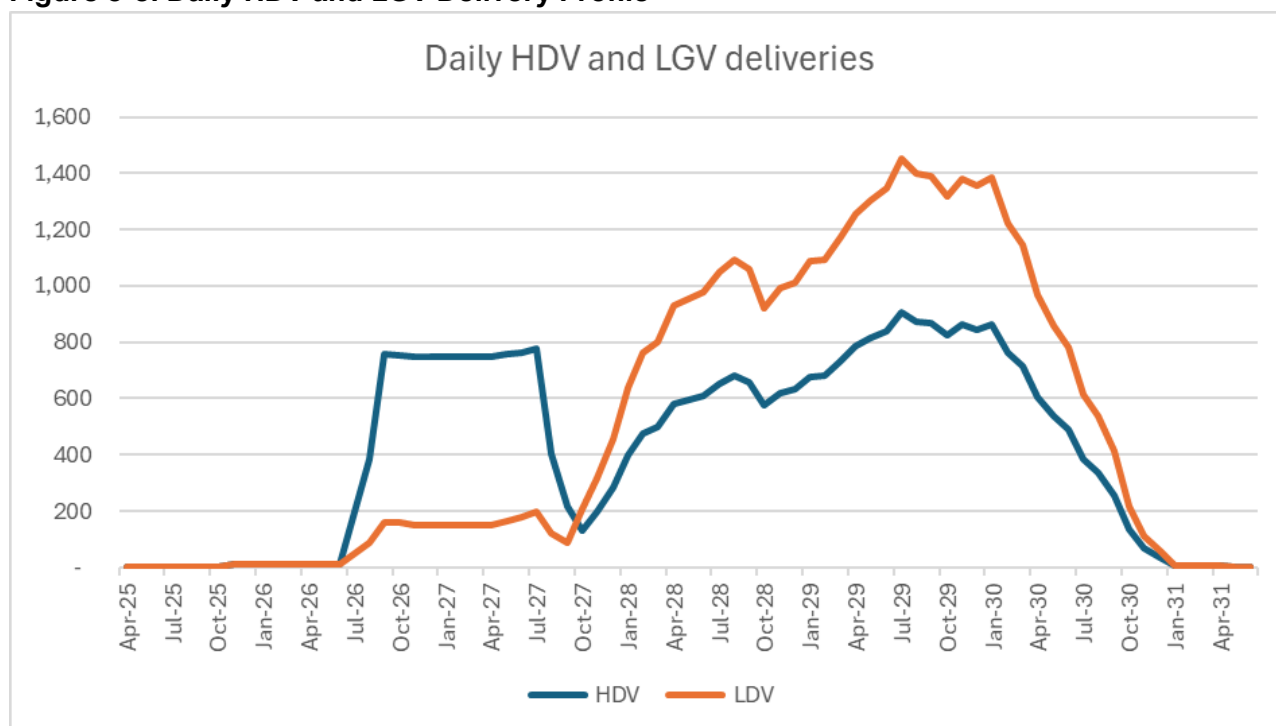
8.9 **Figure 8-2** presents the expected number of construction workers across the Proposed Development Construction Phase (including associated access infrastructure construction). This information is presented in workers per day for each month of construction on the Site.

Figure 8-2: Daily Construction Workers Profile



8.10 **Figure 8-3** presents the expected number of HDV deliveries and LGV deliveries per day for each month across the construction programme.

Figure 8-3: Daily HDV and LGV Delivery Profile



- 8.11 These profiles have been used to define construction traffic caps as defined in paragraph 3.3.87 of Appendix 2.3: OCEMP (Volume 3) of the ES. The transport related implications of the defined peak and average construction traffic associated with the Proposed Development are assessed in this Section.

Construction Access Routes

- 8.12 The construction vehicle routing is set out in the OCEMP (Appendix 2.3: OCEMP (Volume 3) of the ES.

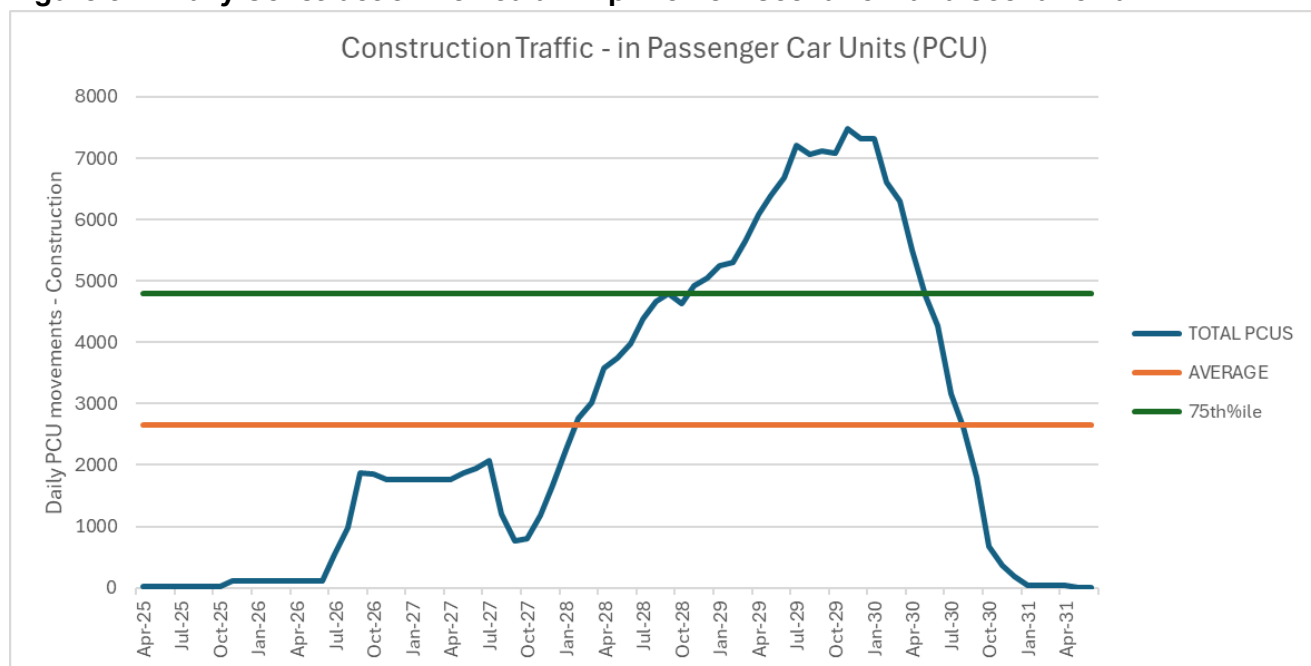
Cautious Worst Case for the Purpose of Assessment

- 8.13 A cautious worst case for the assessment of the construction traffic impacts related to the Proposed Development consider the following:
- Each HDV/LGV delivery represents one inbound movement followed by one outbound movement, so two movements per delivery.
 - To ensure a cautious worst case construction assessment, the assessment considers that 100% of construction workers to the Proposed Development, excluding the Wixams Rail Station would access the Site by car, with an assumed car occupancy of 2.5 workers per car. For Construction workers at the Wixams Rail Station and potential EWR Station, the assessment considers a 100% car mode share and a car occupancy of 2. In practice it is possible that some workers would access the Site by non-car modes and at later points in the Construction Phase some facilities may be constructed such as the Full Wixams Station. The OCEMP (**Appendix 2.3: OCEMP (Volume 3)** of the ES) sets out potential ways of reducing the traffic impact of construction by encouraging a reduction in car borne movements to/from the

Site by construction workers. In addition, a significant proportion of the construction workers are likely to use temporary accommodation in relative proximity to the Site as their involvement in the project would be temporary/specific to a phase of construction. It is likely that these workers would use shared travel arrangements (either car sharing or shuttle buses) in order to access the Site.

- 8.14 Based on the above, a daily vehicular trip profile has been derived for Scenario 2 and Scenario 2a. **Figure 8-4** shows the daily vehicular trips (in pcus) related to the construction of the Proposed Development and associated access infrastructure across the construction programme.

Figure 8-4: Daily Construction Vehicular Trip Profile – Scenario 2 and Scenario 2a



- 8.15 It is worth noting that the traffic associated with the construction of the Proposed Development would have a relatively sharp peak around the end of 2029/early 2030. November 2029 is identified in this assessment as the Scenario 2 period. These peak conditions are likely to last for about 7 months when construction traffic would be within 10% of the peak (so for about 9% of the construction programme). The traffic resulting from Scenario 2a (average construction) results in substantially less vehicle on the network directly related to construction activities. Scenario 2a is only 35% of Scenario 2. The average construction traffic estimate is equal to or higher than the estimated construction movements for 60% of the construction period. This indicates that Scenario 2 predicts a 'sharp' peak likely to occur only temporarily in a short period of time across the entire construction programme. Across the significant majority of time 91% of the 6 year construction period flows would be below Scenario 2.

Assessment of Construction Activities

- 8.16 The Scenarios considered are:
- 2023 Existing referred to as Scenario 1;
 - 2023 Existing Plus Scenario 2 referred to as Scenario 2;
 - 2023 Existing Plus Scenario 2a referred to as Scenario 2a.

Core Construction Assessment - 2023 Scenario 2

- 8.17 In order to provide a robust assessment of construction impacts, the assessment has been carried out against the 2023 baseline flow. Whilst a 2023 does not include any potential traffic growth, which may or may not occur, it also does not include any mitigation which may come forward either, and therefore the network is assessed in its most constrained state. It also ensures the percentage impact of construction traffic is maximised, and not masked by the addition of any background traffic. The 2029 date is also the predicted peak of construction traffic movement. There may be some flex on this, and therefore less emphasis should be placed on the year.
- 8.18 This section of the report considers the traffic implications of Scenario 2 compared to Scenario 1 (2023 Baseline). As set out previously, this 'peak' construction assessment will be temporary and for the majority of the 6 year construction period the assessment presented in Scenario 2a which considers the 'average' construction conditions are likely to prevail.
- 8.19 The Scenario 2 considers the following:
- a. Peak in construction activities in November 2029 would include:
 - i. HDVs – 861 movements per day;
 - ii. LGVs – 1,378 movements per day;
 - iii. Construction Staff – 5,381; and
 - iv. Staff car travel – 4,376 movements per day.
 - b. HDVs and LGVs would access the construction site via Broadmead Road east and west of the Marston Vale Railway Line (for the Core Zone) and from Ampthill Road for Wixams Rail Station only.
 - c. Staff would access the construction site split 50-50 between Broadmead Road and Manor Road (east) via Ampthill Road.
- 8.20 In order to facilitate construction access via Broadmead Road and limit impacts on local communities and other traffic, the construction strategy includes the delivery of a traffic signal scheme at the Bedford Road/Broadmead Road junction (**Appendix 2.3: Outline Construction Environmental Management Plan (Volume 3)**).
- a. HDV/LGV trips have been spread between 08:00 and 18:00. In the first and last hour, vehicles would arrive and depart only respectively.
 - b. On a weekday, staff arrivals have been spread between 07:00 to 10:00 with the majority (60%) arriving between 07:00 to 08:00. Staff departures have been spread between 16:00 to 19:00 with the majority (75%) leaving before 17:00. On a Saturday, staff arrivals are spread between 07:00 and 09:00 with 75% of arrivals before 08:00. Staff departures are spread between 12:00 and 14:00 with 75% of departures before 13:00.

- c. For the purpose of a cautious worst-case assessment, the model considers that Manor Road would be closed at the level crossing for a period during construction. This is to account for a potential closure as a result of the possible construction by NR of a road bridge over the railway in that location. Although its delivery is not fully certain yet, it is understood from discussions with NR that, if delivered, construction of the road bridge could occur within the initial years of the construction of the Proposed Development, so the bridge could be in place by the time of Scenario 2. However, the assessment presented here takes a cautious worst case approach by accounting for the possibility that there could be no access possible from Manor Road (west).

8.21 This assessment is based on detailed outputs from the Paramics model that can be found in **Annex 11**.

Additional Assessments – Scenario 2a Assessment

8.22 Scenario 2a represents the average construction period as set out previously. The assessment in the Scenario 2a case considers the following vehicular movements:

- a. HDVs – 440 movements per day;
- b. LGVs – 524 movements per day; and
- c. Staff car travel – 1,317 movements per day.

8.23 All of the other assessment criteria in Scenario 2 are the same within Scenario 2a to enable a direct comparison.

2023 Scenario 2 and Scenario 2a Assessment

Total Network Statistics

8.24 The first set of results to be reported is the Total Network Statistics. This records the total number of completed trips, the total time taken by all vehicles to pass through the network and calculates the average speed per vehicle and average delay per vehicle.

8.25 **Table 8-1** provides a summary of the completed trips through the modelled network and latent demand (i.e. trips that are not completed) with the addition of Scenario 2 traffic and Scenario 2a traffic referenced against the base traffic on a Weekday and then on a Saturday.

Table 8-1: Completed Trips and Latent Demand

	Scenario 1			Scenario 2			Scenario 2a		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
Completed Trips (Weekday)	79,371	133,018	86,349	81,525	134,460	88,947	80,091	132,766	87,189
Completed Trips (Saturday)	45,160	153,541	66,175	47,672	156,502	66,194	45,978	154,527	66,177
% Completed trips (Weekday)	100%	99%	100%	100%	101%	99%	100%	101%	98%
% Completed trips (Saturday)	97%	100%	100%	97%	101%	100%	97%	100%	100%

- 8.26 As the data in **Table 8-1** suggests, Scenario 2 results in an increase in the vehicle trips completed during the AM, Inter and PM Peaks. There are not noticeable changes in the percentage of completed trips between Scenario 1 and Scenario 2.
- 8.27 In Scenario 2a there are no substantial changes compared to Scenario 2 in terms of the percentage of completed trips on the network.
- 8.28 **Table 8-2** provides mean vehicle speeds across the network modelled, considering the addition of the construction trips compared with 2023 baseline traffic case.

Table 8-2: Mean Vehicle Speed (kph)

Network Mean Speed	Scenario 1			Scenario 2			Scenario 2a		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
Weekday	74	79	75	70	79	62	73	79	73
Saturday	84	80	82	82	77	82	84	79	82

- 8.29 **Table 8-2** shows that on both a Weekday and a Saturday, in all time periods reported, there is a slight reduction in average vehicle speeds accompanying the introduction of construction traffic. During the AM and Interpeak the change during a weekday and Saturday equates to 4 kph or less which is less than the daily variation of 10% experienced across a network. The maximum reduction in average speed (-7 kph) is expected to occur in the PM peak of a Weekday during Scenario 2 however this is only for short period of time and is a localised delay in M1 J13 and Marsh Leys but is only temporary during peak construction. This is shown by comparing Scenario 2a where the speed is only 2 kph lower compared to Scenario 1 during the average construction period. As a result, there are not predicted to be long term severe residual adverse effects as a result of the construction of the development. **Table 8-3** details the average delay in seconds in the model in Scenario 1, 2 and 2a.

Table 8-3: Mean Delay in Seconds – Weekday and Saturday

Network Mean Delay	Scenario 1			Scenario 2			Scenario 2a		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
Weekday	352	297	332	382	306	411	360	301	341
Saturday	281	292	291	302	308	292	287	297	292

- 8.30 **Table 8-3** demonstrates that the average delay likely to be encountered on the network increases slightly during Scenario 2. During a weekday this is an increase of 30 seconds (AM), 9 seconds (Interpeak) and 79 seconds (PM Peak). As set out previously these are localised to the A421 network at M1 J13 and Marsh Leys only during the PM Peak during peak construction only and are short term and temporary. During the remainder of the construction period shown in Scenario 2a the increases compared to Scenario 1 is significantly lower and are 8 seconds (AM), 4 seconds (Interpeak) and 9 seconds (PM Peak).
- 8.31 Overall, the model shows that changes in general conditions across the network modelled across the day are relatively limited. During the PM Peak in Scenario 2 there is potentially temporary short term localised congestion on the A421 network but there are not predicted to be long term severe residual adverse effects. This is shown in Scenario 2a where the effects are very small and there are no significant changes in network performance in the PM Peak.

Journey Times

- 8.32 The Paramics model allows an assessment of variations in journey times along set routes through the model. The following paragraphs set out the difference in journey times along sections of the wider highway network around the Site between Scenario 1, Scenario 2 and Scenario 2a. The key routes considered in this assessment and in the Executive Summary to this Transport Assessment are illustrated in **Figure 8-5** and the other routes are shown in **Figure 8-6**.

Figure 8-5: Journey Time ES Routes

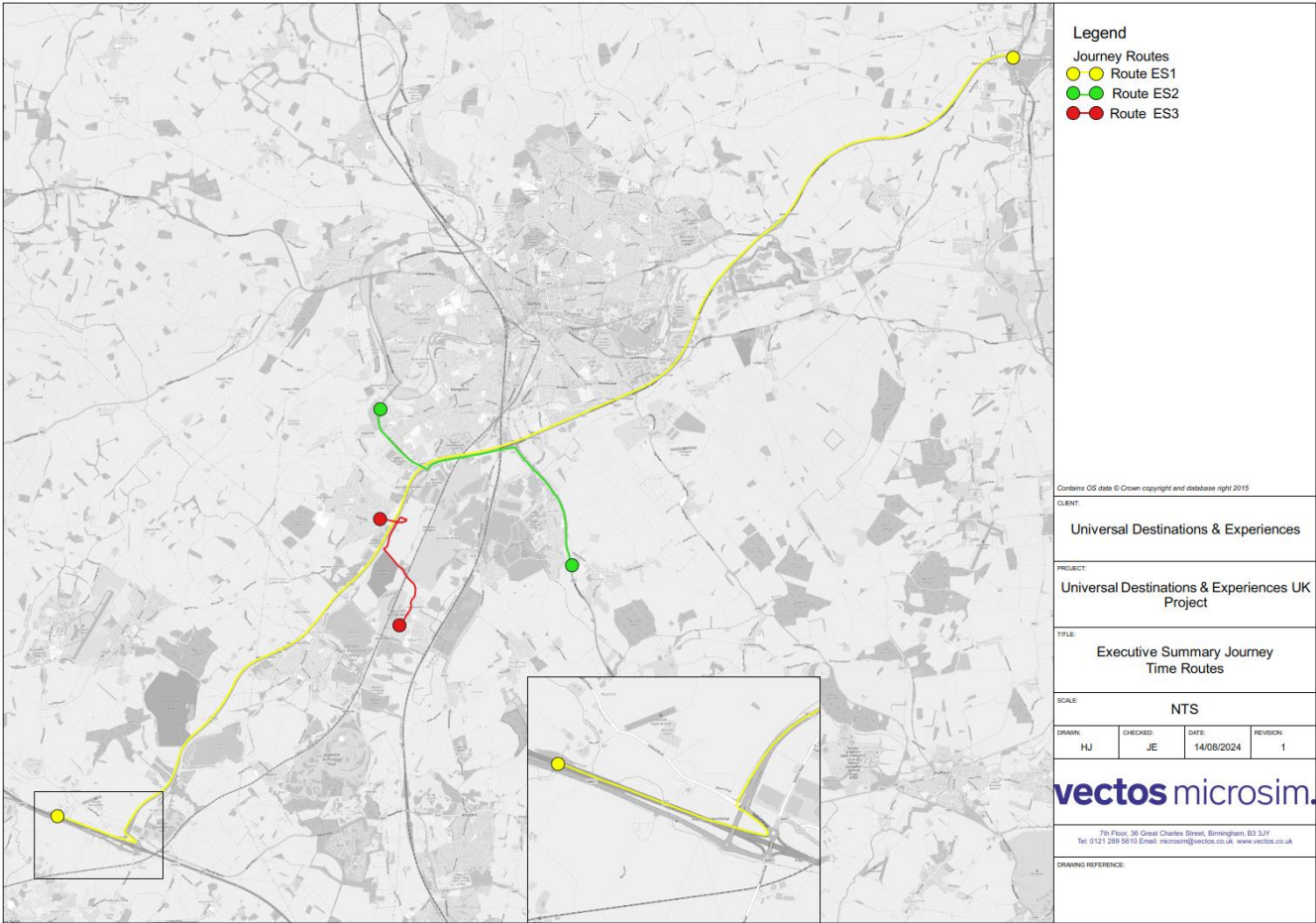
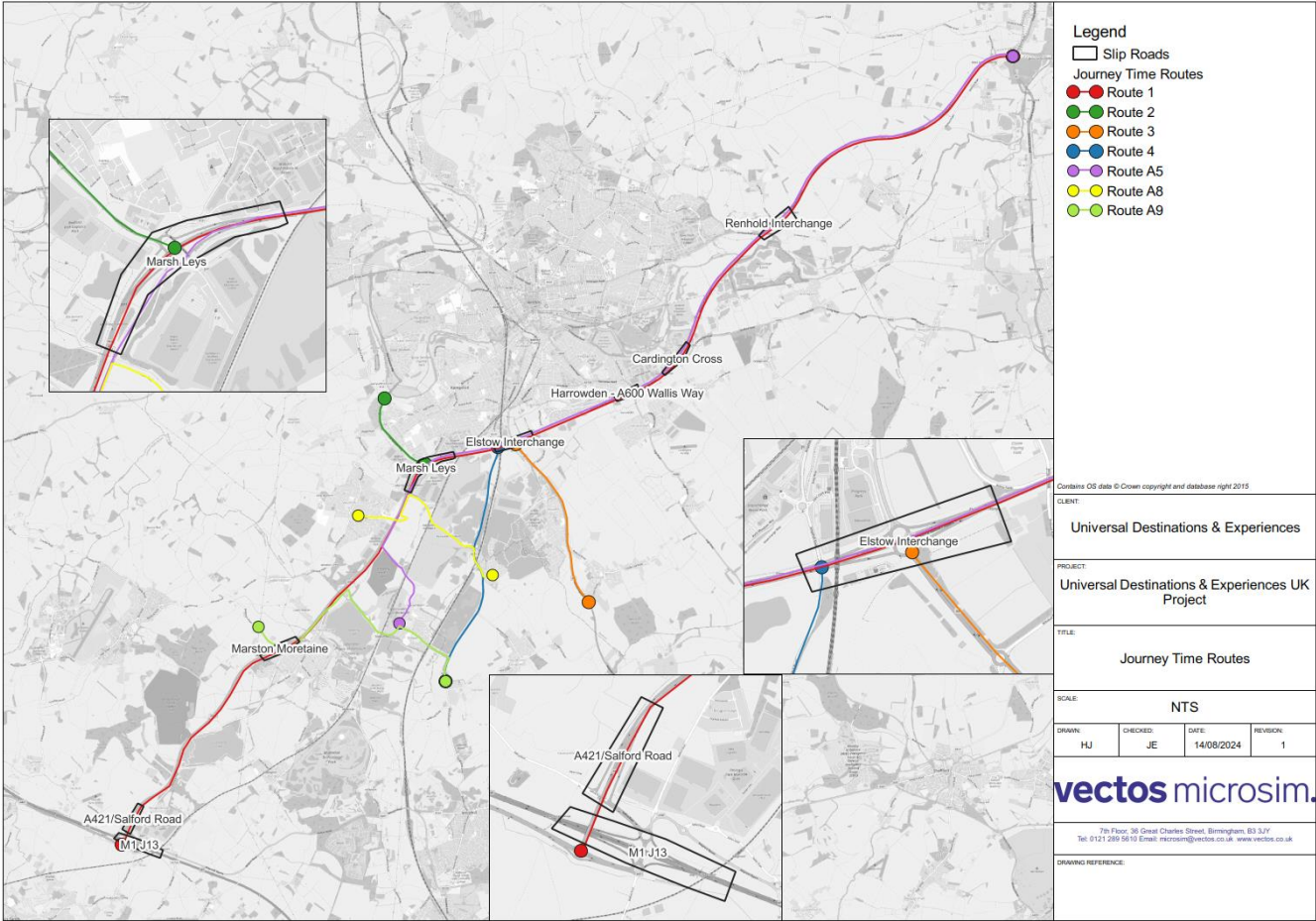


Figure 8-6: Journey Time Routes



8.33 **Table 8-4** provides an overall summary of the average journey times along the key routes for the duration of the model period (07:00 to 22:00) for all scenarios.

Table 8-4: Journey Times Comparison by Route (07:00 to 22:00) (in seconds)

Route	Weekday			Saturday		
	Scenario 1	Scenario 2	Scenario 2a	Scenario 1	Scenario 2	Scenario 2a
Route ES1 – Northbound	1109	1146	1120	1052	1054	1053
Route ES1 - Southbound	1091	1162	1096	1049	1051	1050
Route ES2 – Northbound	420	498	444	382	388	384
Route ES2 – Southbound	375	395	382	352	353	352
Route ES3 – Northbound	213	186	179	203	201	192
Route ES3 – Southbound	208	181	178	203	183	181
Route 1 – A421 – Northbound	996	1004	1004	955	957	956
Route 1 - A421 - Southbound	981	983	983	950	951	950
Route 2 - A6 Branston Way – Southbound	126	132	132	110	110	110
Route 2 - A6 Branston Way - Northbound	130	146	146	109	112	110
Route 3 - A6 South of A421 - Southbound	142	142	142	140	140	140
Route 3 - A6 South of A421 - Northbound	159	167	167	148	150	149
Route 4 - B530 South of A421 - Southbound	275	275	275	273	279	274
Route 4 - B530 South of A421 - Northbound	274	274	274	272	283	272
M1 J13 Off-Slip Eastbound	36	38	38	25	25	25
M1 J13 Off-Slip Westbound	28	29	29	27	27	27
A421/Salford Road Off-slip SB	34	34	34	28	28	28
A421 Marston Moretaine Junction Off-slip Northbound	18	19	19	17	17	17
A421 Marston Moretaine Junction Off-slip Southbound	19	19	19	17	18	17
A421 Marsh Leys Roundabout Off-slip Northbound	36	34	34	35	35	35
A421 Marsh Leys Roundabout Off-slip Southbound	30	29	29	27	28	27
A421 Elstow Roundabout Off-slip Eastbound	21	22	22	18	19	19
A421 Elstow Roundabout Off-slip Westbound	21	22	22	18	18	18
Route A5 - A421 Black Cat to Stewartby Southbound	936	976	913	855	902	868

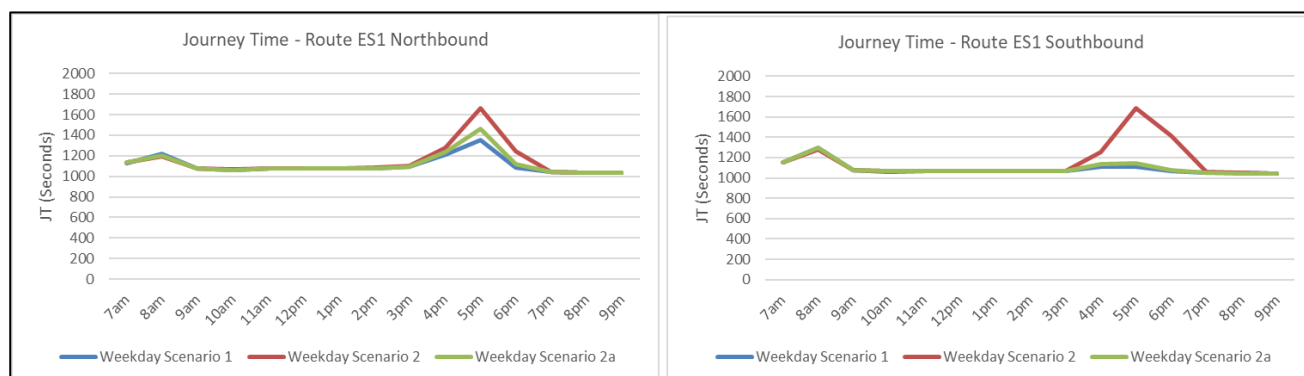
Route	Weekday			Saturday		
	Scenario 1	Scenario 2	Scenario 2a	Scenario 1	Scenario 2	Scenario 2a
Route A5 - Stewartby to A421 Black Cat Northbound	807	815	807	792	811	808
Route A8 - Wixams to Wootton via Manor Road Westbound	279	434	424	272	425	420
Route A8 - Wootton to Wixams via Manor Road Eastbound	285	457	442	276	450	437
Route A9 - B530 to Beancroft Road via Green Lane Westbound	303	321	317	300	314	312
Route A9 - Beancroft Road to B530 via Green Lane Eastbound	304	322	317	301	317	313

- 8.34 The data summarised in **Table 8-4** suggests that the Scenario 2 and Scenario 2a traffic would not significantly affect journey times on the key routes through the modelled wider road network across the entire modelled period.
- 8.35 The most significant average increase in journey time on the network across a whole day will be 172 seconds and is expected to occur along the Wootton to Wixams via Manor Road route. This is the result of the closure of Manor Road to through east-west traffic within the Scenario 2 and Scenario 2a assessments to account for the construction by NR of a road bridge over the Marston Vale Railway Line. This is not part of the Proposed Development but has been included as committed infrastructure and would be constructed in Scenario 2 and 2a.
- 8.36 The following paragraphs detail the changes in journey time across the day for each route considered. In the figures presented, the blue lines represent the Scenario 1 data, the red lines represent the Scenario 2 case data, and the green lines represent the Scenario 2a case data.

Route ES1

- 8.37 In Scenario 2, journey times are predicted to decrease in the AM Peak in the northbound direction by 25 seconds and by 15 seconds in the southbound direction for the same time period. During the PM Peak, journey times will increase by 314 second and 596 seconds in the northbound and southbound directions respectively. As set out previously these are localised to the A421 network at M11 J13 and Marsh Leys only during the PM Peak during peak construction only and are short term and temporary. Outside of the Peaks, the impact of Scenario 2 traffic is not material. Across the whole day, journey times will increase on average by 37 seconds and 71 seconds in the northbound and southbound directions respectively following the addition of Scenario 2 traffic, which is not considered material for this route.
- 8.38 Following the introduction of Scenario 2a traffic, minimal changes in journey times are predicted across the majority of the day on a weekday in both the northbound and southbound directions. Journey times are predicted to increase by 11 seconds in the northbound direction and reduce by 12 seconds in the southbound direction during the AM Peak. During the PM Peak, journey times are predicted to increase by 108 seconds in the northbound direction and by 31 seconds in the southbound direction. These are relatively small increases across the length of the A421 corridor. The journey times across the day for this route are illustrated in **Figure 8-7**.

Figure 8-7: Route ES1 – Weekday – Journey Time



- 8.39 On a Saturday as can be seen in **Figure 8-8**, the introduction of Scenario 2 traffic is expected to increase journey times during the AM Peak in the northbound direction by 4 seconds and in the southbound direction by 1 seconds whereas journey times will decrease by 1 seconds during the PM Peak in the northbound direction and increase by two seconds in the southbound direction.
- 8.40 However, in the average construction scenario (Scenario 2a) traffic there is expected to be minimal variation in journey times across the day with a maximum increase of four seconds experienced in both directions.

Figure 8-8: Route ES1 – Busy Saturday – Journey Time

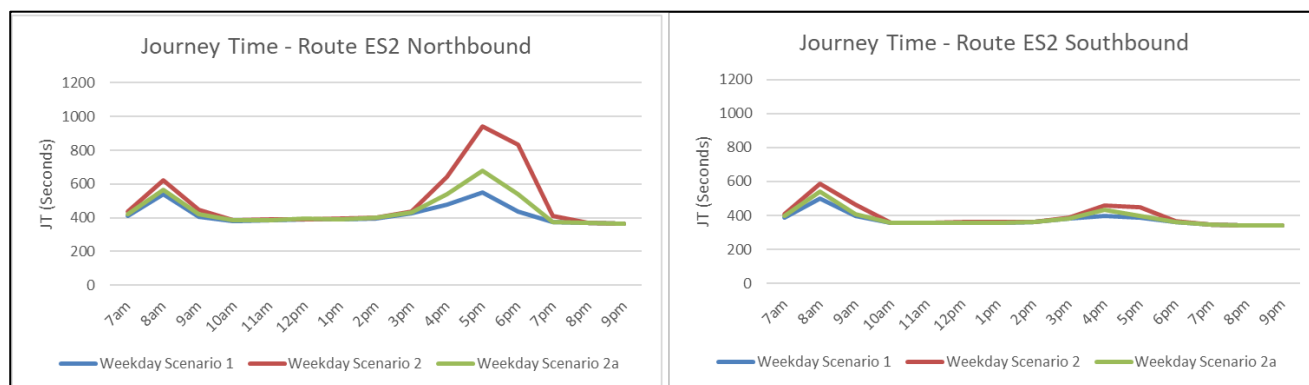


Route ES2

- 8.41 In Scenario 2, journey times are predicted to increase in the AM Peak in the northbound direction by 83 seconds and increase by 88 seconds in the southbound direction for the same time period. During the PM Peak, journey times will increase by 392 seconds and 60 seconds in the northbound and southbound directions respectively. These are largely at the junction of Marsh Leys but only occur for a short period of time during the day and are temporary in nature. Outside of the Peaks, the impact of Scenario 2 traffic is not material. Across the whole day, journey times will increase on average by 78 seconds and 21 seconds in the northbound and southbound directions respectively following the addition of Scenario 2 traffic, which is not considered material for this route.

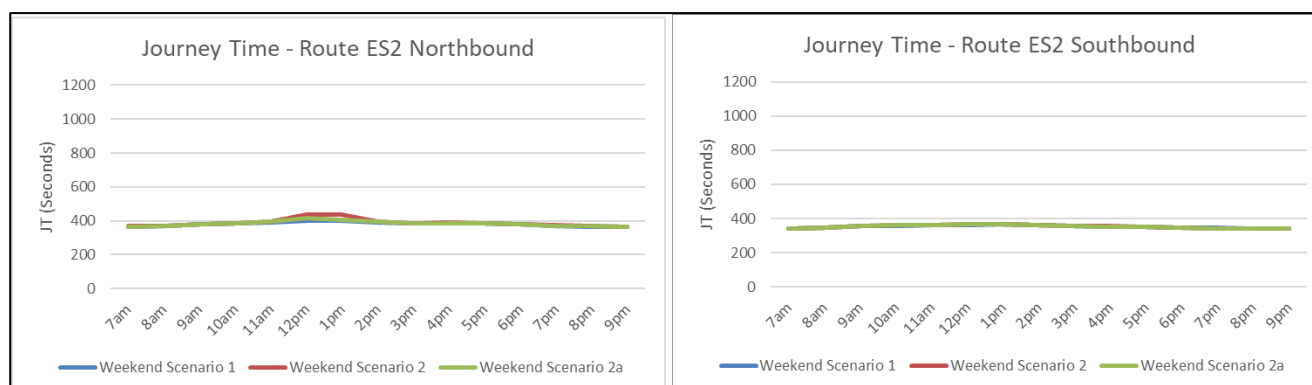
- 8.42 Following the introduction of Scenario 2a traffic, some changes in journey times are predicted across the majority of the day on a weekday in both the northbound and southbound directions. Journey times are predicted to increase by an average of 27 seconds in the northbound direction and by 41 seconds in the southbound direction during the AM Peak. During the PM Peak, journey times are predicted to increase by 132 seconds in the northbound direction and by 35 seconds in the southbound direction. The journey times across the day for this route are illustrated in **Figure 8-9**.

Figure 8-9: Route ES2 – 'Average Weekday' – Journey Time



- 8.43 On a Saturday, Scenario 2 is not shown to affect journey times across the day. The same trend is predicted following the addition of Scenario 2a traffic.

Figure 8-10: Route ES2 – 'Busy' Saturday – Journey Time

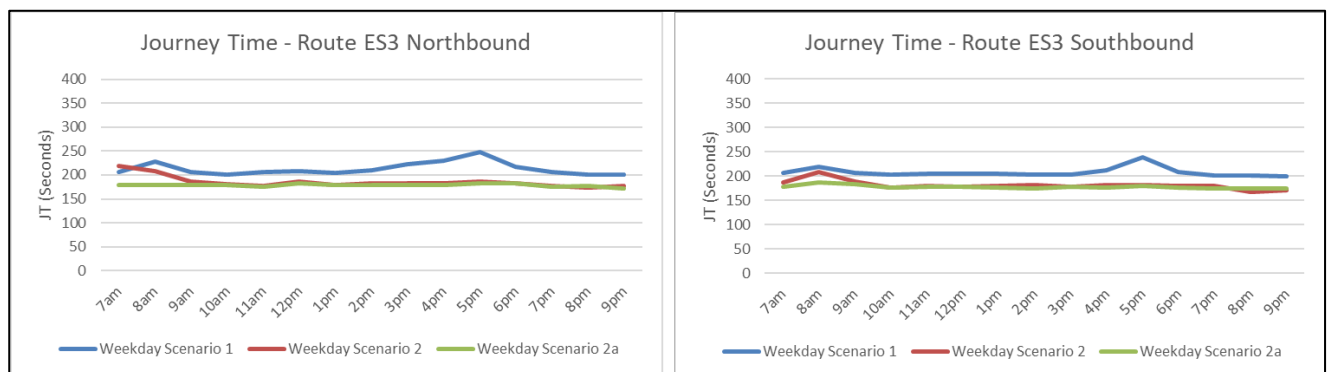


Route ES3

- 8.44 In Scenario 2, minimal changes in journey times are predicted across the majority of the day on a weekday in both the northbound and southbound directions. Journey times are predicted to decrease by 21 seconds in the northbound direction and decrease by 10 seconds in the southbound direction during the AM Peak. During the PM Peak, journey times are predicted to reduce by 60 seconds in the northbound direction and by 58 seconds in the southbound direction.

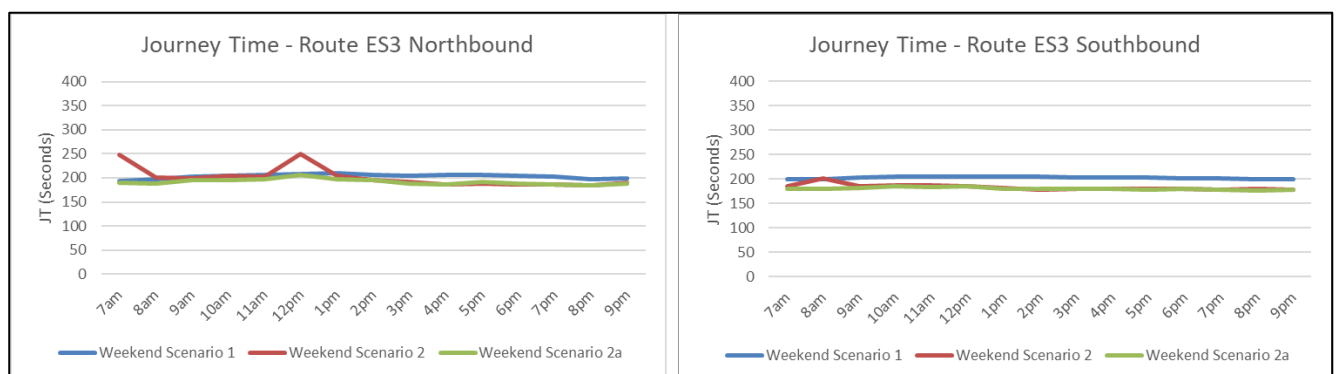
- 8.45 With the introduction of Scenario 2a traffic, journey times are predicted to decrease in the AM Peak in the northbound direction by 50 seconds and by 32 seconds in the southbound direction for the same time period. During the PM Peak, journey times will decrease by 65 seconds and 59 seconds in the northbound and southbound directions respectively. These decreases in journey time are beneficial but are overall not considered to be material. Across the whole day, journey times will decrease on average by 34 seconds and 30 seconds in the northbound and southbound directions respectively following the addition of Scenario 2a traffic, which is not considered material for this route.
- 8.46 The journey times across the day for this route are illustrated in **Figure 8-11**.

Figure 8-11: Route ES3 – Weekday – Journey Time



- 8.47 On a Saturday as can be seen in **Figure 8-11**, Scenario 2 is expected to increase journey times during the AM Peak in the northbound direction by 3 seconds and in the southbound direction by 1 second whereas journey times will decrease by 18 and 23 seconds during the PM Peak in northbound and southbound directions respectively. These decreases in journey time are beneficial but are overall not considered to be material.
- 8.48 Scenario 2a is expected to decrease journey times minimally during the AM Peak by 48 and 20 seconds in the northbound and southbound directions respectively and during the PM Peak, journey times will decrease by 64 and 59 seconds along both the northbound and southbound directions respectively.

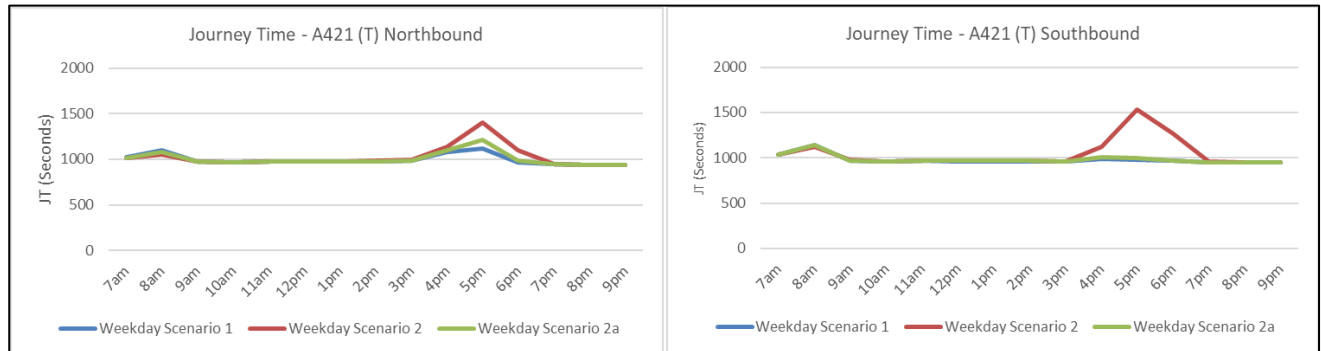
Figure 8-12: Route ES3 – Busy Saturday – Journey Time



A421

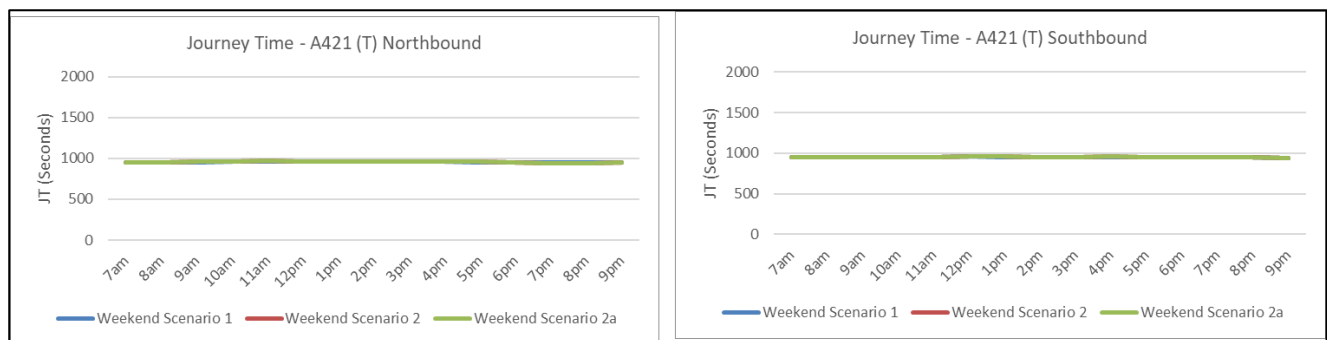
- 8.49 The A421 route, runs from M1 J13 to the A1 Black Cat junction. This route is similar to ES1 and as such the results are similar on the A421 network. For ease of reference, the analysis presented, and conclusions drawn for ES1 should be referred to.
- 8.50 The journey times across the day for this route are illustrated in **Figure 8-13**.

Figure 8-13: A421 – Weekday – Journey Time



- 8.51 On a Saturday, the trends are captured in **Figure 8-14**.

Figure 8-14: A421 – Saturday – Journey Time



- 8.52 Overall, Scenario 2 and Scenario 2a will have a temporary impact on journey times along the A421 related to the Scenario 2 conditions particularly during peak hours. However, this is short term and temporary and across the majority of the construction period (Scenario 2a) these effects are significantly reduced.

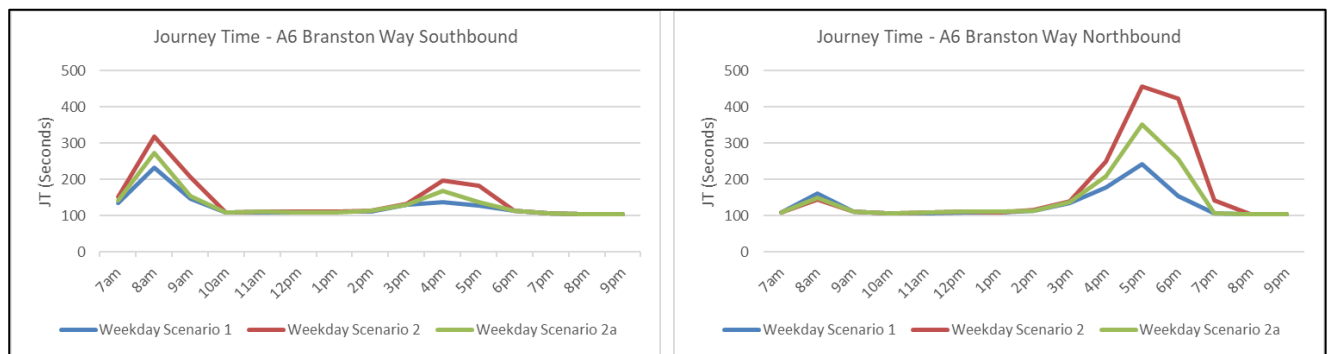
A6 Branston Way

- 8.53 The A6 Branston Way is included within ES2 described previously. For ease of reference, the analysis presented, and conclusions drawn for ES2 should be referred to.
- 8.54 Scenario 2 is expected to increase journey times during the AM Peak in the southbound direction by 86 seconds and by 55 seconds during the PM Peak. In the northbound direction, journey times will reduce by 16 seconds during the AM peak and increase by 268 seconds during the PM Peak.

8.55 Scenario 2a results in weekday journey times along A6 Branston Way to increase by 40 seconds in the AM Peak and by 33 seconds during the PM peak in the southbound direction. In the northbound direction, journey times are expected to reduce by 12 seconds in the AM peak and increase by 101 seconds in the PM peak. Average journey time increase across a whole weekday is expected to be around 7 seconds in the southbound direction and 16 seconds in the northbound direction. These predicted increases are not considered material given the likely strategic nature of trips along this corridor, part of a much longer journey.

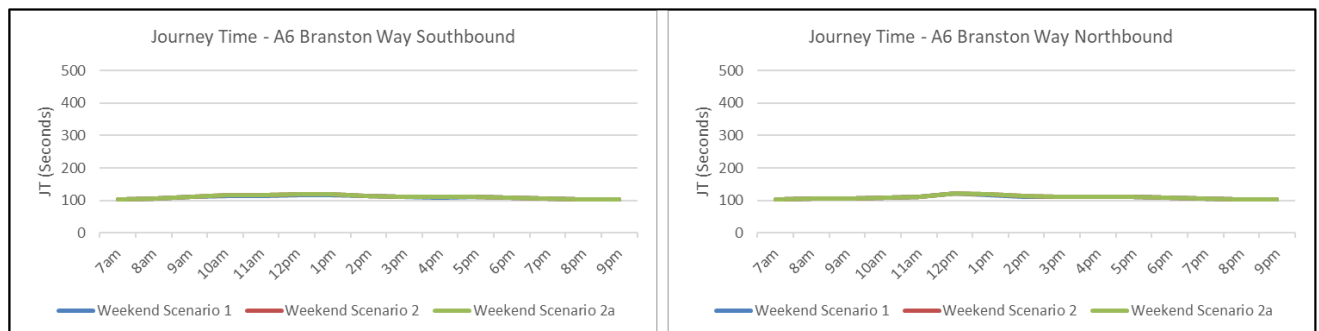
8.56 These journey times across the day are depicted in **Figure 8-15**.

Figure 8-15: A6 Branston Way – Weekday – Journey Time



8.57 These trends are shown in **Figure 8-16**.

Figure 8-16: A6 Branston Way – Saturday – Journey Time



A6 South of A421

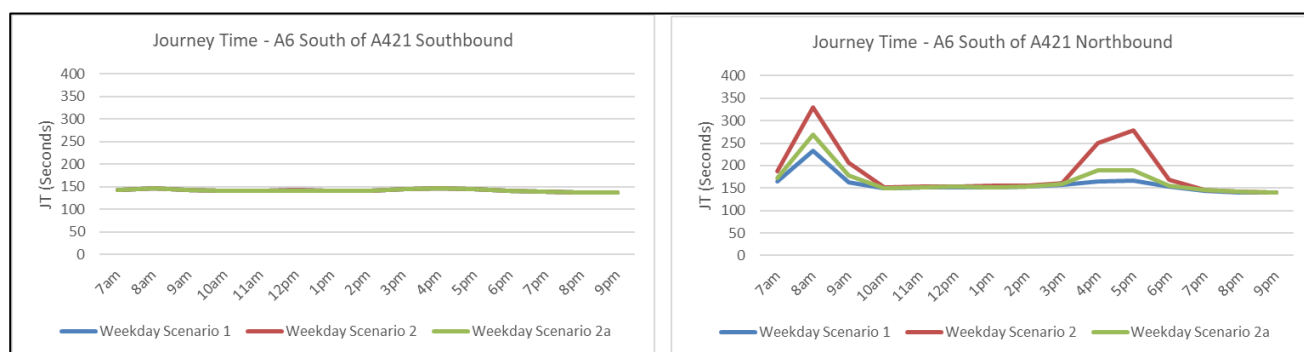
8.58 The results of the assessments on the A6 south of A421 route is shown in **Figures 8.17** and **8.18**. The overall conclusions are that the introduction of construction traffic would not impact journey times materially.

8.59 Journey times within Scenario 2 will remain unchanged along the southbound direction for both the AM peak and PM Peaks of the day. However, there are larger increases in the northbound direction of 97 seconds and 112 seconds are expected for journey times during the AM Peak and PM Peaks respectively.

8.60 On a Weekday, journey times with the introduction of Scenario 2a will remain unchanged along the southbound direction for both the AM peak and PM Peaks of the day. In the northbound direction, increases of 37 seconds and 23 seconds are expected for journey times during the AM Peak and PM Peaks respectively.

- 8.61 These predicted increases in journey time are not material and at worse will be temporary in nature and only occur in the weekday AM and PM Peaks.

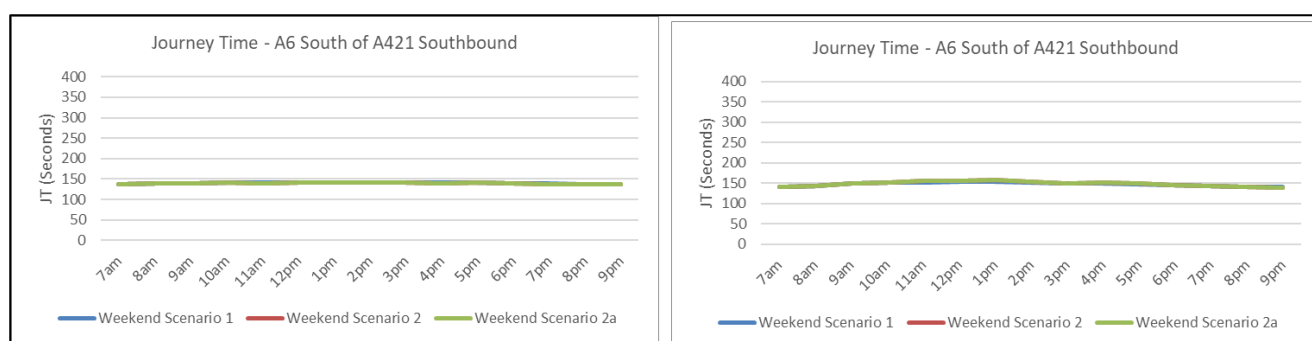
Figure 8-17: A6 South of A421 – Weekday – Journey Time



- 8.62 On a Saturday, introduction of Scenario 2 is not expected to significantly increase journey times and Scenario 2a shows minimal changes in journey time across the day.

- 8.63 These trends are shown in **Figure 8-18**.

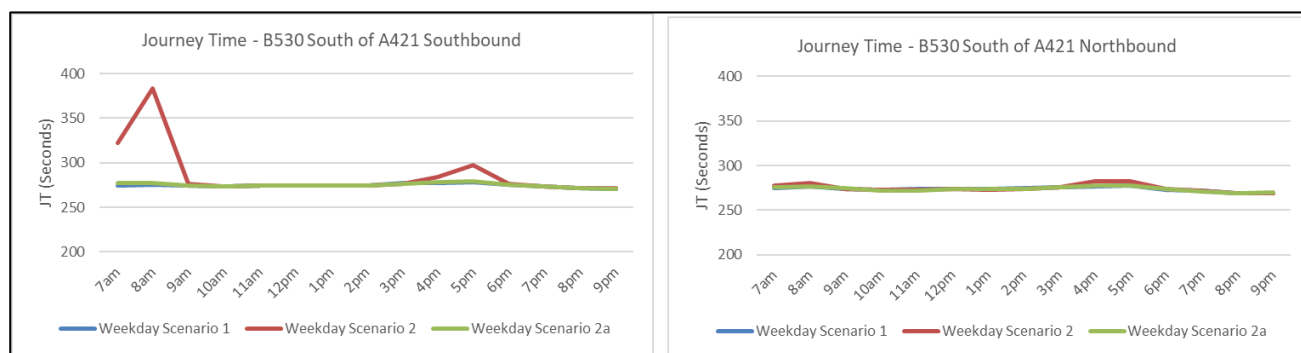
Figure 8-18: A6 South of A421 – Saturday – Journey Time



B530 South of A421

- 8.64 On a Weekday, journey times along the southbound direction will increase with the introduction of Scenario 2 by 109 seconds and 20 seconds for the AM peak and PM Peaks of the day respectively. In the northbound direction, increases of 3 seconds and 5 seconds are expected for journey times during the AM Peak and PM Peaks respectively. The maximum hourly increase in journey time predicted with Scenario 2 traffic is in the southbound direction between 08.00 and 09.00 at +109 seconds. This increase is more noticeable yet still not material in that it will be temporary in nature (Scenario 2, 9% of overall programme duration).
- 8.65 On a Weekday, journey times along the southbound direction with the introduction of Scenario 2a traffic will increase by 2 seconds for the AM peak and 1 second for the PM Peak. In the northbound direction, journey times will remain unchanged during the AM peak and PM Peaks.
- 8.66 These trends are shown in **Figure 8-19**.

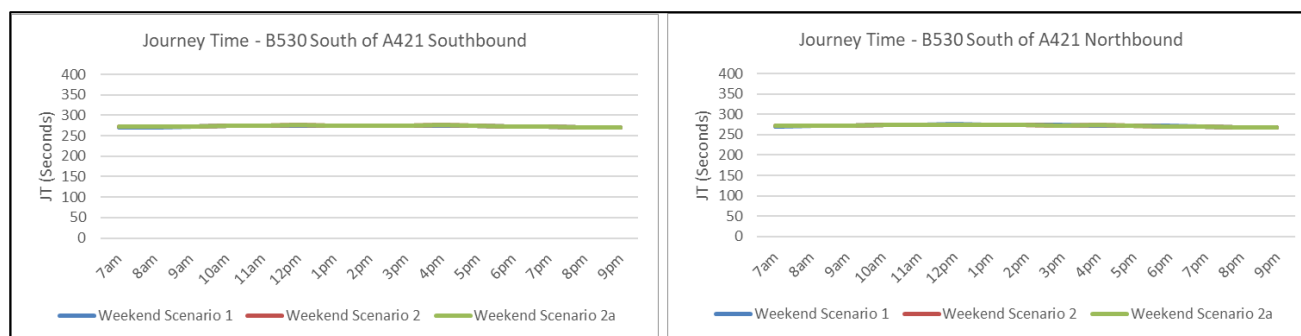
Figure 8-19: B530 South of A421 – Weekday – Journey Time



8.67 On a Saturday, Scenario 2 and Scenario 2 there will be no material change in journey time. With a maximum increase and decrease of 1 second experienced across the day.

8.68 These are shown in **Figure 8-20**.

Figure 8-20: B530 South of A421 – Saturday – Journey Time



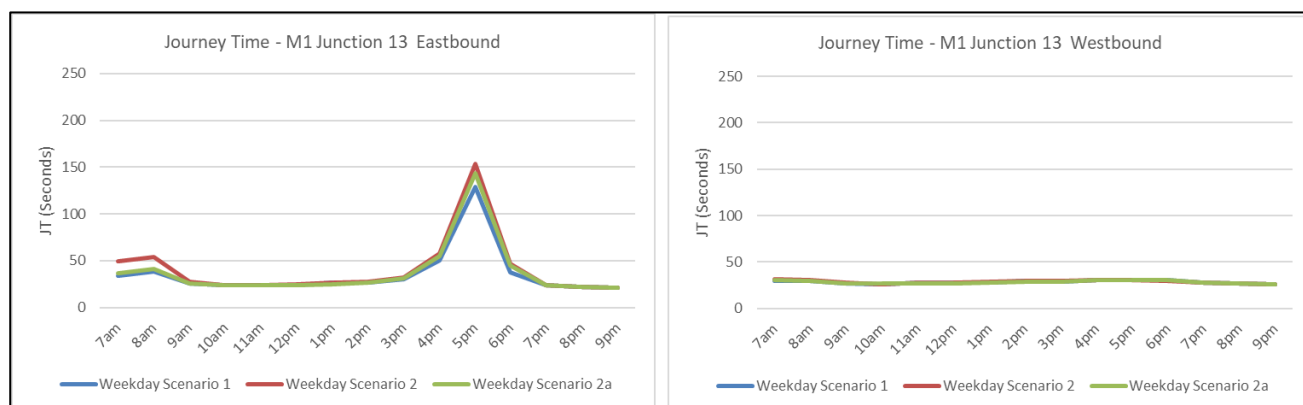
M1 Junction 13

8.69 On a Weekday, in Scenario 2, journey times will increase during the AM peak by 16 seconds and 1 second on the eastbound off-slip and the westbound off-slip respectively whereas for the PM Peak, journey times will increase by 25 seconds on the eastbound off-slip and remain unchanged along the westbound off-slip. These increases are not considered material. As set out previously these are short term and temporary and only account for a small period of time during construction.

8.70 Scenario 2a is predicted to lead to increased journey times on the eastbound off-slip only with a predicted increase in journey time of 3 seconds in the AM Peak and 15 seconds in the PM Peak.

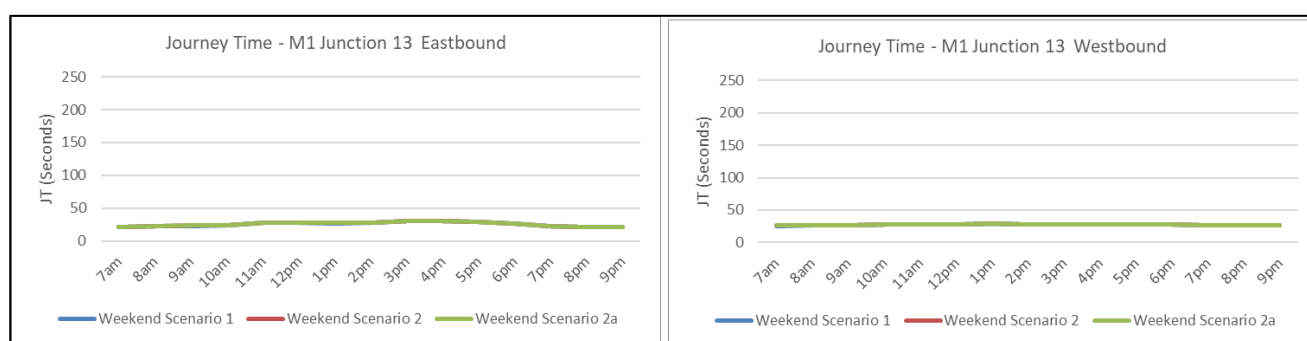
8.71 **Figure 8-21** provides the hourly trends in journey time.

Figure 8-21: M1J13 off slips – Weekday – Journey Time



8.72 On a Saturday, neither scenario affect journey times on both the eastbound off-slip and the westbound off-slip. This is illustrated on **Figure 8-22**.

Figure 8-22: M1 J13 Off Slips – Saturday – Journey Time



A421/Salford Road

8.73 As can be seen in **Figure 8-23**, journey times are predicted to increase on the A421 southbound off-slip into Salford Road, during the PM Peak on a weekday by 252 seconds with the introduction of Scenario 2 and with Scenario 2a by 16 seconds. The rest of the weekday, the construction traffic will not have any effect on journey times on the slip road. Although the increase in journey time predicted with Scenario 2 traffic in the PM peak is noticeable, it is not considered a material effect as it will be temporary in nature (Scenario 2 only) and only affect the typical weekday PM peak hour only.

8.74 On a Saturday no material changes in journey time are expected.

Figure 8-23: A421/Salford Road Off-slip Road – ‘Average Weekday’ - Journey Time

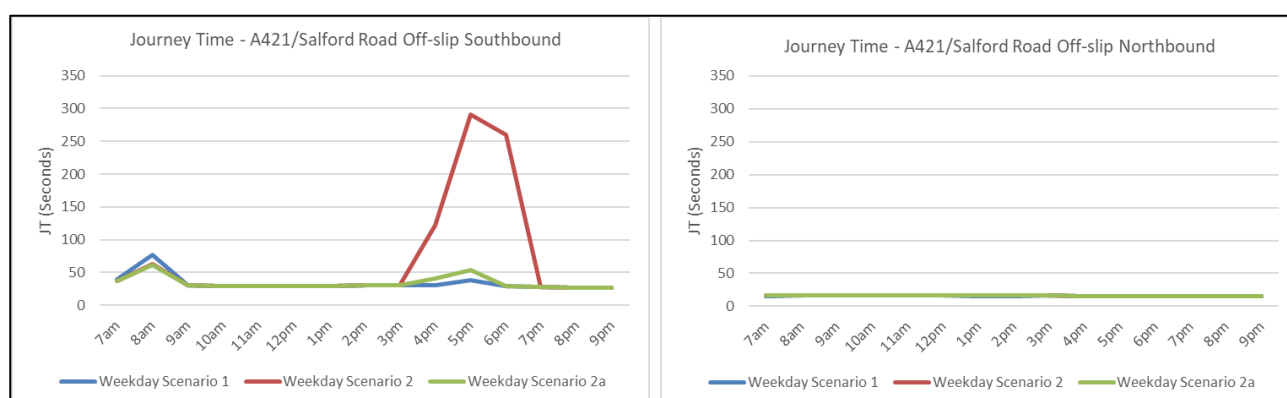
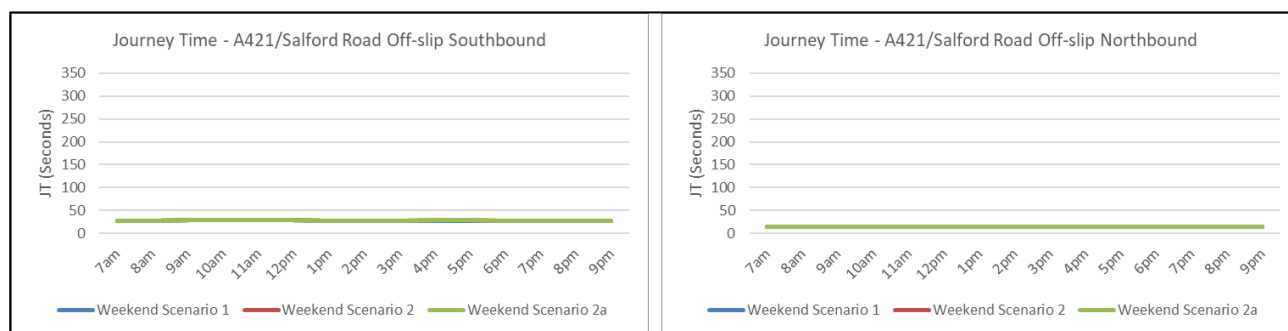


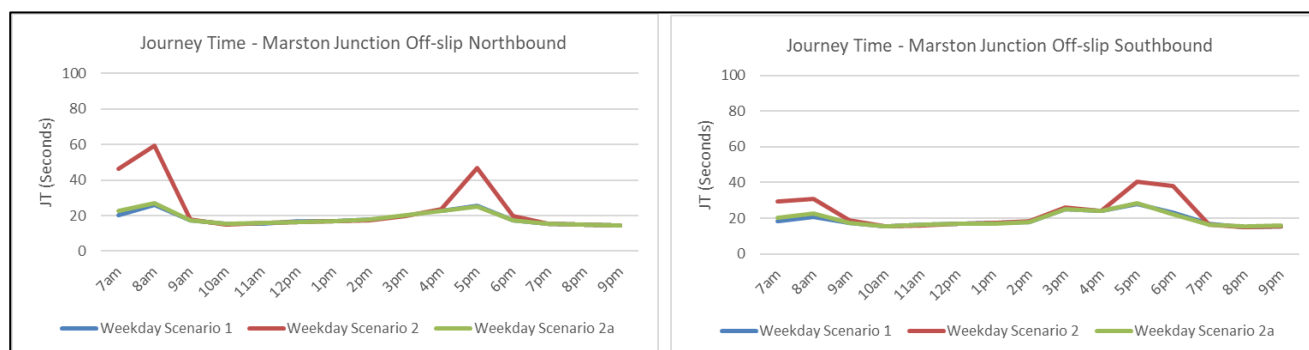
Figure 8-24: A421/Salford Road Off-slip Road – ‘Busy Saturday’ - Journey Time



A421 Marston Moretaine Interchange

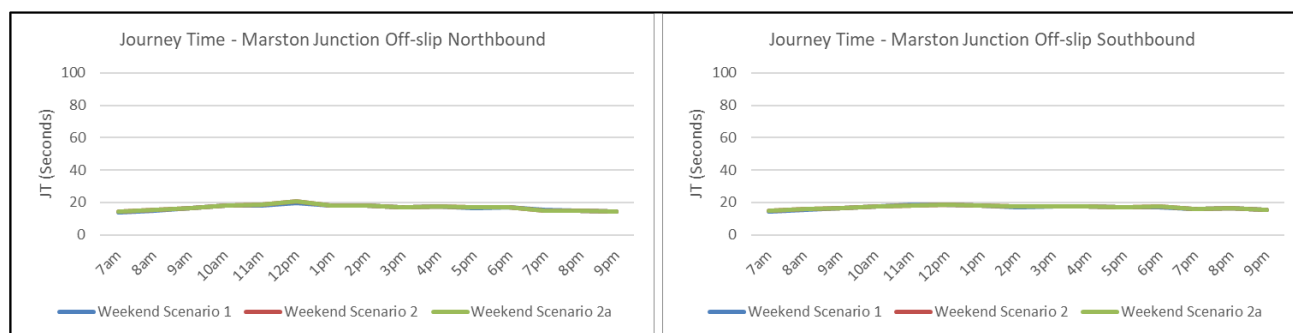
- 8.75 The introduction of Scenario 2 is predicted to increase journey times during the AM Peak on the northbound off-slip road by 33 seconds and by 21 seconds during the PM Peak. On the southbound off-slip, journey times will increase by 10 seconds across the AM Peak and increase by 13 seconds during the PM Peak with a further maximum increase of 15 seconds between 18:00-19:00. These predicted changes in journey time during Scenario 2, as stated previously, are temporary and limited in time (9% of the total construction programme) and only occur for a short window of time during the day.
- 8.76 Following the addition of Scenario 2a, weekday journey times along the Maston Junction off-slip roads are not predicted to materially change across the entire day.
- 8.77 These trends are shown in **Figure 8-25**.

Figure 8-25: A421 Marston Moretaine Off Slips – Weekday – Journey Time



- 8.78 On a Saturday, no material change in journey time are expected in either scenario. **Figure 8-26** shows the predicted journey times across the day for a Saturday.

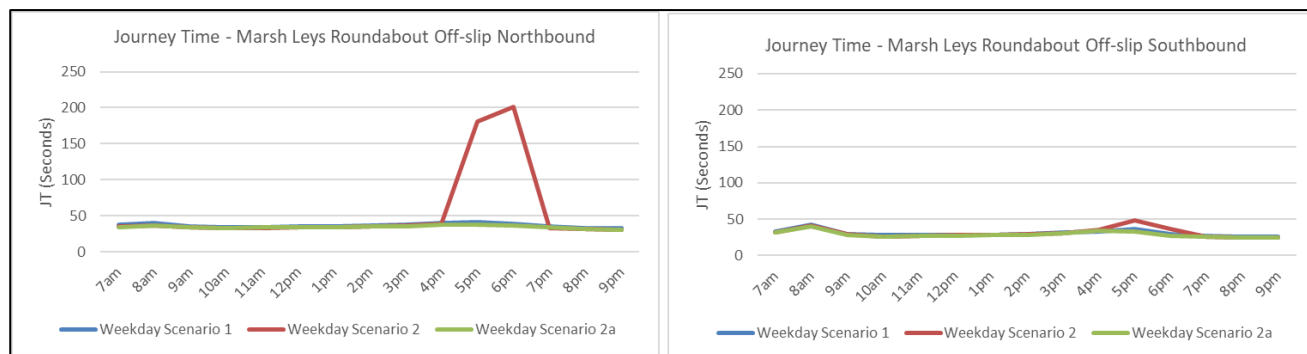
Figure 8-26: A421 Marston Moretaine Off Slips – Saturday – Journey Time



A421 Marsh Leys Interchange

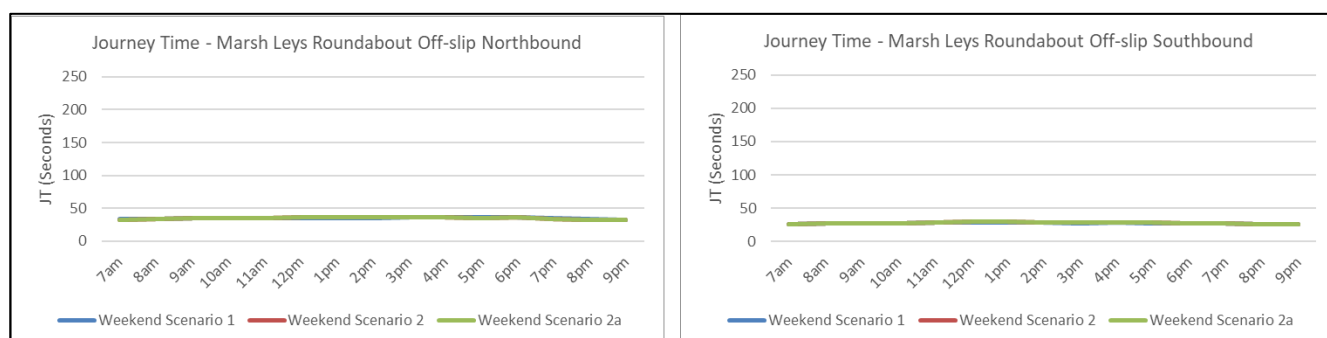
- 8.79 Scenario 2 is predicted to lead to an increase in journey time in the PM peak of 140, seconds on the northbound slip road but a maximum increase of 162 seconds from 18:00-19:00. Journey times remaining broadly unaffected for the rest of the day on this slip road. As stated previously, these effects are temporary and limited in time (9% of the total construction programme) and only occur for a short window of time during the day.
- 8.80 Following the addition of Scenario 2a, weekday journey times on the off-slip roads at the A421 Marsh Leys Interchange are not predicted to vary materially across the Weekday. This is likely to be the typical effect during the overall construction period.
- 8.81 These trends are shown in **Figure 8-27**.

Figure 8-27: A421 Marsh Leys Off Slips – Weekday – Journey Time



- 8.82 On a Saturday, neither Scenario 2 nor 2a is predicted to lead to material change in journey times on the off-slip roads at the A421 Marsh Leys Interchange. This is illustrated in **Figure 8-28**.

Figure 8-28: A421 Marsh Leys Off Slips – Saturday – Journey Time

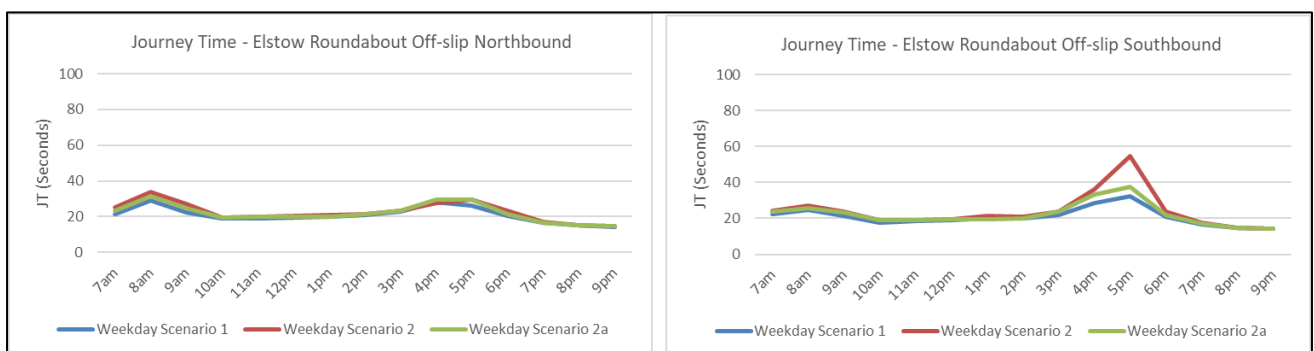


A421 Elstow Interchange

8.83 Scenario 2 is expected to increase journey times during the AM Peak by 5 seconds and 2 seconds in the northbound direction and southbound directions respectively. For the PM Peak, journey times will increase by 3 seconds and 22 seconds in the northbound and southbound directions respectively. The maximum journey time increase over a 1h period is predicted on the southbound off-slip between 17.00 and 18.00 (22 seconds). As stated previously, these effects are temporary and limited in time (9% of the total construction programme) and only occur for a short window of time during the day. Following the addition of Scenario 2a traffic, weekday journey times on the off-slip roads at the Elstow Roundabout are not expected to materially change across the entire assessment period.

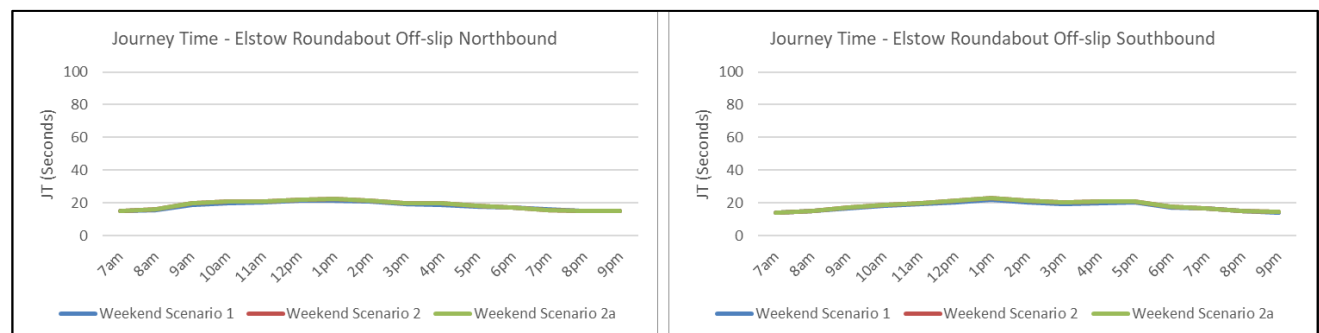
8.84 These trends are shown in **Figure 8-29**.

Figure 8-29: A421 Elstow Off Slips – Weekday – Journey Time



8.85 On a Saturday, neither Scenario 2 nor 2a is predicted to lead to material change in journey times on the off-slip roads at the A421 Elstow Interchange. This is illustrated in **Figure 8-30**.

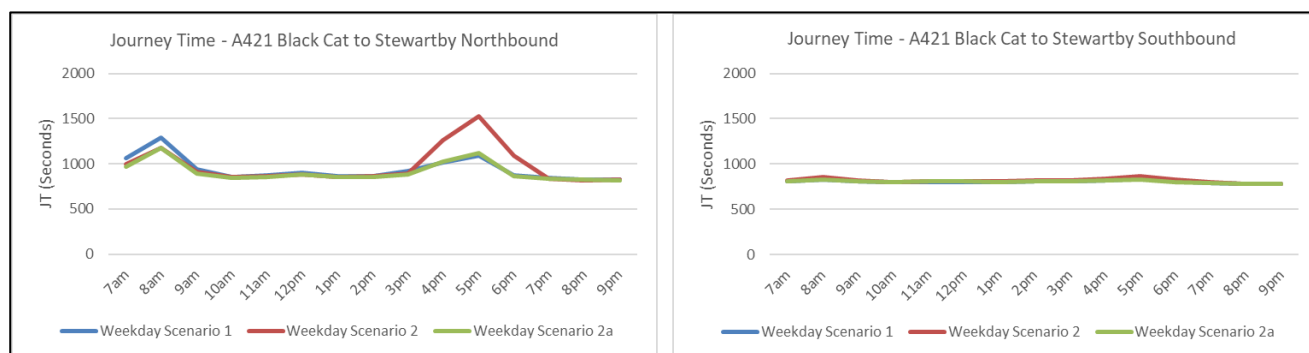
Figure 8-30: A421 Elstow Off Slips – Saturday – Journey Time



A421 Black Cat to Stewartby

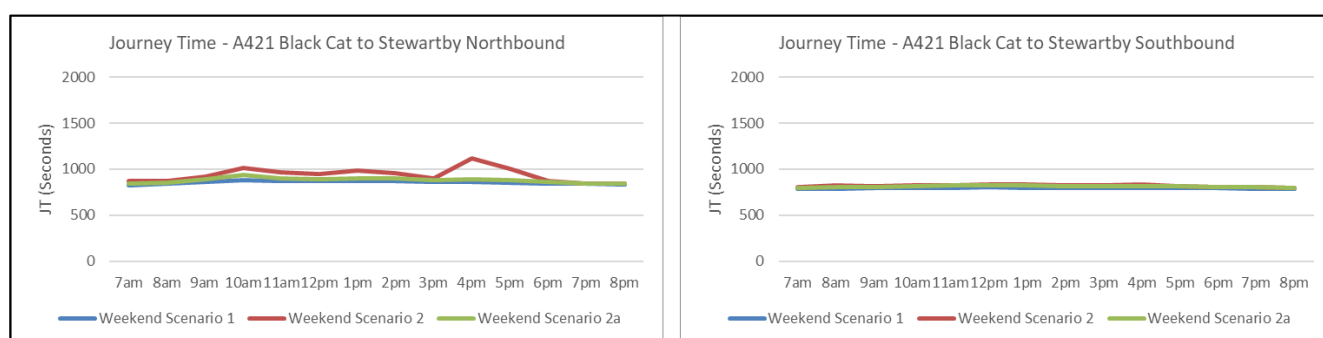
8.86 It can be seen in **Figure 8-31** and **Figure 8-32** that the introduction of construction traffic (average and peak) would only lead to changes in journey times on the route between the A421/A1 Black Cat junction and Stewartby, in the PM Peak on a Weekday. This route illustrates the effect of construction traffic on a longer route originating/ending in the centre of Stewartby.

Figure 8-31: A421 Black Cat to Stewartby – Weekday – Journey Time



- 8.87 Scenario 2 will see journey times only vary marginally across most of the Weekday. However, in the PM peak on a Weekday, journey times are predicted to increase by 439 seconds in the northbound direction. Again, this more noticeable increase in journey time needs to be considered against the temporary nature of the Scenario 2 period, the fact that this level of increase will only occur during the typical weekday Peak. As stated previously, these effects are temporary and limited in time (9% of the total construction programme) and only occur for a short window of time during the day. In Scenario 2a none of these effects are prevalent which demonstrates the short-term temporary nature of the issue which therefore is not considered to be significant.
- 8.88 On a Saturday, in Scenario 2 there are some increases although the route is far quicker than the weekday and as such there is no material effect as a result of the development the during the AM peak and PM peak increases of 30 and 149 seconds are seen respectively. Furthermore, a maximum increase of 258 seconds is seen from 16:00-17:00 This is illustrated on **Figure 8-32**. With the introduction of Scenario 2a traffic, the AM and PM peak on the northbound fall to 14 seconds and 21 second respectively.

Figure 8-32: A421 Black Cat to Stewartby – Saturday – Journey Time



Wixams to Wootton via Manor Road

- 8.89 On a Weekday, Scenario 2 will see journey times increase across the day in both direction, by around 202 seconds during the AM peak and 134 seconds during the PM Peak in the eastbound direction. In the westbound direction, journey times will increase by 184 seconds in the AM peak and 199 PM Peak. This is a similar level of increase to the Scenario 2a traffic test. These are likely to be the result of the closure of Manor Road to construct the NR bridge over the Marston Vale Railway Line assumed within the model. These trends are captured in **Figure 8-33** but are not a direct result of the Proposed Development.

Figure 8-33: Wixams to Wootton via Manor Road – Weekday – Journey Time

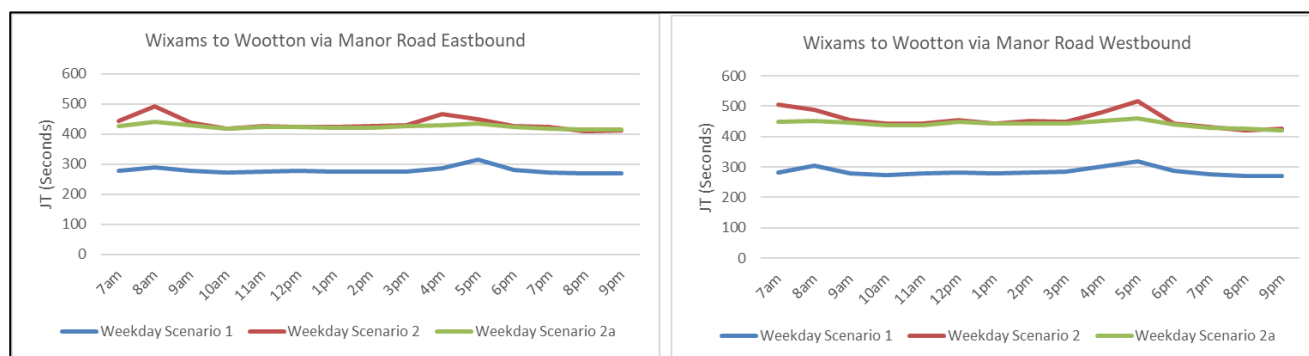
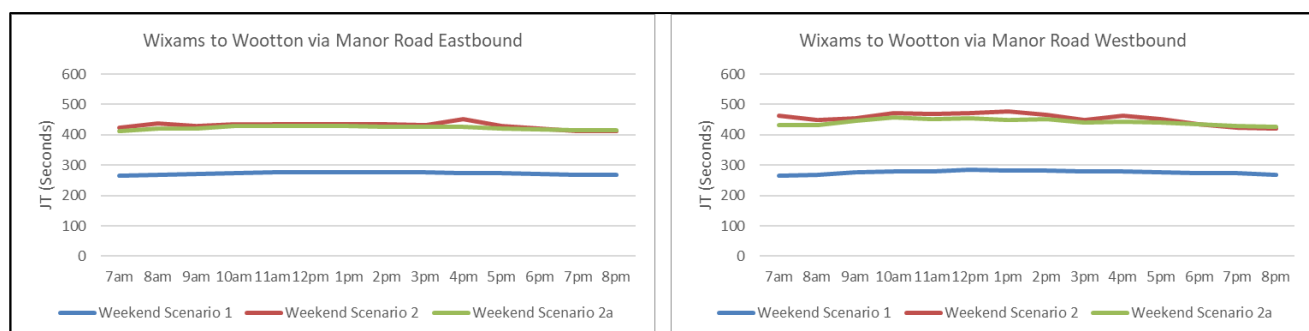


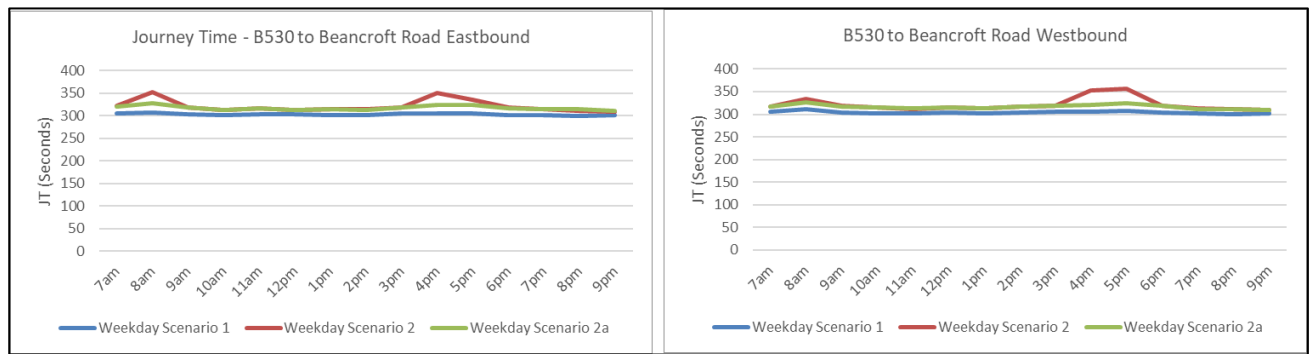
Figure 8-34: Wixams to Wootton via Manor Road – ‘Busy’ Saturday – Journey Time



B530 to Beancroft Road

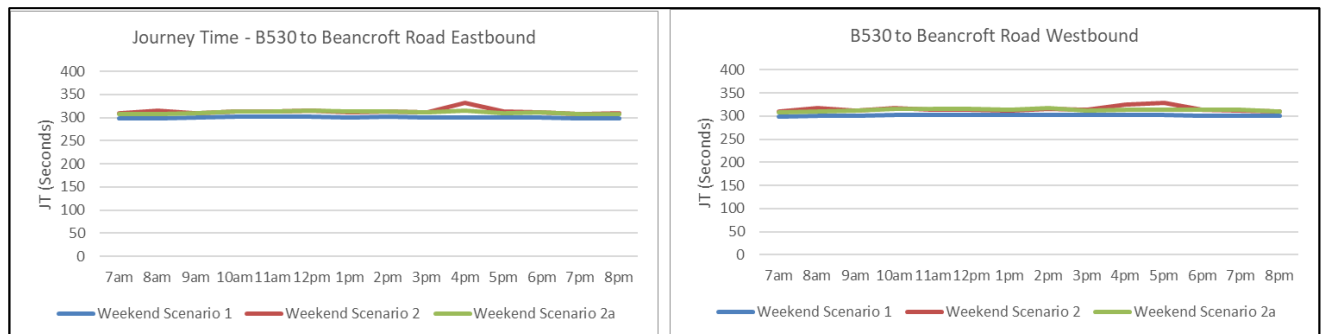
- 8.90 The B530 to Beancroft Road route modelled within this assessment runs from Beancroft Road west of the A421 to Green Lane and Stewartby Way. It can be seen in **Figure 8-35** and **Figure 8-36** that the introduction of construction traffic would lead to minor increases in journey time for both a Weekday and a Saturday.
- 8.91 Scenario 2 sees journey times increase by 45 seconds during the AM peak and 30 seconds during the PM Peak in the eastbound direction. In the westbound direction, journey times will increase by 22 seconds in the AM peak and 49 seconds during the PM Peak. These changes are not considered material.
- 8.92 Scenario 2a is predicted to increase journey time on the B530 to Beancroft Road route in the eastbound direction by an average of 20 seconds and 18 seconds in the AM peak and PM Peaks respectively. In the westbound direction, journey times are expected to increase by 14 seconds in the AM Peak and 17 seconds in the PM Peak of an Average Weekday. These changes are not considered material. The hourly trends in journey time changes can be seen in **Figure 8-35**.

Figure 8-35: B530 to Beancroft Road via Green Lane – Weekday – Journey Time



8.93 On a Saturday, there are small increases in journey time, but these are not considered to be material in either Scenario 2 or 2a.

Figure 8-36: B530 to Beancroft Road via Green Lane – Saturday – Journey Time



Journey Time Summary

- 8.94 The Journey Time assessment presented here shows that the introduction of construction traffic is predicted, overall, not to materially affect journey times on most key routes through the modelled road network around the Site. There are some routes where changes in journey times following the introduction of construction traffic are most noticeable. These routes are highlighted below:
- On the A421 there are maximum increases in journey times predicted as a result of Scenario 2 traffic of 286 seconds and 551 seconds, in the northbound and southbound directions respectively, in the weekday PM peak. This is likely to result in temporary localised congestion along this route. The rest of the time, including on a Saturday, and in particular in Scenario 2a conditions, there are no material effect predicted on journey times on this route.
 - On the A6 Branston Way the only noticeable increase in journey time is predicted in the Scenario 2 conditions in the PM Peak of a weekday (+55 seconds southbound and +268 seconds northbound).
 - On the M1 J13 eastbound off-slip, the maximum journey time increase with the Scenario 2 traffic is +25 seconds in the PM hourly peak on a Weekday. For all other time periods (including on the Saturday) conditions on the M1 J13 off-slips would not be affected by construction traffic.

- d. On the A421 southbound off-slip into Salford Rd, again with Scenario 2 traffic and in the PM Peak, there is a predicted increase in journey time of 231 seconds. For all other time periods, including the Saturday, construction traffic does not affect journey times.
- e. The same occurs on the Marsh Leys Interchange, on the northbound off-slip, with a journey time increase of 140 seconds across the PM Peak, all other time periods not being materially affected.
- f. On the A421 Black Cat Junction to Stewartby route, following the addition of Scenario 2 traffic, journey times are expected to increase by 439 seconds across the PM peak in the northbound direction.
- g. The Wooton to Wixams via Manor Road route would be affected by the closure on Manor Road at the MVL level crossing, as assumed in this assessment. This closure is not related to the delivery of the Proposed Development but relates to the potential construction by NR of a road bridge over the MVL, totally unrelated to the Proposed Development.

Sensitivity Test – Scenario 4a (Primary Opening Year - Reference Case plus Development plus Construction)

- 8.95 Furthermore, a sensitivity test has been undertaken of the effect of construction once the development is operational. This section considers the traffic implications of Scenario 4a. These are considered against Scenario 4 (Primary Opening Year) and Scenario 5 (Future Year). This is done so that the Transport Assessment can confirm that the infrastructure planned in Scenario 4 and Scenario 5 is sufficient to accommodate Scenario 4a.
- 8.96 Scenario 4a covers the existing road network and traffic, plus traffic associated with agreed committed developments plus Primary Opening Year plus 10 years (midpoint between Primary Opening Year and Future Year demands) related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only and the A421 Junction being complete. For clarity this assumes construction activities in the Core Zone, Lake Zone and West Gateway Zone.
- 8.97 Scenario 4 covers the existing road network and traffic, plus traffic associated with agreed committed development, plus Primary Opening Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only with a shuttle bus service operation between Milton Keynes and the Site and the new A421 Junction being complete. For clarity this scenario does not include trip generating development on either the Lake Zone or West Gateway Zone (there may be some drainage or other infrastructure works required on the Lake Zone and West Gateway Zone to support the delivery of development on the Core Zone).
- 8.98 Scenario 5 covers the existing road network and traffic plus traffic associated with agreed committed developments plus Future Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only and the A421 Junction being complete. For clarity this scenario considers full development of the Lake Zone and West Gateway Zone.
- 8.99 This section reports on the key statistics output from the Paramics model (Total Network Statistics) describing the general operation of the network around the Site.

8.100 This section considers the impacts of Scenario 4a against Scenario 4 and Scenario 5.

8.101 This is done for:

- a. An 'Average' weekday; and
- b. A 'Busy' Saturday.

8.102 This assessment is based on detailed outputs from the Paramics model that can be found in **Annex 11**.

Visitor Growth in Scenario 4a

8.103 The number of domestic and international visitors to the Theme Park has been increased to replicate a position in between the Primary Opening Year (Scenario 4) and the Future Year (Scenario 5). Therefore, half of the difference in visitors (Domestic and International) and TMs on an 'Average' weekday and a 'Busy' Saturday have been modelled. **Table 8-5** sets out the visitor and TM numbers considered here.

Table 8-5: Scenario 4a – Visitors and TM numbers

	Domestic Visitors	International Visitors	TMs
'Average'	16,175	10,950	6,283
'Busy'	29,709	20,500	6,731

8.104 The modelling also considers in Scenario 4a that only 500 hotel bedrooms would be available within the Core Zone to visitors on-site.

Construction Activities in Scenario 4a

8.105 Scenario 4a considers a less intense period of construction activities than compared with the Main Construction Phase but includes the operation of the Theme Park in the Primary Opening Year plus growth to a midpoint between the Primary Opening Year and Future Year. Scenario 4a includes the construction of facilities in either the Lake Zone or the West Gateway Zone as well as possible changes to development within the Core Zone (but still within the consented uses for the Proposed Development). This would happen on a plot-by-plot basis and several plots could be in construction at any one time.

8.106 It is advised by UDX that a reasonable proxy for busy construction activities during the Operational Phase is to consider construction of a hotel and construction of a major new section of the Theme Park, together. These construction demands were provided by UDX.

8.107 The level of construction traffic considered in Scenario 4a is:

- a. 'Hotel':
 - i. Cars – 315 movements per day;
 - ii. HDVs – 81 movements per day; and

- iii. LGVs – 130 movements per day.
- b. 'New section of Theme Park':
 - i. Cars – 668 movements per day;
 - ii. HDVs – 100 movements per day; and
 - iii. LGVs – 160 movements per day.

8.108 These movements have been distributed using the same distribution assumptions as the Main Construction Phase assessment. The routes available to this construction traffic and construction access points are different however, as in this scenario, the Core Zone's road infrastructure is available and the road bridge over the MVL at Manor Road is open (as DfT advises that the NR bridge over the MVL is committed, it is assumed as open to traffic post Primary Opening Year). The only restriction suggested within this assessment on construction traffic is the assumption that construction HDV traffic would be discouraged from using the western section of Manor Road to access the Site in order to limit construction traffic impact on this link. All other routes are considered available.

8.109 Construction access points in the assessment have been identified so as to capture as wide a range of potential locations for these construction activities. The following points of access have been considered:

- a. 'Hotel' on Lake Zone, accessed 50% from a new construction access off the B530 Ampthill Road and 50% from the new Manor Road Roundabout; and
- b. 'Theme Park' on the Core Zone, accessed from one of the established access points into the Core Zone on Manor Road.

Total Network Statistics

8.110 The first set of results to be reported is the Total Network Statistics. This records the total number of completed trips, the total time taken by all vehicles to pass through the network and calculates the average speed per vehicle and average delay per vehicle.

8.111 **Table 8-6** provides a summary of the completed trips through the modelled network and latent demand (i.e. trips that are not completed) for Scenario 4a compared back to Scenario 4 and Scenario 5, on an 'Average' Weekday and then on a 'Busy' Saturday.

Table 8-6: Completed Trips and Latent Demand – ‘Average’ Weekday

	Scenario 4a			Scenario 4			Scenario 5		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
Completed Trips (Average Weekday)	91,590	149,261	98,703	90,988	148,548	97,981	92,492	152,494	99,641
Completed Trips (Busy Saturday)	56,303	173,407	76,557	55,370	172,438	75,685	57,435	177,130	77,812
% Completed Trips (Average Weekday)	99%	100%	99%	99%	100%	99%	99%	100%	99%
% Completed Trips (Busy Saturday)	96%	101%	100%	97%	101%	100%	96%	101%	100%

8.112 The analysis shows that both on an ‘Average’ Weekday and on a ‘Busy’ Saturday, in the AM Peak, Interpeak and PM Peak, that the level of completed trips is the same in Scenario 5 compared to 4a, and the same or only marginally lower in Scenario 4 when compared to Scenario 4a. This shows that the infrastructure available in the Primary Opening Year and in the Future Year would be able to accommodate predicted traffic in the Scenario 4a to the same extent as it is able to accommodate traffic flows in Scenario 4 and Scenario 5.

8.113 **Tables 8-7 and 8-8** provide average vehicle speeds and average delay across the network modelled, comparing Scenario 4 and Scenario 5 with Scenario 4a.

Table 8-7: Average Vehicle Speed (kph) – ‘Average’ Weekday and ‘Busy’ Saturday

Time	Scenario 4a			Scenario 4			Scenario 5		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
‘Average’ Weekday	59	75	62	61	75	65	59	74	62
‘Busy’ Saturday	80	75	77	80	75	78	79	72	76

8.114 The analysis shows that on both an ‘Average’ Weekday and a ‘Busy’ Saturday, in most time periods reported, that Scenario 4a performs better than the Future Year case with the Proposed Development (Scenario 5) and returns similar performance when compared to Scenario 4 with the Proposed Development in the Primary Opening Year.

Table 8-8: Average Delay in Seconds – ‘Average’ Weekday and ‘Busy’ Saturday

Time	Scenario 4a			Scenario 4			Scenario 5		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
‘Average’ Weekday	449	325	408	440	322	388	457	332	414
‘Busy’ Saturday	316	324	326	312	321	320	323	339	334

- 8.115 Overall, the model shows that in terms of average speeds and delay, Scenario 4a returns results that are somewhere in between Scenario 4 and Scenario 5, with the predicted differences across the three scenarios being not material.
- 8.116 It is therefore concluded that conditions on the wider road network would remain unchanged when comparing Scenario 4a to Scenario 4 and to Scenario 5. This confirms that the infrastructure in place in Primary Opening Year and then in Future Year will be able to accommodate predicted trips in the case of Scenario 4a.

Summary of Impact Assessment and Approach to Mitigation

- 8.117 The traffic impact assessment presented in this section demonstrates that the introduction of construction traffic in Scenario 2 and Scenario 2a would not have a significant impact on the operation of the road network considered in this study for most of the construction period. The only noticeable effect of construction on some of the routes focussed on the A421 corridor for a limited time within Scenario 2, which will be temporary in nature (9% of the entire construction period) and limited mostly to the typical weekday PM Peak.
- 8.118 The assessment presented in this section represents a cautious worst case as follows:
- This assessment considers the Scenario 2 traffic, without the benefit of any mitigations or management.
 - These Scenario 2 conditions would only occur in for 9% of the entire construction period. So the implications identified here would occur only temporarily for a relatively short period of time.
 - Scenario 2a represents the overall nature of construction of the Proposed Development for over 60% of the construction period and is more likely to be the case.
 - Post Primary Opening Year, the conditions on the local road network during additional construction activities would be within the threshold of what is predicted in the Future Year scenario.

Wider Impacts and Traffic Management Proposals

- 8.119 The effects of the construction of the Proposed Development can be further managed through the implementation of measures set out in the OCEMP (**Appendix 2.3: OCEMP (Volume 3)** of the ES).

Early Enabling Works and Manor Road

- 8.120 Early enabling works would be required in an area around Manor Road interacting with the Lake Zone and the Core Zone. These works would be accessed from Manor Rd (east). The Scenario 2 assessment considers the traffic impact implications of a proportion of the Scenario 2 traffic accessing the Site via Manor Road (east).
- 8.121 **Table 8-9** provides the summary for the purpose of assessment of the 24 hour traffic movements on Manor Road (east) and the B530 north of Manor Road.

Table 8-9: 24 hour Traffic Impact Assessed on Manor Road (east) and B530 North of Manor Road (Two-way)

Two-way	Scenario 1	Construction Traffic – Proposed Development (includes East Gateway Zone)
	PCUs	PCUs
Manor Road (east)	3,035	1,864
B530 north of Manor Road	10,592	1,621

Summary

- 8.122 The assessment presented focuses on the Scenario 2 period identifying effects that would be noticeable but of a short temporary nature. The majority of the time (Scenario 2a assessment) the traffic implications of the construction of the Proposed Development would not be material. However, the traffic implications of the construction of the development would be managed through the implementation of measures set out within the OCEMP (**Appendix 2.3: OCEMP (Volume 3)** of the ES) with the aim to minimise the traffic impacts of the construction activities at the Site.

9 Traffic Analysis – Primary Opening Year Scenarios

Introduction

- 9.1 This section considers the traffic implications of the Proposed Development on the operation of the wider road network around the Site by assessing the Primary Opening Year Case against the Reference Case.
- 9.2 The Primary Opening Year Case, hereafter referred to as ‘Scenario 4’, comprises the existing road network and traffic plus traffic associated with agreed committed developments plus Primary Opening Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only with a shuttle bus service operating between Milton Keynes and the Site and the new A421 Junction being complete. For clarity this scenario does not include trip generating development on either the Lake Zone or West Gateway Zone (There may be some drainage or other infrastructure works required on the Lake Zone and West Gateway Zone to support the delivery of development on the Core Zone).
- 9.3 The Reference Case assessed within this report (Scenario 3) simply refers to the existing road network and traffic along with traffic associated with committed developments only.
- 9.4 The scope of the assessment carried out relates to the scope of the micro-simulation model as it provides a good understanding of the operation of the network that is the most likely to see the highest level of impacts, i.e. on the strategic routes on the approach to the Proposed Development. For clarity, the wider network considered here includes the following key nodes and links: The M1 J13;
 - a. The A421 between M1 J13 and the Black Cat junction;
 - b. The grade separated junctions on the A421 on the approach to the Site, i.e. the A421 Marston Moretaine Interchange, the A421 Marsh Leys Interchange and the A421 Elstow Interchange;
 - c. The A6 south of the Elstow Interchange; and
 - d. The A6 Branston Way, north of the Marsh Leys Interchange.
- 9.5 This section reports on the key statistics output from the Paramics model (Total Network Statistics) describing the general operation of the network around the Site. It then provides more detailed information including journey time on key routes and delay on the network.
- 9.6 In order to consider further the potential impact of the Proposed Development on the operation of the SRN, an assessment of predicted queues on off slip roads at the main SRN interchanges in the vicinity of the Site has also been carried out, including at A421 Marston Moretaine, A421 Marsh Leys and A421 Elstow interchanges.
- 9.7 This is done for:
 - a. An ‘Average’ weekday; and
 - b. A ‘Busy’ Saturday.

- 9.8 This assessment is based on detailed outputs from the Paramics model that can be found in **Annex 11**. Traffic flows on links within the model related to Scenario 3 and Scenario 4 are provided in **Annex 10**.

Total Network Statistics

- 9.9 The first set of results to be reported is the Total Network Statistics. This records the total number of completed trips, the total time taken by all vehicles to pass through the network and calculates the average speed per vehicle and average delay per vehicle.
- 9.10 **Table 9-1** provides a summary of the completed trips through the modelled network and latent demand (i.e. trips that are not completed) for the Proposed Development along with its associated elements in the Primary Opening Year compared against Reference Case scenario, on an 'Average' Weekday and then on a 'Busy' Saturday.

Table 9-1: Completed Trips and Latent Demand

	Scenario 3			Scenario 4		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
Completed Trips (Average Weekday)	88,746	144,398	96,582	90,988	148,548	97,981
Completed Trips (Busy Saturday)	51,895	167,227	73,336	55,370	172,438	75,685
% Completed Trips (Average Weekday)	100%	100%	99%	99%	100%	99%
% Completed Trips (Busy Saturday)	97%	101%	100%	97%	101%	100%

- 9.11 The analysis shows that on both an 'Average' Weekday and on a 'Busy' Saturday, in the AM Peak period, Interpeak period and PM Peak period, a significant number of additional trips are completed through the modelled network in Scenario 4, reflecting the addition of the Proposed Development. However, it can be seen that the percentage of trips completed across the network does not change significantly as a result of Scenario 4, across all time periods tested. This suggests that the proposed infrastructure improvements included with the planning proposal deliver adequate capacity at an overall network level to accommodate the Proposed Development in the Primary Opening Year.
- 9.12 **Table 9-2** provides average vehicle speeds across the network modelled, comparing Scenario 4 to Scenario 3.

Table 9-2: Average Vehicle Speed (kph)

Time	Scenario 3			Scenario 4		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
'Average' Weekday	60	77	67	61	75	65
'Busy' Saturday	81	77	79	80	75	78

- 9.13 **Table 9-2** shows that in Scenario 4, average speeds across the network on an 'Average' Weekday are predicted to remain broadly similar to the average speeds returned by the model in Scenario 3 (within 2kph) during the AM Peak period, Interpeak period and PM Peak period. For a 'Busy' Saturday, average speeds are predicted to remain broadly similar to the average speeds returned by the model in Scenario 3 (within 2kph) during the AM Peak period, Interpeak period and PM Peak period. The changes reported by the model are negligible and indicate that the general traffic conditions on the wider network around the Proposed Development in Scenario 4 will not materially change when compared to Scenario 3.
- 9.14 **Table 9-3** details the likely delays to be experienced as a result of the introduction of the Proposed Development in Scenario 4.

Table 9-3: Average Delay in Seconds – 'Average' Weekday and 'Busy' Saturday

Time	Scenario 3			Scenario 4		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
'Average' Weekday	437	310	374	440	322	388
'Busy' Saturday	296	308	308	312	321	320

- 9.15 In line with the comments in relation to average speed, there is generally a non-material increase in average delay in Scenario 4 when compared to Scenario 3. The worst predicted increase in delay with the introduction of Scenario 4 is predicted in the PM Peak in the 'Average' Weekday, with an increase of 15 seconds. This represents an increase of 3% when compared to Scenario 3, which is considered minimal and well within the daily variation anticipated within a transport network (+/- 10%).
- 9.16 Overall, the model shows that, with the introduction of Scenario 4, there will be slight decreases in average speeds and slight increases in average delay, but these changes are not material and conditions on the wider road network will remain unchanged and well within the daily variation anticipated within a transport network (+/- 10%).

Journey Times

- 9.17 The Paramics model allows an assessment of variations in journey times along set routes through the model. The following paragraphs set out the difference in journey times along sections of the wider highway network around the Site between Scenario 3 and Scenario 4.
- 9.18 The key routes considered in this assessment and in the Executive Summary to this Transport Assessment are shown in **Figure 9-1** with other routes illustrated in **Figure 9-2**.

Figure 9-1: Journey Time ES Routes

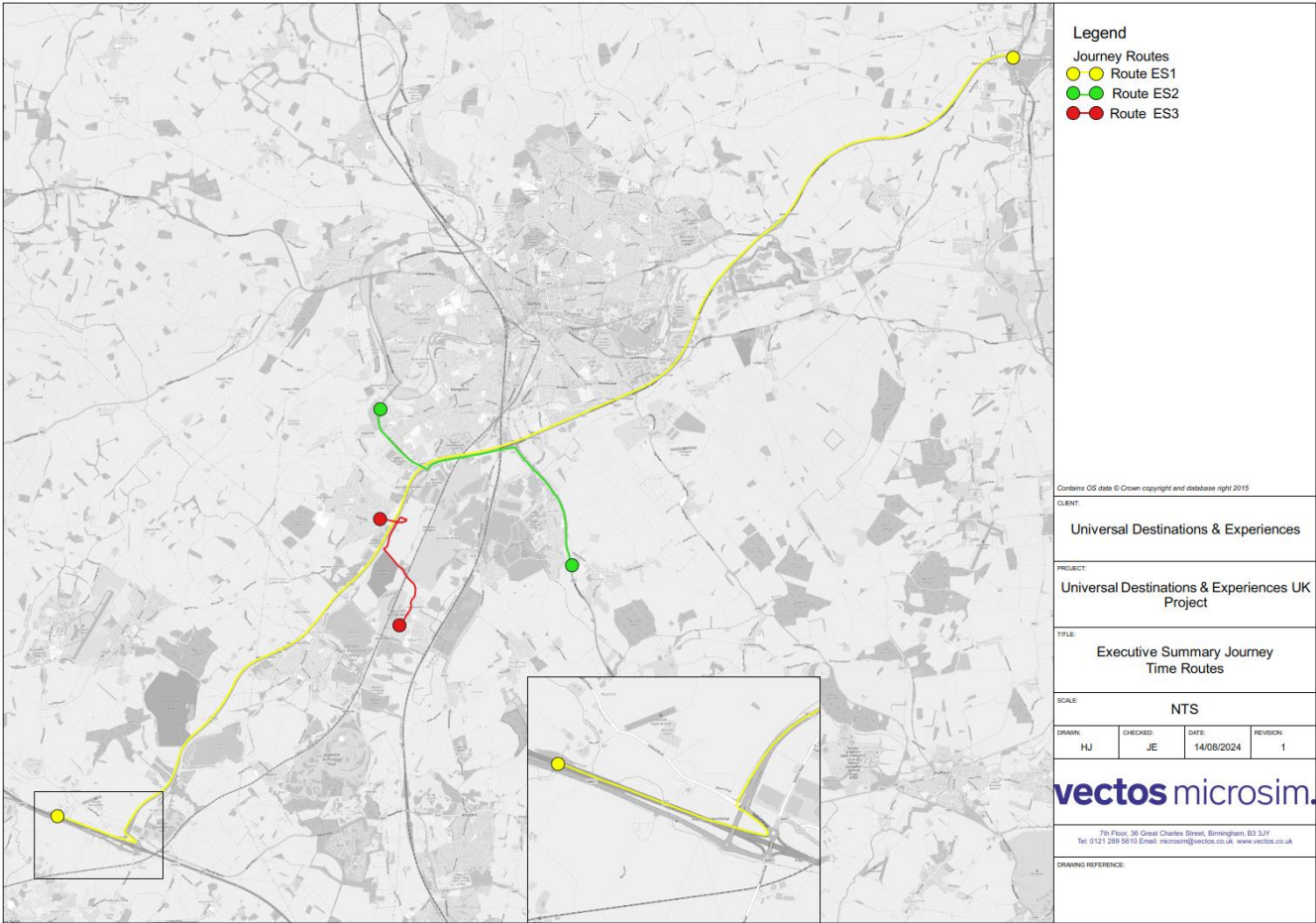
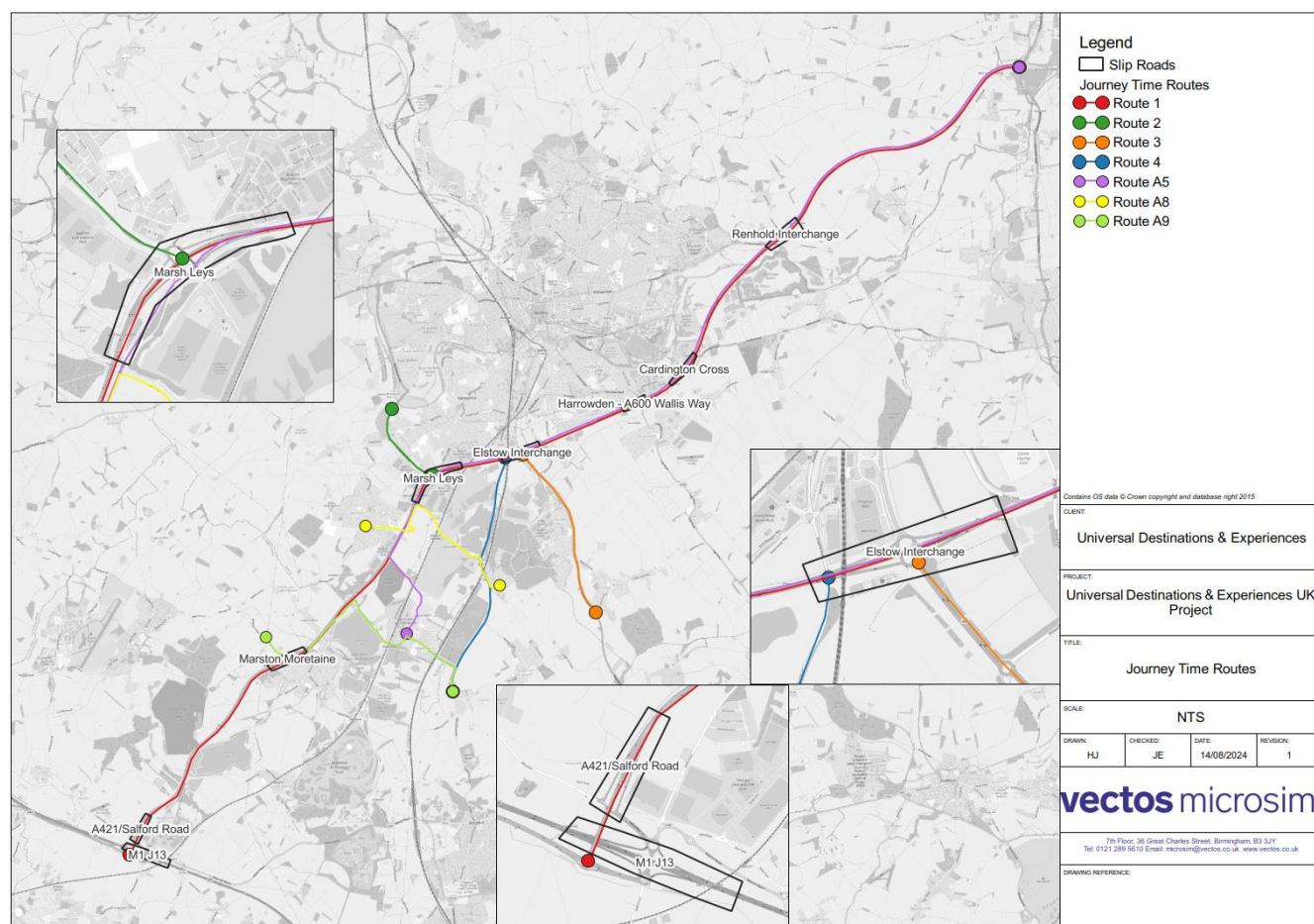


Figure 9-2: Journey Time Routes



9.19 **Table 9-4** provides an overall summary of the average journey times along the key routes considered within the model for an ‘Average’ Weekday, comparing Scenario 3 and Scenario 4 across the entire modelled period (07:00-22:00).

Table 9-4: Journey Times Comparison by Route (in seconds)

Route	‘Average Weekday’		‘Busy Saturday’	
	Scenario 3	Scenario 4	Scenario 3	Scenario 4
Route ES1 – Northbound	1049	1051	1034	1034
Route ES 1 – Southbound	1080	1096	1044	1046
Route ES2 – Northbound	511	438	364	366
Route ES2 – Southbound	429	454	344	342
Route ES3 – Northbound	261	287	225	273
Route ES3 – Southbound	221	250	212	235
Route 1 – A421 – Northbound	955	956	941	942
Route 1 - A421 - Southbound	980	996	950	953
Route 2 - A6 Branston Way – Southbound	172	188	111	111

Route	'Average Weekday'		'Busy Saturday'	
	Scenario 3	Scenario 4	Scenario 3	Scenario 4
Route 2 - A6 Branston Way - Northbound	111	111	108	109
Route 3 - A6 South of A421 - Southbound	144	144	141	141
Route 3 - A6 South of A421 - Northbound	258	182	157	151
Route 4 - B530 South of A421 - Southbound	337	352	327	346
Route 4 - B530 South of A421 - Northbound	347	381	327	357
M1 J13 Off-Slip Eastbound	29	26	25	24
M1 J13 Off-Slip Westbound	21	22	19	20
A421/Salford Road Off-slip SB	30	30	28	29
A421 Marston Moretaine Junction Off-slip Northbound	24	21	18	17
A421 Marston Moretaine Junction Off-slip Southbound	24	20	18	18
A421 Marsh Leys Roundabout Off-slip Northbound	37	39	35	36
A421 Marsh Leys Roundabout Off-slip Southbound	40	41	26	28
A421 Elstow Roundabout Off-slip Eastbound	27	34	21	23
A421 Elstow Roundabout Off-slip Westbound	36	41	20	20
Route A5 - A421 Black Cat to Stewartby Southbound	327	322	829	874
Route A5 - Stewartby to A421 Black Cat Northbound	1049	1051	796	821
Route A8 - Wixams to Wootton via Manor Road Eastbound	1080	1096	270	319
Route A8 - Wootton to Wixams via Manor Road Westbound	511	438	271	357
Route A9 - B530 to Beancroft Road via Green Lane Westbound	429	454	308	311
Route A9 - Beancroft Road to B530 via Green Lane Eastbound	261	287	308	309

9.20 The data summarised in **Table 9-4** suggests that Scenario 4 would not significantly affect journey times on the key routes through the modelled wider road network, nor would it affect the conditions on the off slips into the key trunk road interchanges in the vicinity of the Proposed Development. Journey times across all routes will increase only minimally by an average of six seconds on an 'Average' Weekday and whereas for a 'Busy' Saturday, average increase in journey times of about eight seconds is likely to be experienced across the network across the entire modelled period.

- 9.21 The most significant increase in journey time on the network will be circa 82 seconds and is predicted to occur along the Wootton to Wixams via Manor Road route in the westbound direction on a 'Busy' Saturday. This likely to be a reflection of the addition of highway infrastructure within the planning proposal to support the Proposed Development and in particular traffic signal-controlled junctions to manage traffic flows. Such an increase in journey time is considered minimal, however. The most significant reduction in journey time as a result of Scenario 4 is predicted along the A6 South of A421 in the northbound direction with a journey time savings of 82 seconds. It is possible that this reflects the fact that the Proposed Development introduces a new route to/from the A421 south from Wixams across the Marston Vale and through the Site, a route which may attract traffic that would have otherwise used the A421 Elstow Interchange.
- 9.22 The following paragraphs detail the changes in journey time across the day for each route considered. In the figures presented, the blue lines represent the Scenario 3 data, and the orange lines represent the Scenario 4 data.

Route ES 1

- 9.23 Following the introduction of Scenario 4, minimal increases in journey times are predicted along the Route ES1 corridor for an 'Average' Weekday. Journey times are predicted to increase by 4 seconds during the AM Peak hour and 3 seconds during PM Peak hour in the northbound direction whereas an average increase of 55 seconds and 118 seconds are predicted in the southbound direction for the AM and PM Peak hours respectively.
- 9.24 **Figure 9-3** illustrates the journey time predicted across the day on the ES1 route on an 'Average' Weekday.

Figure 9-3: Route ES1 – 'Average' Weekday – Journey Time

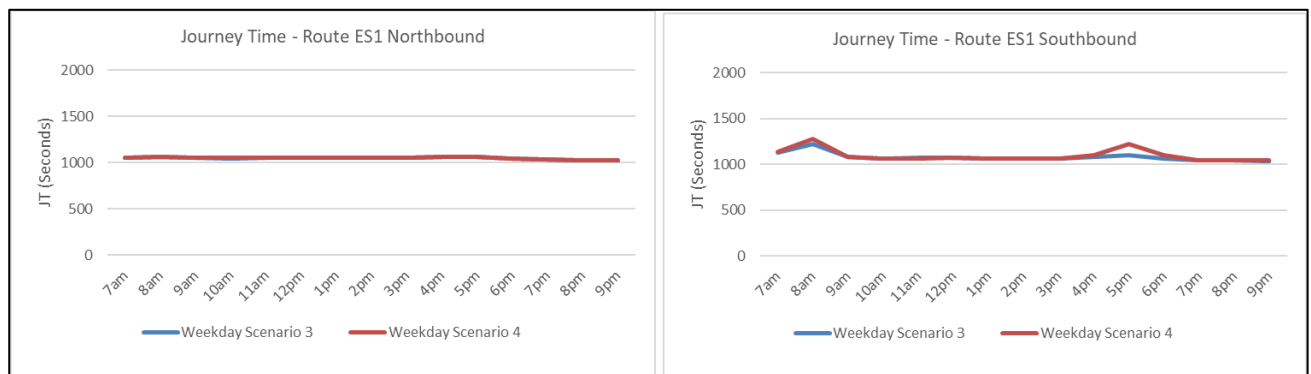
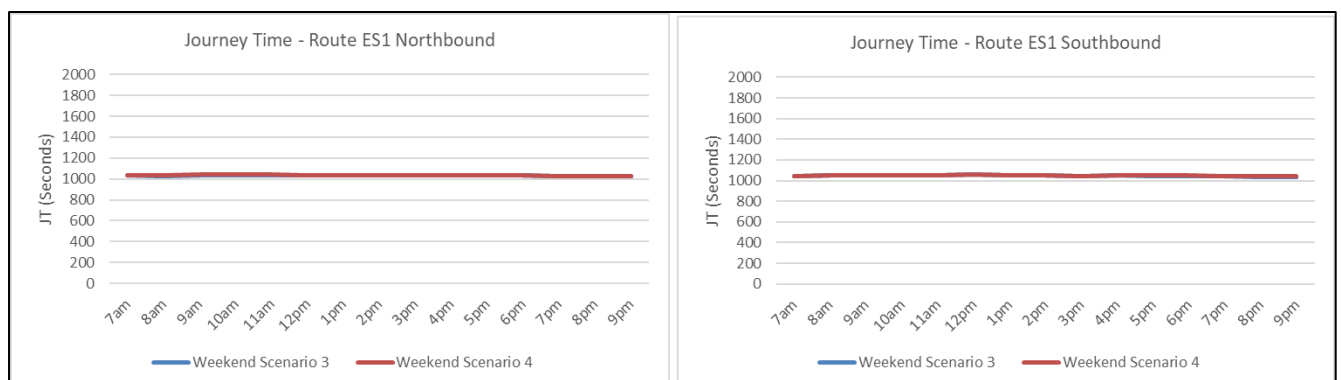


Figure 9-4: Route ES1 – 'Busy' Saturday – Journey Time



- 9.25 On a 'Busy' Saturday as can be seen in **Figure 9-4**, minimal increases in journey times are predicted in both directions with a three-second increase predicted in the AM peak and PM peak hours along the northbound direction whereas in the southbound direction, journey times are expected to remain unchanged for the AM Peak and increase by five seconds during the PM Peak. There are no material changes across this route.

Route ES2

- 9.26 Following the introduction of Scenario 4, journey times for an average weekday are predicted to reduce significantly in the northbound direction with a reduction of 307 seconds during the AM peak and 269 seconds during the PM Peak. In the southbound direction however, journey times will increase by 39 seconds and 136 seconds for the AM and PM Peaks respectively.
- 9.27 **Figure 9-5** illustrates the journey time predicted across the day on the ES2 route on an 'Average' Weekday

Figure 9-5: Route ES2 – 'Average' Weekday – Journey Time

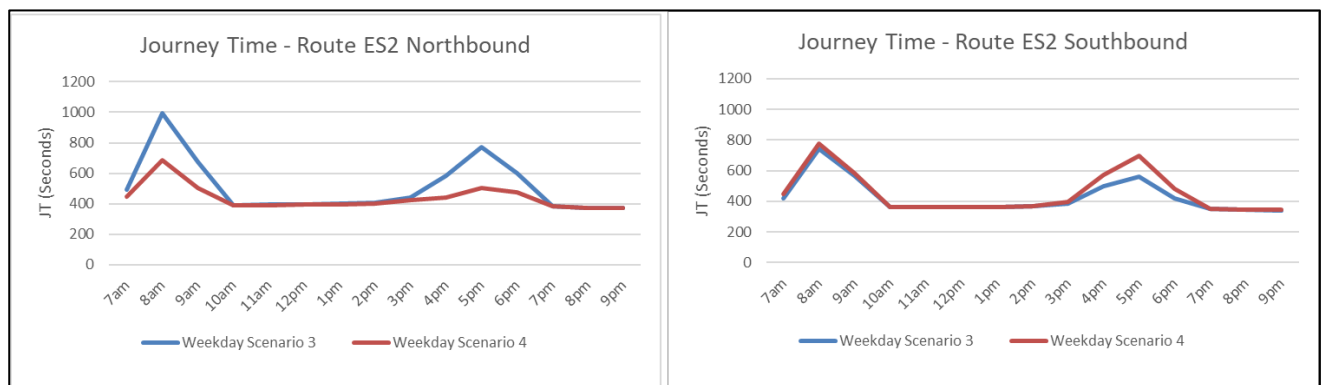
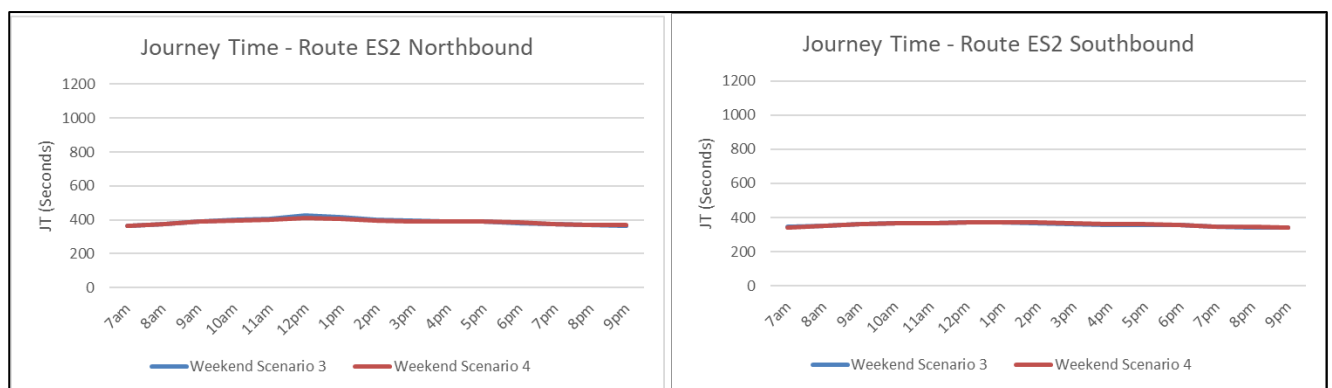


Figure 9-6: Route ES2 – 'Busy' Saturday – Journey Time



- 9.28 On a 'Busy' Saturday as can be seen in **Figure 9-6**, minimal increases in journey times are predicted in both directions except for in the northbound direction 12:00-13:00 which sees a decrease of 1 seconds, which is not considered material.

Routes ES3

- 9.29 It can be seen in **Figures 9.7** and **9.8** that the Proposed Development in Scenario 4 will not affect journey times materially for both an Average Weekday and a Busy Saturday.

9.30 On an 'Average' Weekday, journey times will increase by 32 seconds during the AM peak in the northbound direction whereas a reduction in journey times of 6 seconds is predicted during the PM Peak in the northbound direction. In the southbound direction, increases in journey time of 26 seconds is anticipated in the AM peak and 29 seconds during the PM Peak.

9.31 The journey time trends for a weekday are illustrated in **Figure 9-7**.

Figure 9-7: Route ES3 – 'Average' Weekday – Journey Time

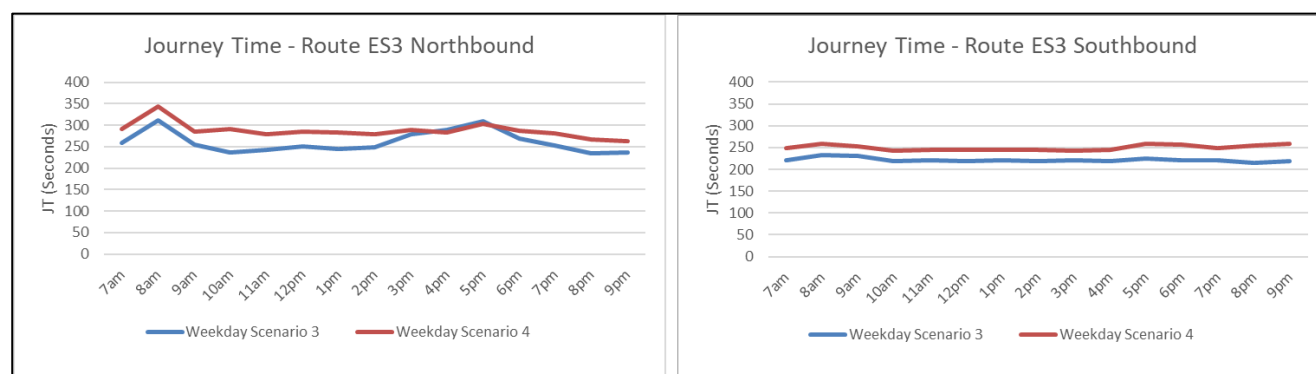
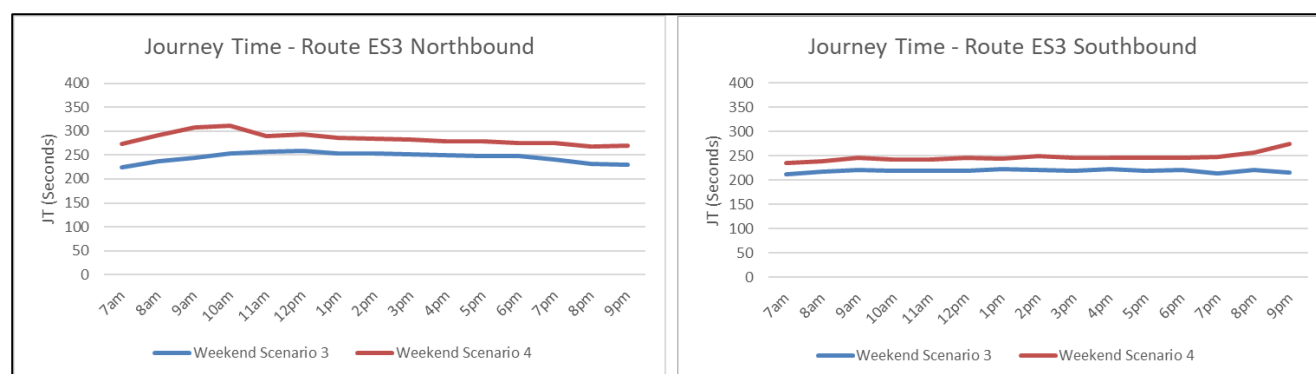


Figure 9-8: Route ES3 – 'Busy' Saturday – Journey Time



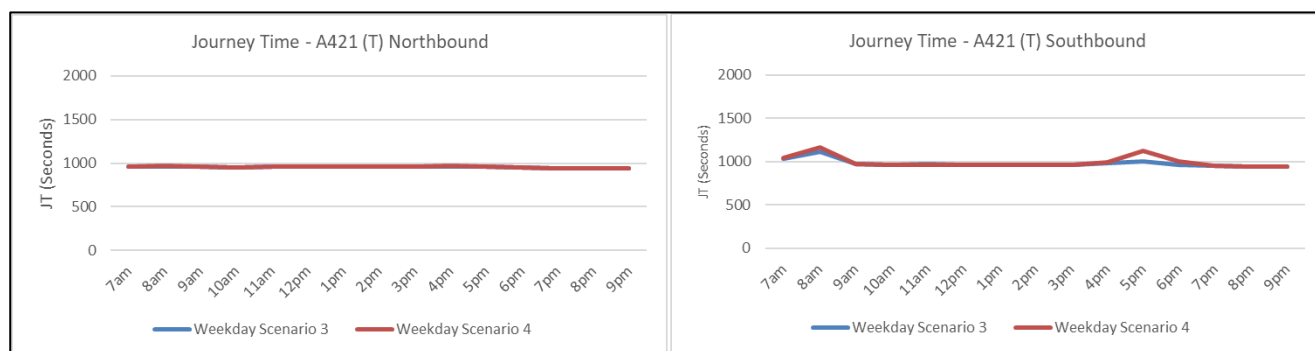
9.32 On a 'Busy' Saturday as can be seen in **Figure 9-8**, journey times are predicted to increase in both directions with a 55-second increase predicted in the AM peak of the northbound direction and a 30-second increase expected along the southbound direction during the PM Peak. Along the southbound direction, journey times will likely increase by 22 seconds and 26 seconds during the AM and PM Peaks respectively.

A421

9.33 The A421 route modelled within this assessment, runs from M1 J13 to the A1 Black Cat junction. Following the introduction of Scenario 4, minimal increases in journey times are predicted along the A421 corridor for an 'Average' Weekday. Journey times are predicted to increase by 2 seconds during the AM Peak and 2 seconds during PM Peak in the northbound direction whereas an average increase of 51 seconds and 127 seconds are predicted in the southbound direction for the AM and PM Peaks respectively.

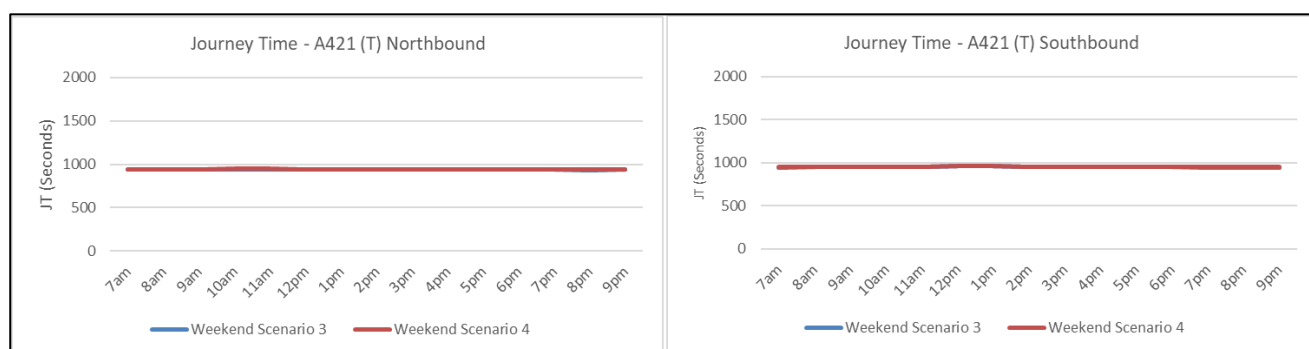
9.34 **Figure 9-9** illustrates the journey time predicted across the day on the A421 route on an 'Average' Weekday.

Figure 9-9: A421 – ‘Average’ Weekday – Journey Time



- 9.35 The largest increase in journey time on an ‘Average’ Weekday as a result Scenario 4 is +127 seconds between 17:00 - 18:00 in the southbound direction. This is not considered a material journey time increase considering that trips along the entire length of the A421 between the Black Cat junction and M1 J13 are likely to form part of much longer journeys.
- 9.36 On a ‘Busy’ Saturday, the Proposed Development in Scenario 4 is predicted to lead to only minimal increases in journey times in the northbound and southbound directions along the A421. This is shown in **Figure 9-10**.

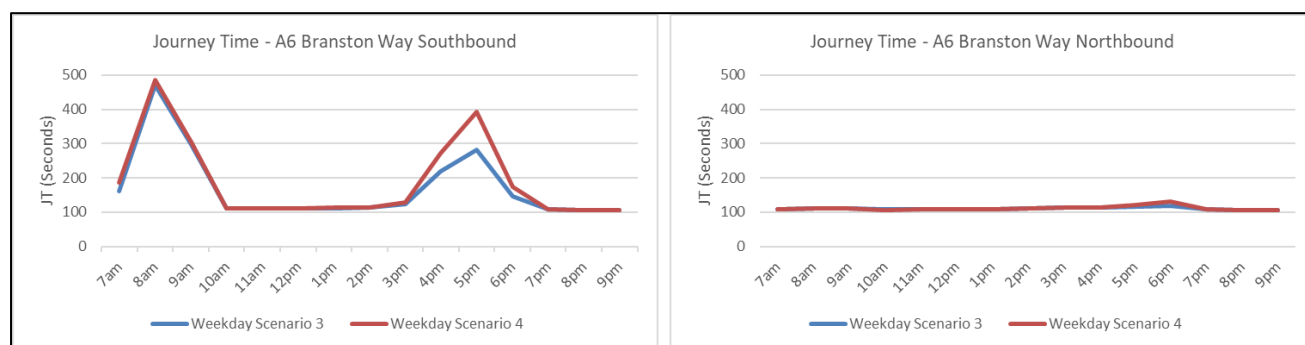
Figure 9-10: A421 – ‘Busy’ Saturday – Journey Time



A6 Branston Way

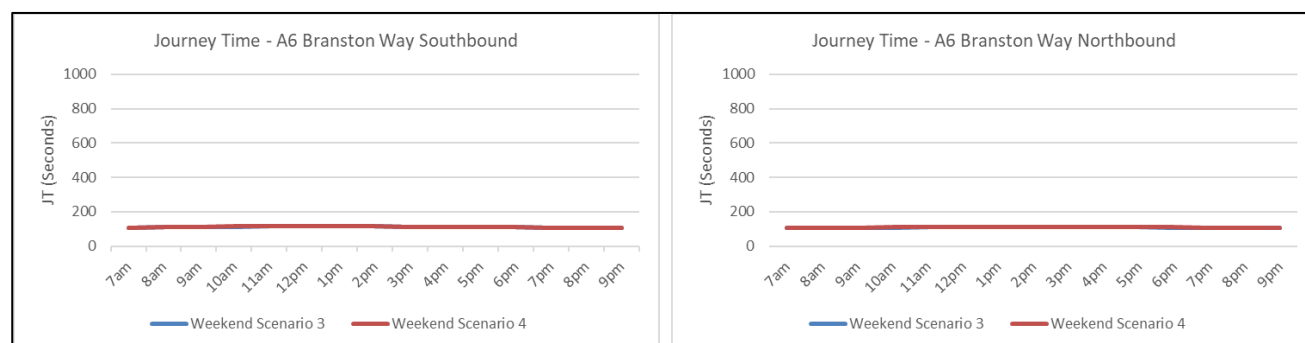
- 9.37 The A6 Branston Way route modelled within this assessment runs from the A421 Marsh Leys Interchange to the Cemetery Road roundabout. On an ‘Average’ Weekday, journey times along A6 Branston Way are predicted to increase by 18 seconds in the AM Peak and by 111 seconds during the PM peak in the southbound direction. In the northbound direction, journey times are predicted to increase minimally by 11 seconds in the PM peak. Average journey time increase across a whole weekday is predicted to be around 16 seconds in the southbound direction and 1 seconds in the northbound direction.
- 9.38 The journey times across an ‘Average’ Weekday for the Reference Case and Scenario 4 are illustrated in **Figure 9-11**.

Figure 9-11: A6 Branston Way – ‘Average’ Weekday – Journey Time



- 9.39 The most significant increase in journey times in the southbound direction on an ‘Average’ Weekday is 111 seconds between 17:00 - 18:00. This predicted increase remains relatively low when considered in the context of a longer trip along strategic routes (from the A421, along the A6). In the southbound direction, the development is predicted to lead to negligible changes in journey times across the day.
- 9.40 On a ‘Busy’ Saturday, minimal increases in journey times are predicted in both directions with a one-second increase predicted in the AM peak for both the southbound and northbound directions whereas for the PM Peak, journey time will increase by two seconds in both directions. This is shown in **Figure 9-12**.

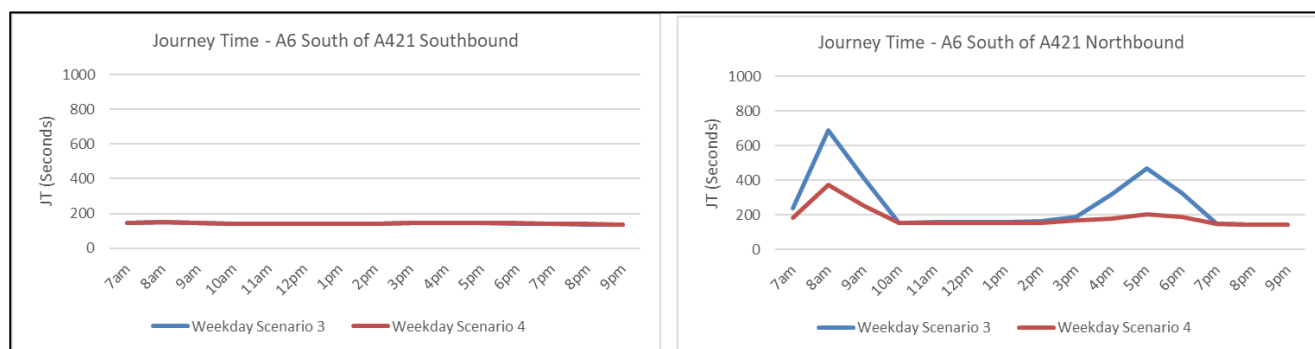
Figure 9-12: A6 Branston Way – ‘Busy’ Saturday – Journey Time



A6 South of A421

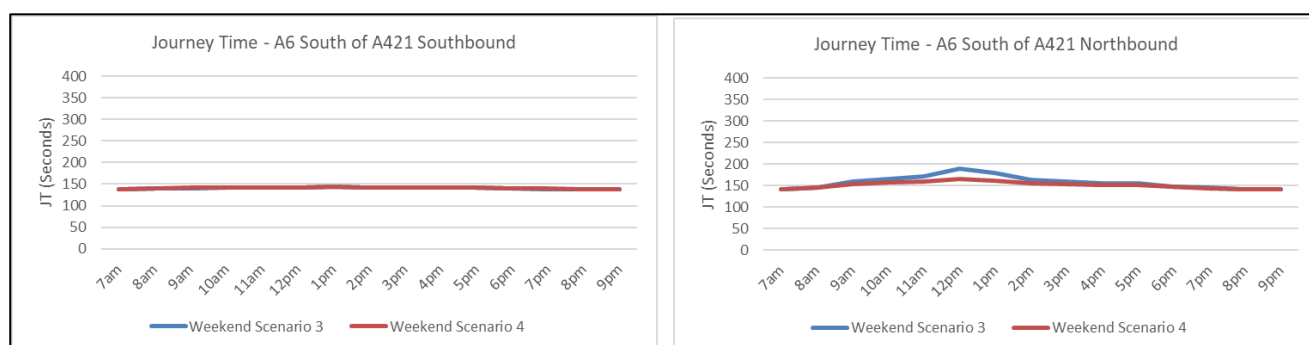
- 9.41 The A6 South of the A421 route modelled within this assessment, runs from the A421 Elstow Interchange to the A6/Luton Road junction south of Wilstead. It can be seen in **Figures 9.13** and **9.14** that the Proposed Development in Scenario 4 will not affect journey times in the southbound direction on that route and would lead to journey time savings in the northbound direction for an ‘Average’ Weekday.
- 9.42 On an ‘Average’ Weekday, a reduction in journey times of 317 seconds is predicted during the AM Peak in the northbound direction and 266 seconds during the PM peak. This is likely a result of the Proposed Development creating a new route to/from the A421 south that is likely to capture trips away from the A6 northbound approach into the A421 Elstow Interchange. In the southbound direction, a marginal reduction in journey time of one second is anticipated in the AM peak with journey times then staying unchanged during the PM Peak.

Figure 9-13: A6 South of A421 – ‘Average’ Weekday – Journey Time



- 9.43 Similarly, on a ‘Busy’ Saturday, no changes in journey time are predicted for the AM peak and PM Peaks in the southbound direction, whereas reductions in journey time of two seconds are predicted in the northbound direction for the AM peak and three seconds for the PM Peak. Overall, journey times will not be impacted for journeys in the southbound direction across the whole day and are predicted to reduce by 6 seconds in the northbound direction across a whole Saturday. As can be seen in **Figure 9-14**, the most notable reduction in journey times will likely be around 25 seconds between 12:00 and 13:00.

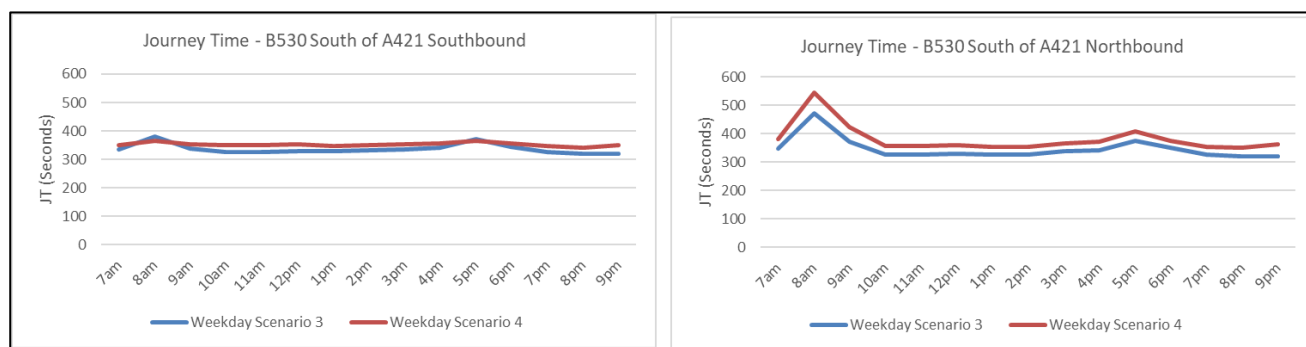
Figure 9-14: A6 South of A421 – ‘Busy’ Saturday – Journey Time



B530 South of A421

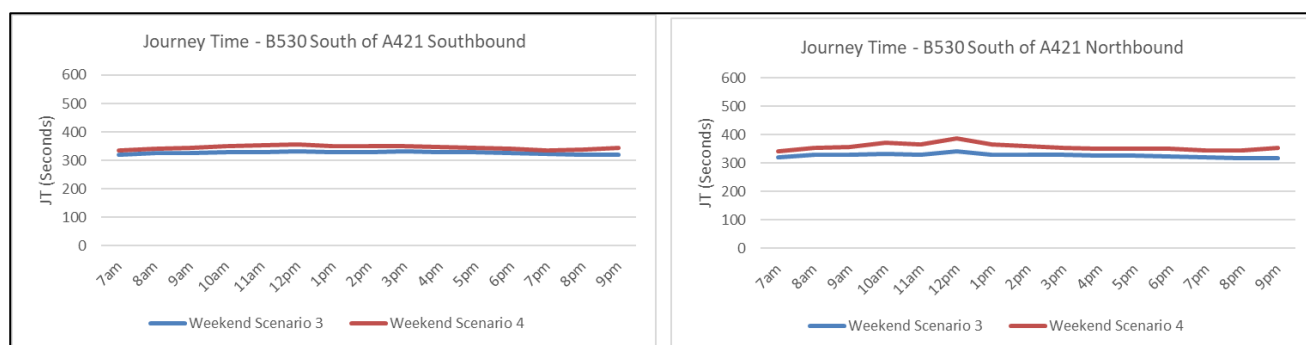
- 9.44 The B530 South of the A421 route modelled within this assessment, runs along the B530 Ampthill Road from the bridge over the A421, south of the Interchange Retail Park in Bedford, to the B530/How End junction west of Houghton Conquest. It can be seen in **Figures 9.15** and **9.16** that the Proposed Development in Scenario 4, would only lead to small increases in journey time along the route.
- 9.45 On an ‘Average’ Weekday, a reduction in journey times in the southbound direction of 14 seconds is predicted during the AM Peak with a decrease in journey time of 5 seconds predicted during the PM peak. In the northbound direction, journey times are predicted to increase by 74 seconds during the AM Peak and 32 seconds during PM Peak. Across the whole day, journey times are predicted to increase by 15 seconds and 35 seconds in the southbound and northbound directions respectively. This is likely to be as a result of the introduction of a traffic signal-controlled junction on the B530 at Manor Road, as a result of the Proposed Development and the creation of a western plaza access to the Full Wixams Station. This level of increase is not considered material.
- 9.46 The journey times predicted across the day in Scenario 3 and Scenario 4 are illustrated in **Figure 9-15** for an ‘Average’ weekday and **Figure 9-16** for a ‘Busy’ Saturday.

Figure 9-15: B530 South of A421 – ‘Average’ Weekday – Journey Time



9.47 On a ‘Busy’ Saturday, the Proposed Development in Scenario 4 is predicted to lead to an increase in journey times in the southbound direction of 15 seconds in the AM peak and 16 seconds in the PM Peak. In the northbound direction, journey time will likely increase by 26 seconds for the AM peak and 23 seconds for the PM Peak. Across the whole day, journey times are predicted to increase by 19 seconds and 30 seconds in the southbound and northbound directions respectively. This is shown in **Figure 9-16**.

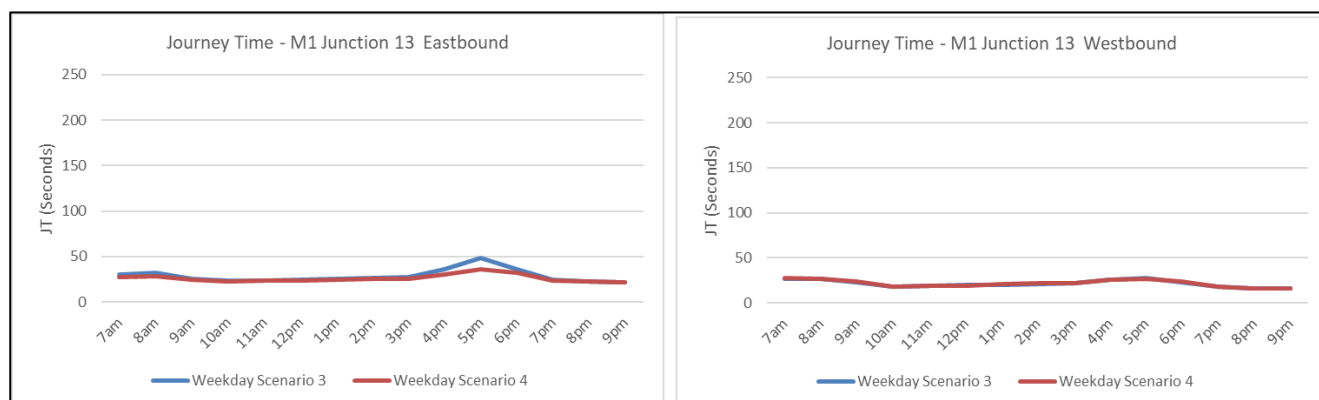
Figure 9-16: B530 South of A421 – ‘Busy’ Saturday – Journey Time



M1 Junction 13 Off-slip

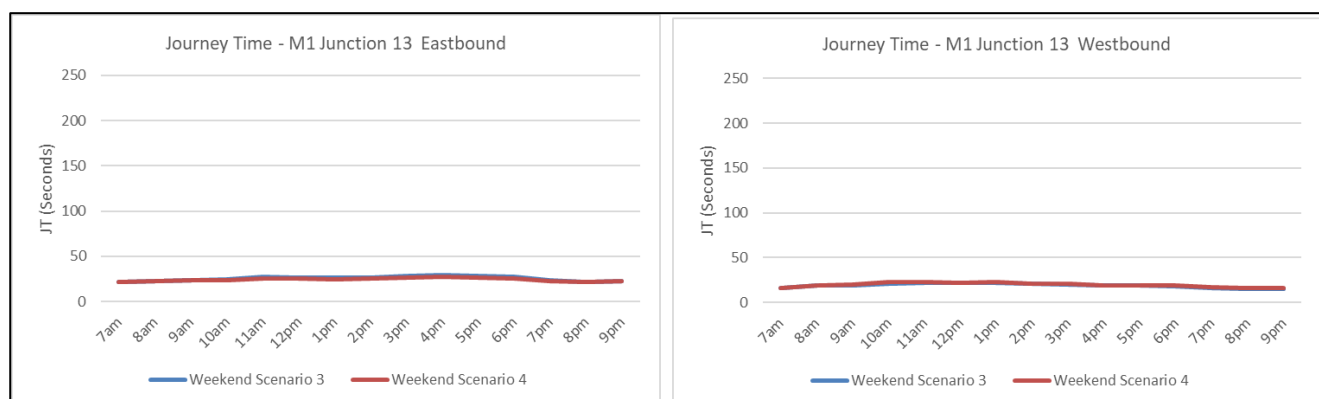
9.48 On an ‘Average’ Weekday, the Proposed Development in Scenario 4 is predicted to lead to journey time savings in the eastbound direction of 4 seconds during the AM Peak and reduce further to 12 seconds during the PM peak. In the westbound direction, journey times would increase marginally by only a second during the AM peak with no changes in journey time expected for the PM peak. **Figure 9-17** illustrates the predicted journey times across an ‘Average’ Weekday.

Figure 9-17: M1 J13 Off Slips – ‘Average’ Weekday – Journey Time



9.49 On a ‘Busy’ Saturday, the Proposed Development in Scenario 4 is predicted to result in a reduction in journey time of about a second across the day in the eastbound direction with no changes to journey time expected in the westbound direction.

Figure 9-18: M1 J13 Off Slips – ‘Busy’ Saturday – Journey Time



A421 Salford Road off Slip

9.50 As can be seen on **Figure 9-19**, the Proposed Development in the Primary Opening Year, would not affect journey times on an ‘Average’ Weekday in both northbound and southbound directions during the AM and PM Peaks. Between 17:00 – 18:00, a reduction in journey times of about two seconds is expected along the off slip as shown in **Figure 9-19**.

Figure 9-19: A421/Salford Road Junction – Average Weekday - Journey Time

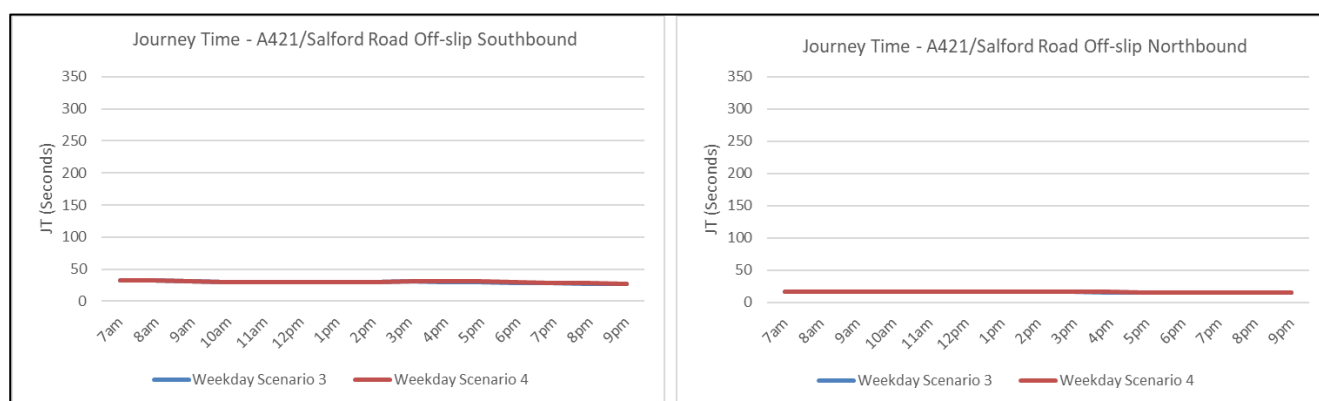
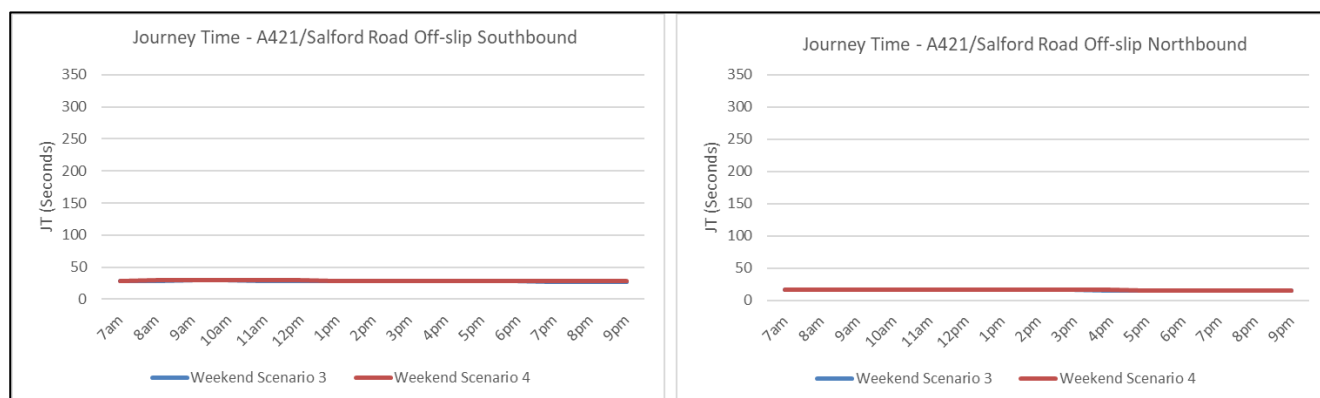


Figure 9-20: A421/Salford Road Junction - Busy Saturday - Journey Time

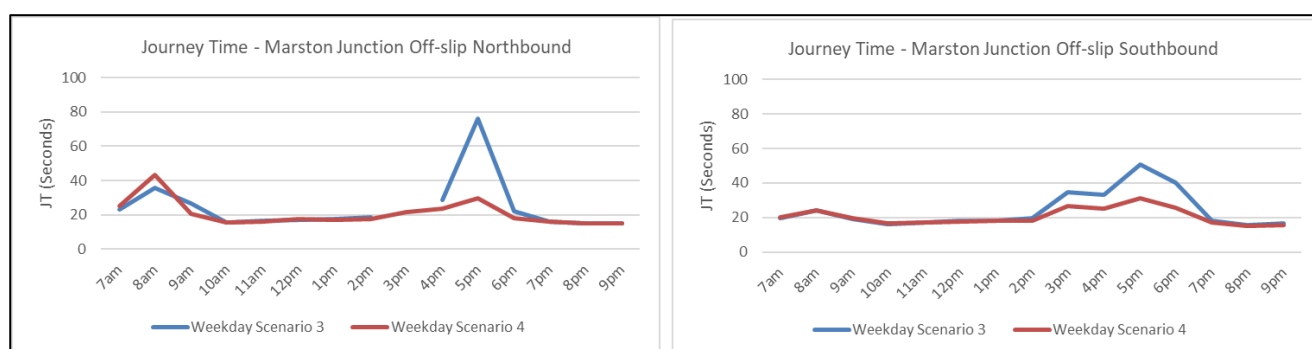


- 9.51 Similarly for a Busy Saturday, journey times will not be affected along the on-slip road (northbound) during the AM and PM Peaks. Along the off-slip (southbound), journey times will not be affected during the AM peak by the Proposed Development in the Primary Opening Year. However, a marginal increase in journey time of one second is expected during the PM peak.

A421 Marston Moretaine Interchange

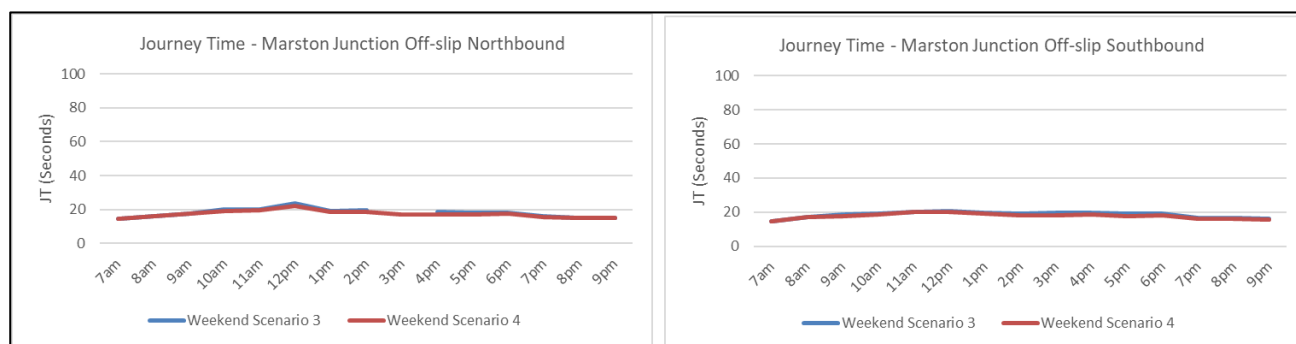
- 9.52 It can be seen on **Figure 9-21** that the Proposed Development in Scenario 4, would result in journey time savings on the off-slip roads at the A421 Marston Moretaine Interchange.
- 9.53 On an 'Average' Weekday in Scenario 4, journey times are predicted to reduce by 2 seconds and 4 seconds across the whole day in the northbound and southbound direction respectively. During Peaks, journey times are predicted to increase by 8 seconds for the AM peak in the northbound direction and to remain unchanged for the same period in the southbound direction whereas for the PM Peak, journey times are predicted to reduce by 46 seconds and 20 seconds for the northbound and southbound direction respectively. This is likely to be as a result of the additional highway infrastructure proposed to support the development, which would create a new junction on the A421 to Stewartby and Wixams to be used as an alternative to the A421 Marston Moretaine junction.

Figure 9-21: A421 Marston Moretaine Off Slips – 'Average' Weekday – Journey Time



- 9.54 For a 'Busy' Saturday, no changes in journey time are predicted for the AM peak in both northbound and southbound directions whereas a marginal journey time reduction of one second is expected during the PM peak in both directions along the route. **Figure 9-22** illustrates the journey times across the day for a 'Busy' Saturday.

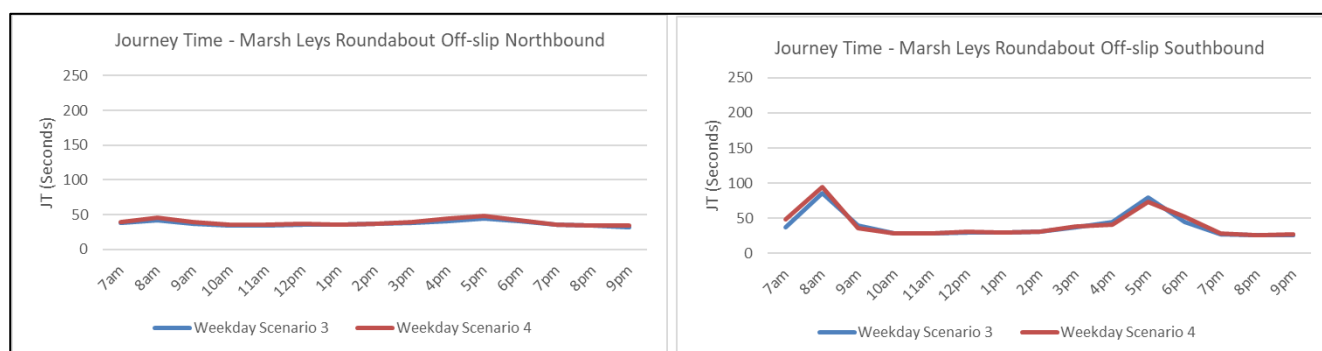
Figure 9-22: A421 Marston Moretaine Off Slips – ‘Busy’ Saturday – Journey Time



A421 Marsh Leys Interchange

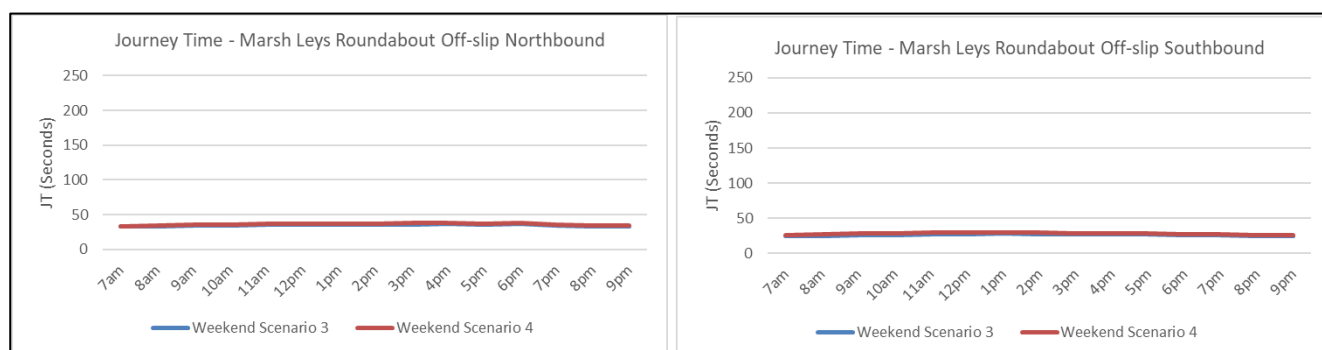
- 9.55 On a Weekday, it can be seen in **Figure 9-23** that journey time on the off-slip roads at A421 Marsh Leys Interchange will increase across a whole day with average journey time increases of 1 second expected in the northbound direction and 1 second predicted in the southbound direction. These changes are not material.

Figure 9-23: A421 Marsh Leys Off-slips – ‘Average’ Weekday – Journey Time



- 9.56 On a ‘Busy’ Saturday, marginal changes in journey time are predicted across the day of about a second in the northbound direction and an average of two seconds in the southbound direction. This change is not considered material. **Figure 9-24** illustrates the journey times across the day for a ‘Busy’ Saturday.

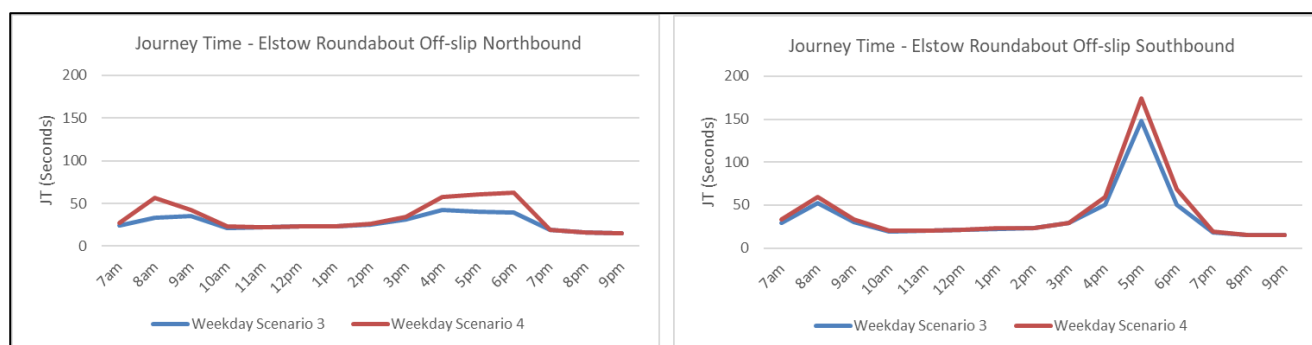
Figure 9-24: A421 Marsh Leys Off-slips – ‘Busy’ Saturday – Journey Time



A421 Elstow Interchange

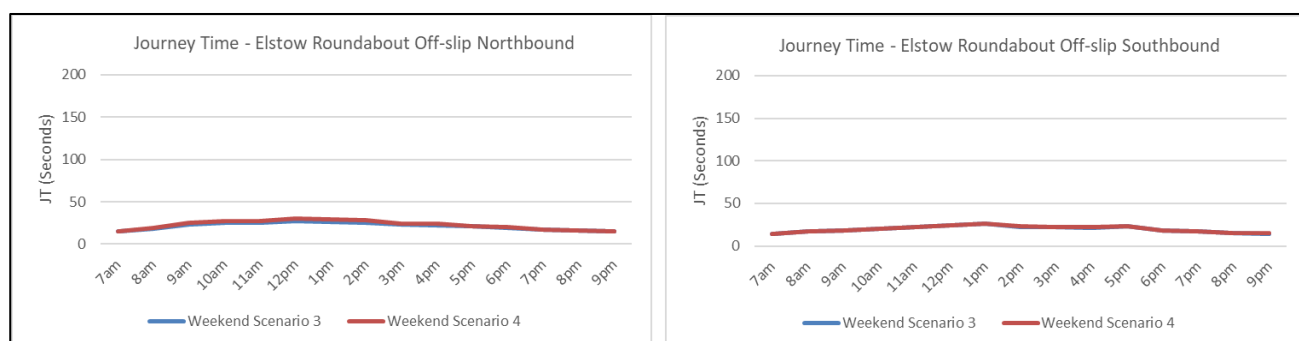
- 9.57 On an 'Average' Weekday, the Proposed Development in Scenario 4 is predicted to increase journey time in the northbound direction by 57seconds across the whole day and by 4 seconds in the southbound direction. The most significant changes to journey time on the southbound off-slip road is modelled to be an increase in journey time of 26 seconds which would likely occur between 17:00 – 18:00. See **Figure 9-25**.

Figure 9-25: A421 Elstow Off Slips – 'Average' Weekday – Journey Time



- 9.58 On a 'Busy' Saturday, the Proposed Development in Scenario 4 is predicted to increase journey time marginally on the northbound off slip during both the AM peak and PM Peaks by a second with no changes in journey time anticipated in the southbound direction along the off-slip road. This is shown in **Figure 9-26**.

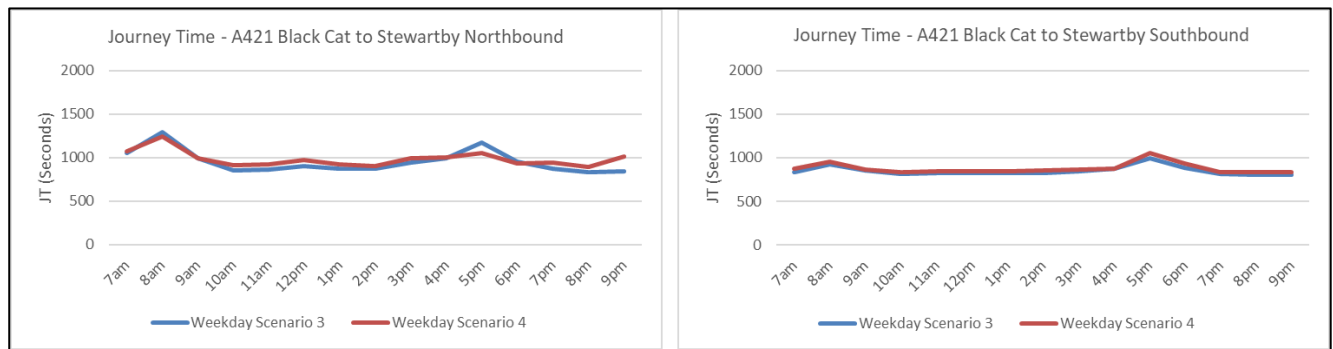
Figure 9-26: A421 Elstow Off Slips – 'Busy' Saturday – Journey Time



A421 Black Cat to Stewartby

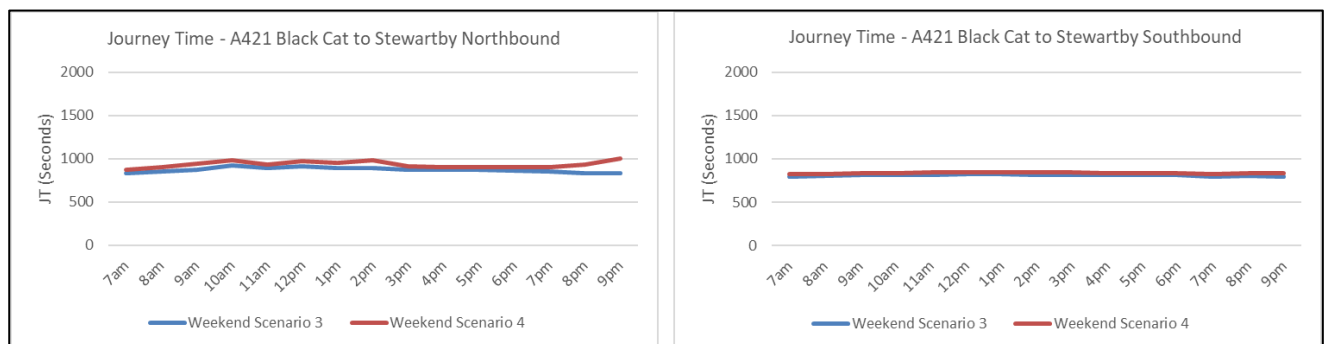
- 9.59 It can be seen in **Figure 9-27** and **Figure 9-28** that with the introduction of the Proposed Development in Scenario 4, some changes in journey time are predicted on the route between the A421/A1 Black Cat junction and Stewartby on an 'Average' Weekday and on a 'Busy' Saturday. This route illustrates the effect of the development on a longer route originating/ending in the centre of Stewartby.

Figure 9-27: A421 Black Cat to Stewartby – ‘Average’ Weekday – Journey Time



- 9.60 On an ‘Average’ Weekday, journey times in the northbound direction are predicted to reduce by 57 seconds in the AM Peak and by 115 seconds during the PM peak. In the southbound direction, journey times are expected to increase by 27 seconds in the AM Peak and 58 seconds in the PM Peak of an ‘Average’ Weekday.
- 9.61 Between 21:00 and 22:00 on an ‘Average’ Weekday, the increase in journey time in the southbound direction is predicted to reach up to 173 seconds reflecting the effect of traffic leaving the Proposed Development and heading north. Again, such an increase is not considered material, particularly outside of the core Peak of background movement on the highway network.
- 9.62 On a ‘Busy’ Saturday, a journey time increase of 55 seconds is predicted in the northbound direction in the AM peak and 30 seconds in the PM peak. In the southbound direction, an increase of 22 seconds is predicted in the AM peak and 202seconds in the PM Peak. The most significant journey time changes along this route on a ‘Busy’ Saturday is predicted to occur between 21:00 – 22:00 in the northbound direction with a journey time increase of 175 seconds as can be seen in **Figure 9-28**.

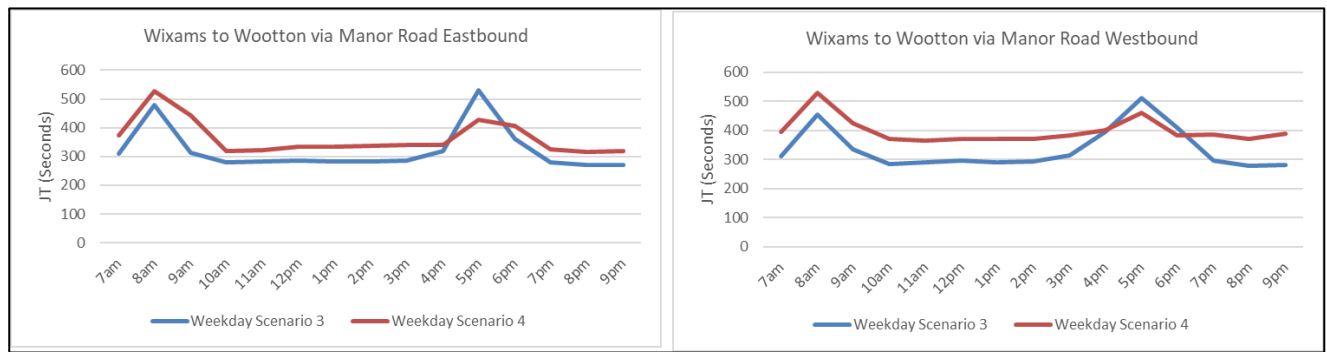
Figure 9-28: A421 Black Cat to Stewartby – ‘Busy’ Saturday – Journey Time



Wixams to Wootton via Manor Road

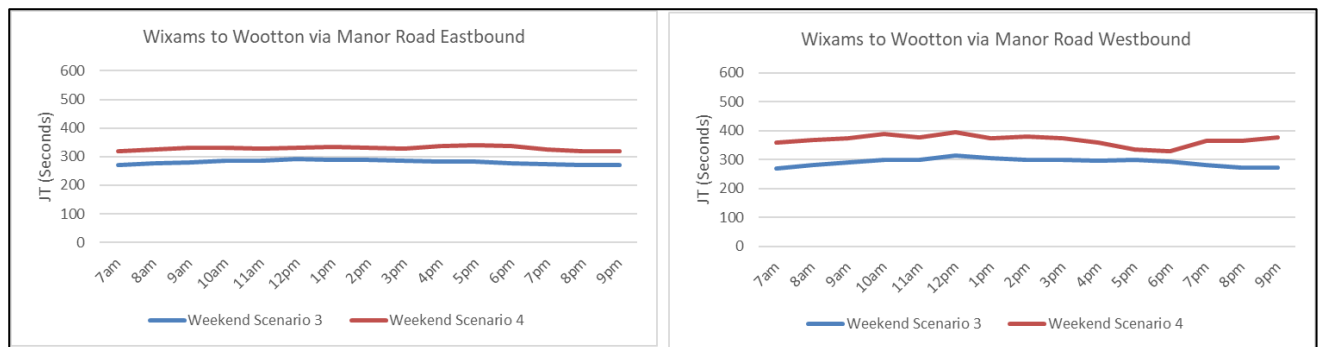
- 9.63 On an ‘Average’ Weekday with the introduction of the Proposed Development in Scenario 4, minor changes to journey time along the route are predicted. Journey times in the eastbound direction are predicted to increase by 46 seconds in the AM Peak with a commensurate reduction in journey times of 104 seconds likely to occur during the PM peak. In the westbound direction, journey times are expected to increase by 73 seconds in the AM Peak and a reduction of 52 seconds in the PM Peak of an ‘Average’ Weekday. This is shown in **Figure 9-29**.

Figure 9-29: Wixams to Wootton via Manor Road – ‘Average’ Weekday – Journey Time



- 9.64 On a ‘Busy’ Saturday, journey times are predicted to increase in the eastbound direction by 48 seconds during the AM Peak and 58 seconds during the PM peak, with the Proposed Development in Scenario 4. In the westbound direction, journey times are predicted to increase by 85 seconds in the AM Peak and 37 seconds during the PM Peak.

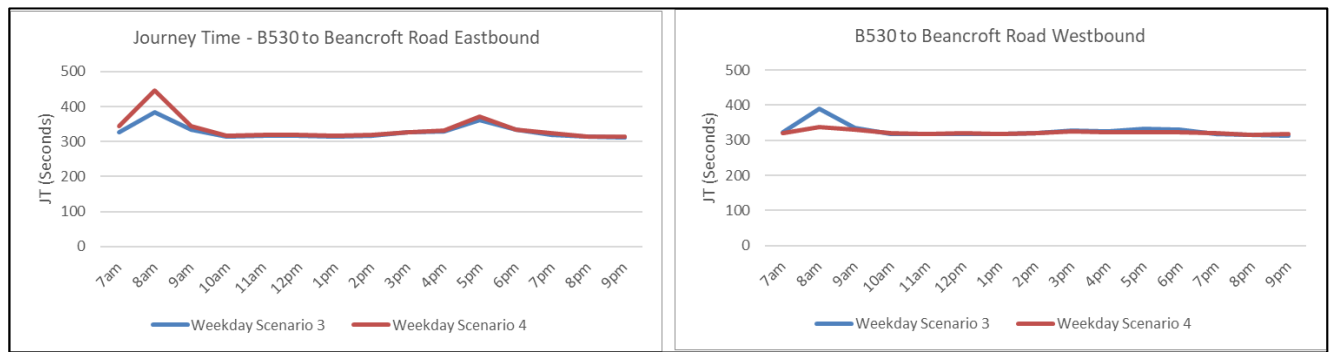
Figure 9-30: Wixams to Wootton via Manor Road – ‘Busy’ Saturday – Journey Time



B530 to Beancroft Road via Green Lane

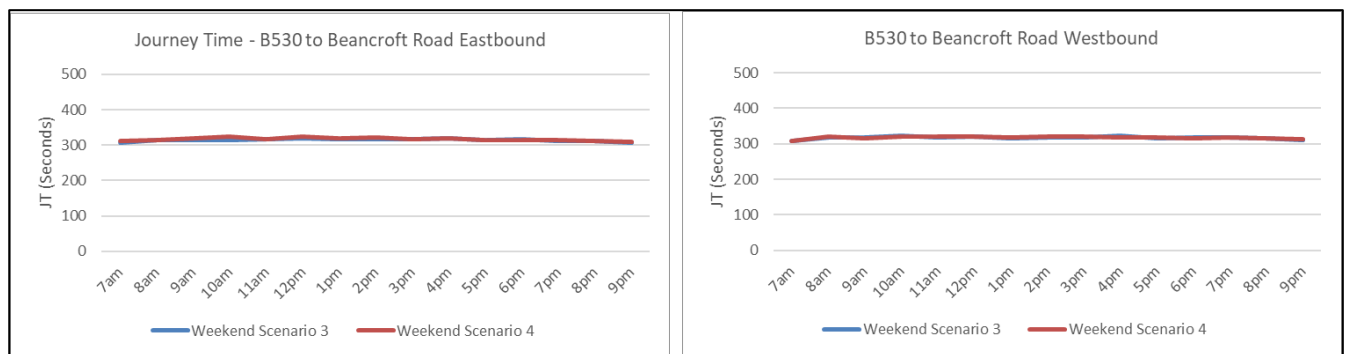
- 9.65 The B530 to Beancroft Road route modelled within this assessment runs from Beancroft Road west of the A421 to Green Lane and Stewartby Way. It can be seen in **Figure 9-31** and **Figure 9-32** that with the introduction of the Proposed Development in Scenario 4, journey times will be marginally affected on both an ‘Average’ Weekday and a ‘Busy’ Saturday. This route runs along Stewartby Way, Green Lane, then along the C94 to Marston Moretaine and finally across the A421 Marston Moretaine interchange to Beancroft Road going northwest. It illustrates the effect of the development on another local route across the Marston Vale.
- 9.66 On an ‘Average’ Weekday, an increase in journey times of 61 seconds is expected during the AM Peak in the eastbound direction and 10 seconds during the PM peak. In the southbound direction, journey times are predicted to reduce by 50 seconds during the AM peak and by 10 seconds during the PM peak. This is illustrated on **Figure 9-31**.

Figure 9-31: B530 to Beancroft Road via Green Lane – ‘Average’ Weekday – Journey Time



- 9.67 On a ‘Busy’ Saturday, in Scenario 4, in the eastbound direction, it is predicted that with the introduction of the Proposed Development, a minimal increase in journey time may likely materialise with predicted increases of +1 to +3 seconds. These predicted increases are not considered material.

Figure 9-32: B530 to Beancroft Road via Green Lane – ‘Busy’ Saturday – Journey Time



Journey Time Summary

- 9.68 The Journey Time assessment presented here shows that the Proposed Development in Scenario 4 compared to Scenario 3 is predicted, overall, not to materially affect journey times on key routes through the modelled road network around the Site. There are some variations that are worth noting, but the assessment carried out does not highlight any significant and consistent increase in journey time on any of the routes studied. The main variations worth noting are highlighted below:
- On the A6 Branston Way, journey times during PM Peaks of a weekday are expected to increase by 111 seconds along the southbound direction and 11 seconds along the northbound direction.
 - On the B530 South of A421 route, journey times on an ‘Average Weekday’ are expected to increase by 15 seconds and 35 seconds across the day in the southbound and northbound direction respectively. For a ‘Busy Saturday’, journey times across a whole day are expected to increase by 19 seconds and 30 seconds in the southbound and northbound direction respectively.
 - On the A6 South of A421 route, journey times on an ‘Average Weekday’ and ‘Busy Saturday’ are expected to reduce by 317 seconds in the AM peak and 266 seconds across in the PM peak.

- d. On the A421 Black Cat Junction to Stewartby route, journey times are expected to increase by 31 and 27 seconds across a whole 'Average' Weekday in the northbound and southbound directions respectively. For a 'Busy' Saturday, journey times are expected to increase by 62 seconds and 27 seconds across the whole day in the northbound and southbound direction respectively.
- e. On the Wixams to Wootton via Manor Road route, journey times are expected to increase by 42 seconds and 62 seconds across an 'Average' Weekday in the eastbound and westbound direction respectively. For a 'Busy' Saturday journey times are expected to increase by 48 seconds and 76 seconds across the whole day in the eastbound and westbound directions respectively.
- f. The Proposed Development would deliver additional road infrastructure including a new junction onto the A421, which would attract traffic away from other A421 Interchanges locally. This beneficial effect is predicted at the A421 Marston Moretaine Interchange, with predicted reductions in journey time of 46 seconds and 20 seconds on the northbound and southbound offslips respectively, in the PM peak on a weekday.

Queue Assessment on the SRN

- 9.69 Estimation of queuing is not a good metric to use when making judgements about traffic effect. This is for a number of reasons. These include that there is tendency for mathematical queue lengths to fluctuate between model runs, that there is a practical and real life day to day variance in queuing which means that measured results cannot be relied upon, and that an individual's perception of a queue differs from person to person (it is subjective) which doesn't compare well to a defined mathematical interpretation.
- 9.70 For these reasons it is not appropriate to place significant weight on queuing when considering effect. Instead journey time is the more appropriate measure, as reported above. This is more pertinent and relevant to the real world.
- 9.71 However, queuing specifically in respect of safety has been considered.
- 9.72 There is no significant evidential link between queuing per se and safety – i.e. queuing per se does not significantly change the safety characteristics of the highway except in specific circumstance. Specific circumstance is often considered to be where queuing extends back from slip roads onto the mainline of a carriageway.
- 9.73 Therefore, the effect of the Planning Proposal on queuing, as defined by the traffic model in the Primary Opening Year Case (Scenario 4) compared to the Reference Case (Scenario 3), on the slip roads of the A421 Marston Moretaine Interchange and at the two adjacent A6/A421 junction, Marsh Leys and Elstow has been looked at. The detailed results, including queuing plots at five minute intervals across the assessed day, are in **Annex 13**.
- 9.74 As is already known and reported, the two A421/A6 junctions experience congestion at some times of the day, with in some circumstances queuing onto the A421 mainline. It is understood that NH has aspirations to make relatively minor improvements to these junctions to improve the flow of traffic at peak times.

- 9.75 The Planning Proposal makes no significant difference to the character of performance of those existing junctions, including to the extent and period of queuing onto the A421 mainline. This is a reasonable conclusion from the journey time analysis and is corroborated by the queuing analysis. Therefore, improvement of these junctions is not necessary or appropriate in the context of the Planning Proposal.
- 9.76 However, UDX does see value to the Planning Proposal in the improvement of these junctions. Therefore, it understands and supports NH's aspirations.

Summary of Impact Assessment and Approach to Mitigation

- 9.77 The assessment presented in this section demonstrates that the Proposed Development in the Primary Opening Year would not have a significant impact on the operation of the road network considered in this study when compared to the Reference Case. The Total Network statistics provided by the model demonstrate that, overall, although the number of trips within the road network modelled will increase as a result of the Proposed Development, these trips will be able to traverse the modelled area and the same proportion of trips will be completed as are completed in the Reference Case. The review of journey times on key routes through the model shows that some routes may experience some increases in journey time, but these are not material. The Proposed Development in Scenario 4 would be supported by new transport infrastructure including the delivery of new slip roads on and off the A421 and a new route through the Marston Vale area which will have a beneficial effect on journey time for some trips. It is likely that this new road infrastructure will benefit trips between the A421 and the Wixams area, providing an alternative route to the A421 Elstow Interchange. The new slip roads also offer an alternative route to traffic currently using the A421 Marston Moretaine Interchange and as such brings benefits in traffic conditions in Marston Moretaine, as well as an alternative to the A421 Marsh Leys Interchange.

10 Traffic Analysis – Future Year Scenarios

Introduction

- 10.1 This section considers the traffic implications of the Proposed Development in the Future Year on the operation of the wider road network around the Site.

Core Scenario

- 10.2 The core scenario assessed within this section is:
- a. Scenario 5 - Future Year – Reference Case plus Development - This is a Scenario of the existing road network and traffic plus traffic associated with agreed committed developments plus Future Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only with a shuttle bus service operating between Milton Keynes and the Site and the new A421 Junction being complete. For clarity this scenario considers full development of the Lake Zone and West Gateway Zone.
- 10.3 Scenario 5 is compared against the Reference Case assessed within this report (referred to as Scenario 3) which is the existing road network and traffic along with traffic associated with committed developments only.

Sensitivity Tests

- 10.4 In addition to the core scenario, this chapter considers three further sensitivity tests as follows:
- a. Scenario 5a which is the Reference Case plus Development plus full EWR. This is a Scenario of the existing road network and traffic, plus traffic associated with agreed committed developments, plus Future Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Cambridge with a new station delivered within the Site and the A421 Junction being complete. For clarity this scenario considers full development of the Lake Zone and the West Gateway Zone.
 - b. Scenario 5b which is the Reference Case plus Development without a Rail Discount. This is a Scenario of the existing road network and traffic, plus traffic associated with agreed committed developments, plus Future Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only with a shuttle bus service operating between Milton Keynes and the Site and the A421 Junction being complete. For clarity this scenario considers full development of the Lake Zone and the West Gateway Zone. In this scenario, there is no rail discount applied for visitors.

- c. Scenario 5c which is the Reference Case plus Development which assesses M1J13 only. This is a Scenario of the existing road network and traffic, plus traffic associated with agreed committed developments, plus Future Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only with a shuttle bus service operating between Milton Keynes and the Site and the A421 Junction being complete. For clarity, this scenario considers full development of the Lake Zone or West Gateway Zone. This scenario is based on a version of the micro-simulation model that considers likely suppressed demand that would naturally occur at M1J13 as a response to existing and predicted capacity constraints at the junction

10.5 The implications of closing the level crossing on Manor Road on traffic assignment locally have been considered in the context of Scenario 5. The details of the assessment carried out are reported in **Annex 7**.

Core Scenario

- 10.6 The scope of the assessment carried out relates to the scope of the micro-simulation model as it provides a good understanding of the operation of the network that is the most likely to see the highest level of impacts, i.e. on the strategic routes on the approach to the Proposed Development. For clarity, the wider network considered here includes the following key nodes and links:
- a. The M1 J13;
 - b. The A421 between M1 J13 and the Black Cat junction;
 - c. The grade separated junctions on the A421 on the approach to the Site, i.e. the A421 Marston Moretaine Interchange, the A421 Marsh Leys Interchange and the A421 Elstow Interchange;
 - d. The A6 south of the Elstow Interchange; and
 - e. The A6 Branston Way, north of the Marsh Leys Interchange.
- 10.7 This section reports on the key statistics output from the Paramics model (Total Network Statistics) describing the general operation of the network around the Site. It then provides more detailed information including journey time on key routes and delay on the network.
- 10.8 In order to consider further the potential impact of the Proposed Development on the operation of the SRN, an assessment of predicted queues on off slip roads at the main SRN interchanges in the vicinity of the Site has also been carried out, including at A421 Marston Moretaine, A421 Marsh Leys and A421 Elstow interchanges.
- 10.9 This is done for:
- a. An 'Average' weekday; and
 - b. A 'Busy' Saturday.
- 10.10 This assessment is based on detailed outputs from the Paramics model provided in **Annex 11** Traffic flows on links within the model related to Scenario 3 and Scenario 5 are provided in **Annex 12**.

Total Network Statistics

- 10.11 The first set of results to be reported is the Total Network Statistics. This records the total number of completed trips, the total time taken by all vehicles to pass through the network and calculates the average speed per vehicle and average delay per vehicle.
- 10.12 **Table 10-1** provides a summary of the completed trips through the modelled network and latent demand (i.e. trips that are not completed) for Scenario 5 compared back to Scenario 3, on an 'Average' Weekday and then on a 'Busy' Saturday.

Table 10-1: Completed Trips and Latent Demand

	Scenario 3			Scenario 5		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
Completed Trips (Average Weekday)	88,746	144,398	96,582	92,492	152,494	99,641
Completed Trips (Busy Saturday)	51,895	167,227	73,336	57,435	177,130	77,812
% Completed Trips (Average Weekday)	100%	100%	99%	99%	100%	99%
% Completed Trips (Busy Saturday)	97%	101%	100%	96%	101%	100%

- 10.13 The analysis shows that both on an 'Average' Weekday and on a 'Busy' Saturday, in the AM peak period, Interpeak period and PM peak period, a significant number of additional trips are completed through the modelled network, in Scenario 5, reflecting the addition of the Proposed Development. However, it can be seen that the percentage of trips completed across the network does not change materially as a result of the Proposed Development, across all time periods tested. This suggests that the proposed infrastructure improvements supporting the Proposed Development deliver adequate capacity at an overall network level to accommodate the Proposed Development in Scenario 5.
- 10.14 **Table 10-2** provides average vehicle speeds and average delay across the network modelled, comparing Scenario 3 and Scenario 5.

Table 10-2: Average Vehicle Speed (kph)

Time	Scenario 3			Scenario 5		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
'Average' Weekday	60	77	67	59	74	62
'Busy' Saturday	81	77	79	79	72	76

- 10.15 The analysis shows that on both an 'Average' Weekday and a 'Busy' Saturday, in all time periods reported, there is a slight reduction in average vehicle speeds in Scenario 5 when compared to Scenario 3. The changes reported by the model are minor and indicate that the general traffic conditions on the wider network around the Proposed Development will not materially change with the addition of the Proposed Development in Scenario 5.

Table 10-3: Average Delay in Seconds – ‘Average’ Weekday and ‘Busy’ Saturday

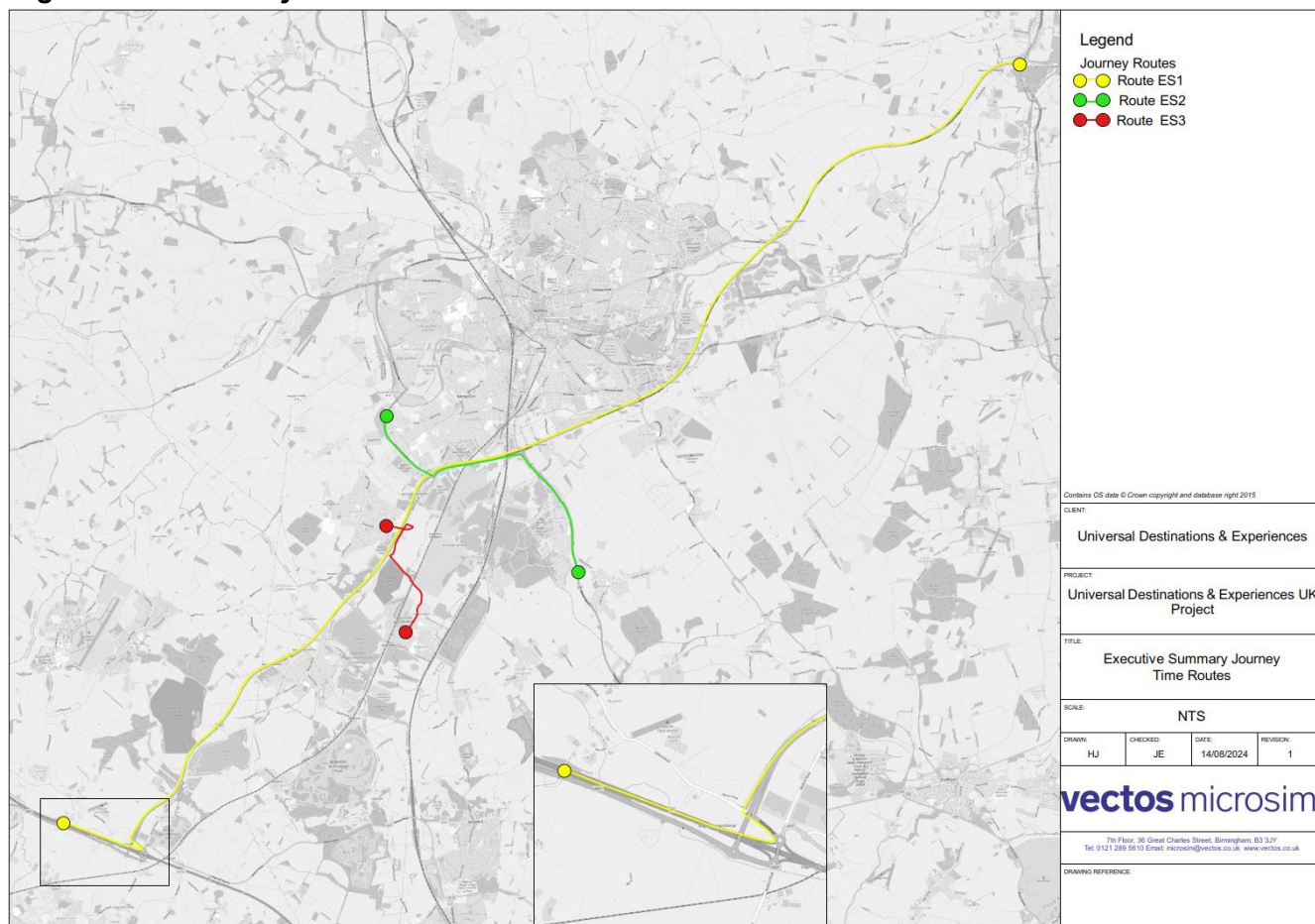
Time	Scenario 3			Scenario 5		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
‘Average’ Weekday	437	310	374	457	332	414
‘Busy’ Saturday	296	308	308	323	339	334

- 10.16 As per the comments in relation to average speed, there is generally an increase in average delay in Scenario 5 when compared to Scenario 3. The worst predicted increase in delay as a result of the Proposed Development in Scenario 5 is predicted in the PM peak period in the ‘Average’ Weekday, with an increase of 40 seconds. This represents an increase of 11% when compared to Scenario 3, which is considered minimal across a large network.
- 10.17 Overall, the model shows that, with the introduction of the Proposed Development in Scenario 5, there will be slight decreases in average speeds and slight increases in average delay, but these changes are not material and conditions on the wider road network will remain unchanged with the introduction of the Proposed Development.

Journey Times

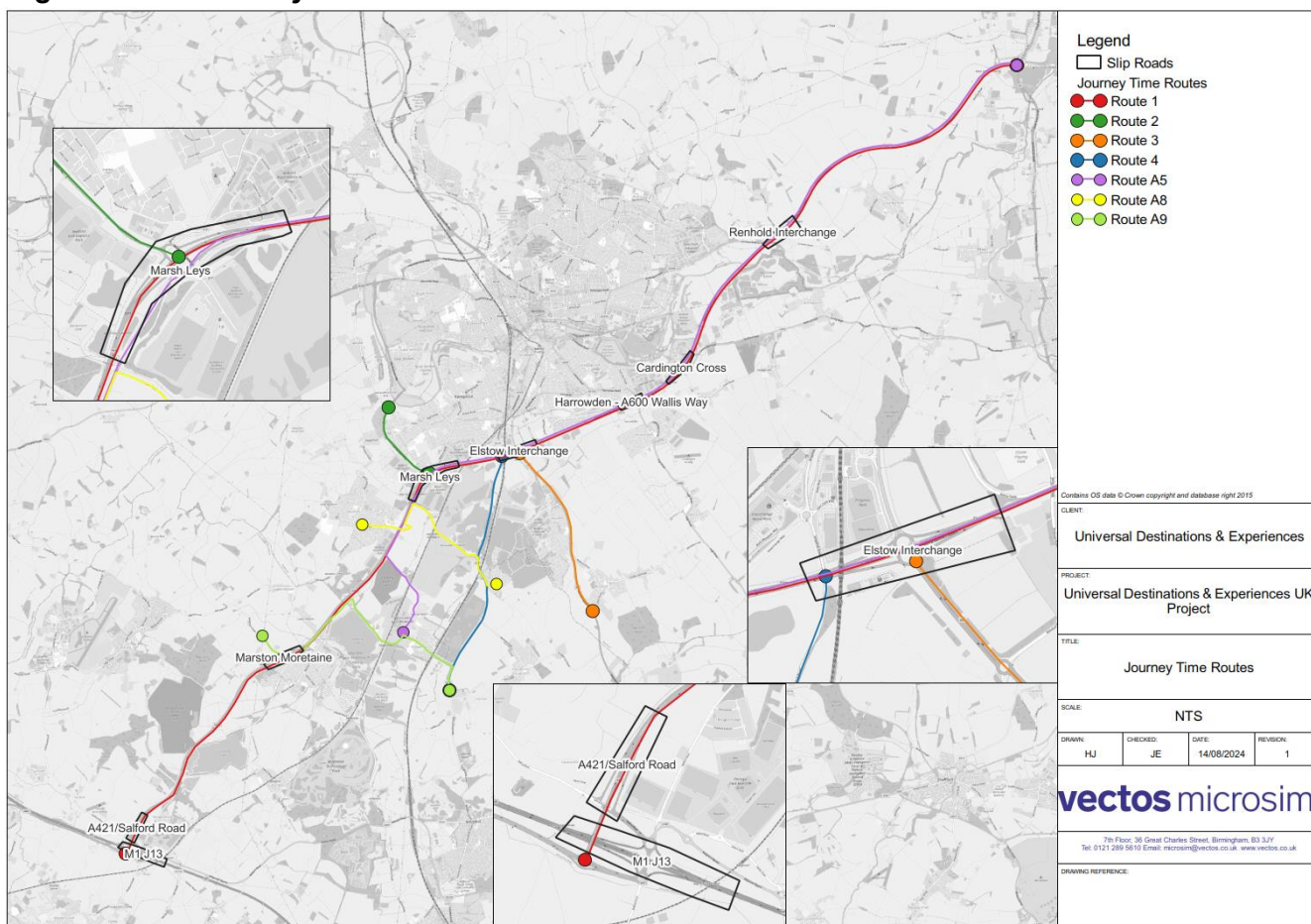
- 10.18 The Paramics model allows an assessment of variations in journey times along set routes through the model. The following paragraphs set out the difference in journey times along sections of the wider highway network around the Site between Scenario 3 and Scenario 5.
- 10.19 The key routes considered in this assessment are illustrated in **Figure 10-1**. These are reflected in the Executive Summary to this Transport Assessment.

Figure 10-1: Journey Time ES Routes



10.20 The further routes considered in this assessment are illustrated in **Figure 10-2**.

Figure 10-2 – Journey Time further Routes



10.21 **Table 10-4** provides an overall summary of the average journey times along the key routes considered within the model for an ‘Average’ Weekday and a ‘Busy’ Saturday, comparing Scenario 3 and Scenario 5 across the entire modelled period (07:00 to 22:00).

Table 10-4: ‘Average’ Weekday and ‘Busy’ Saturday – Journey Times comparison (in seconds)

Route	‘Average’ Weekday		‘Busy’ Saturday	
	Scenario 3	Scenario 5	Scenario 3	Scenario 5
Route ES1 – northbound	1,054	1,057	1,034	1,035
Route ES1– southbound	1,129	1,139	1,044	1,045
Route ES2 – northbound	491	461	364	367
Route ES2 – southbound	419	448	344	344
Route ES3 – northbound	258	294	225	274
Route ES3– southbound	221	248	212	234
Route 1 - A421 - northbound	955	957	941	944
Route 1 - A421 - southbound	980	1007	950	955
Route 2 - A6 Branston Way - northbound	172	196	111	112
Route 2 - A6 Branston Way - southbound	111	115	108	108

Route	'Average' Weekday		'Busy' Saturday	
	Scenario 3	Scenario 5	Scenario 3	Scenario 5
Route 3 - A6 South of A421 - northbound	144	144	141	141
Route 3 - A6 South of A421 - southbound	258	193	157	154
Route 4 - B530 South of A421 – northbound	337	357	327	350
Route 4 - B530 South of A421 – southbound	347	400	327	391
M1 J13 eastbound off slip	29	26	25	24
M1 J13 westbound off slip	21	22	19	21
A421 Salford Road southbound off slip	30	32	28	29
A421 Marston Moretaine – northbound off slip	24	23	18	18
A421 Marston Moretaine – southbound off slip	24	21	18	18
A421 Marsh Leys – northbound off slip	37	40	35	36
A421 Marsh Leys – southbound off slip	40	43	26	28
A421 Elstow – eastbound off slip	27	36	21	24
A421 Elstow – westbound off slip	36	44	20	20
Route A5 - A421 Black Cat to Stewartby southbound	1,049	1,100	1,049	1,100
Route A5 - Stewartby to A421 Black Cat northbound	835	878	835	878
Route A8 - Wixams to Wootton via Manor Road westbound	310	437	310	437
Route A8 - Wootton to Wixams via Manor Road eastbound	312	415	312	415
Route A9 - B530 to Beancroft Road via Green Lane westbound	328	350	328	350
Route A9 - Beancroft Road to B530 via Green Lane eastbound	323	320	323	320

10.22 The data summarised in **Table 10-4** suggests that the addition of the Proposed Development in Scenario 5 would not significantly affect journey times on the key routes through the modelled wider road network, nor would it affect the conditions on the off slips into the key trunk road interchanges in the vicinity of the development. The only noticeable change in journey time reported is a reduction predicted on the A6 northbound approach into the A421 Elstow Interchange in Scenario 5 on an 'Average' Weekday (a reduction of 65 seconds from 258 seconds). This reflects the fact that the Proposed Development introduces a new route to/from the A421 south from Wixams across the Marston Vale and through the Site, a route which may attract traffic that would have otherwise used the A421 Elstow Interchange.⁵ The following figures detail the changes in journey time across the day for each route considered. The blue lines represent the Scenario 3 data, and the orange lines represent the Scenario 5 data.

Route ES1

- 10.23 Following the introduction of Scenario 5, minimal increases in journey times are predicted along the Route ES1 corridor for an 'Average' Weekday. Journey times are predicted to increase by 13 seconds during the AM Peak hour and 5 seconds during PM Peak hour in the northbound direction whereas an average increase of 70 seconds and 184 seconds are predicted in the southbound direction for the AM and PM Peak hours respectively.
- 10.24 **Figure 10-3** illustrates the journey time predicted across the day on the ES1 route on an 'Average' Weekday.

Figure 10-3: Route ES1 – 'Average' Weekday – Journey Time

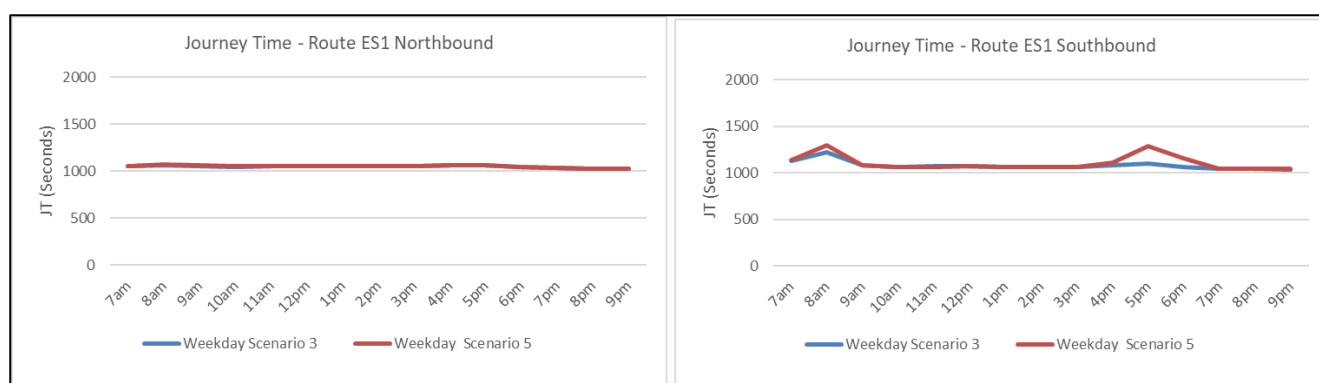
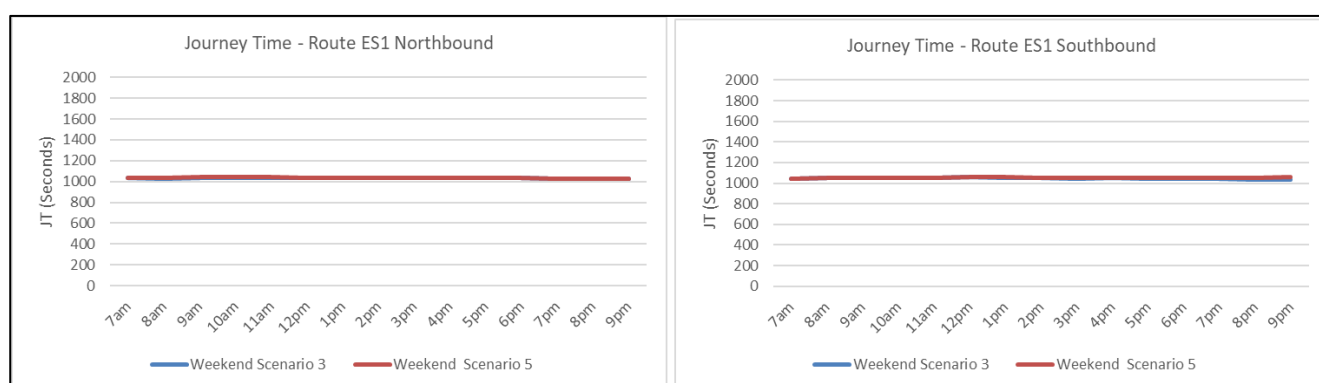


Figure 10-4: Route ES1 – 'Busy' Saturday – Journey Time



- 10.25 On a 'Busy' Saturday as can be seen in **Figure 10-4**, minimal increases in journey times are predicted in both directions with a 4 second increase predicted in the AM peak and PM peak hours along the northbound direction whereas in the southbound direction, journey times are expected to see a 1 second increase for the AM Peak and increase by 8 seconds during the PM Peak. There are no material changes across this route.

Route ES2

- 10.26 Following the introduction of Scenario 5, journey times for an average weekday are predicted to reduce significantly in the northbound direction with a reduction of 248 seconds during the AM peak and 269 seconds during the PM Peak. In the southbound direction however, journey times will increase by 56 seconds and 190 seconds for the AM and PM Peaks respectively.

10.27 **Figure 10-5** illustrates the journey time predicted across the day on the ES2 route on an 'Average' Weekday.

Figure 10-5: Route ES2 – 'Average' Weekday – Journey Time

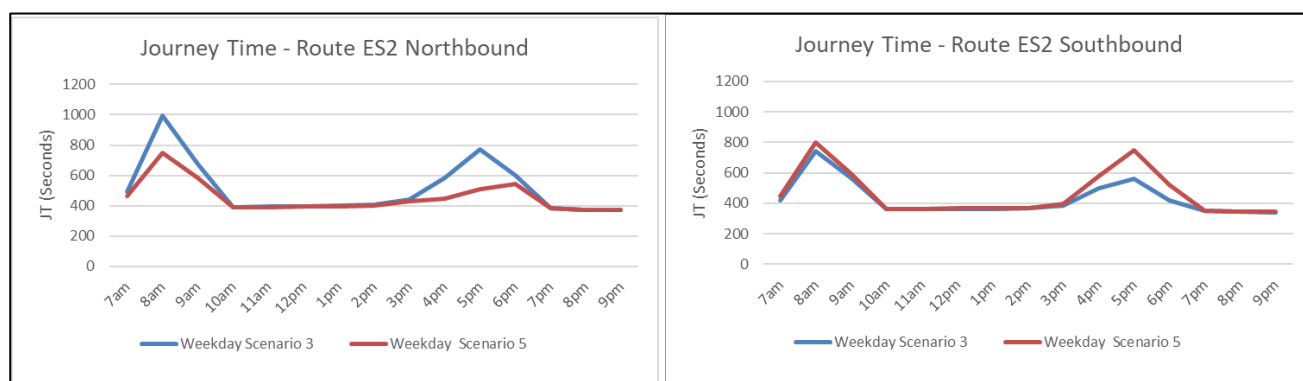
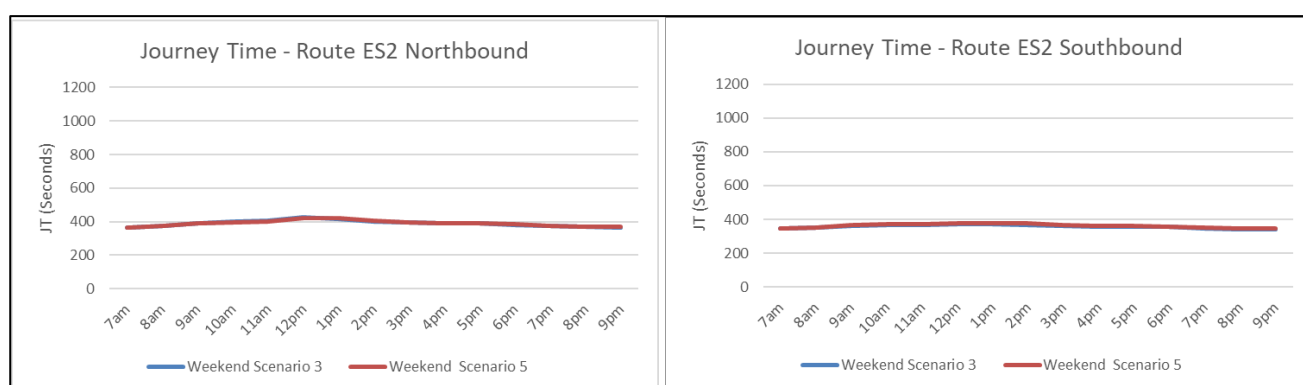


Figure 10-6: Route ES2 – 'Busy' Saturday – Journey Time



10.28 On a 'Busy' Saturday as can be seen in **Figure 10-6**, minimal increases in journey times are predicted in both directions except for in the northbound direction 12:00-13:00 which sees a decrease of 10 seconds, which is not considered material.

Routes ES3

10.29 It can be seen in **Figures 10.7** and **10.8** that the Proposed Development in Scenario 5 will not affect journey times materially for both an Average Weekday and a Busy Saturday.

10.30 On an 'Average' Weekday, journey times will increase by 82 seconds during the AM peak in the northbound direction and by 2 seconds is predicted during the PM Peak in the northbound direction. In the southbound direction, increases in journey time of 35 seconds is anticipated in the AM peak and 34 seconds during the PM Peak.

10.31 The journey time trends for a weekday are illustrated in **Figure 10-7**.

Figure 10-7: Route ES3 – ‘Average’ Weekday – Journey Time

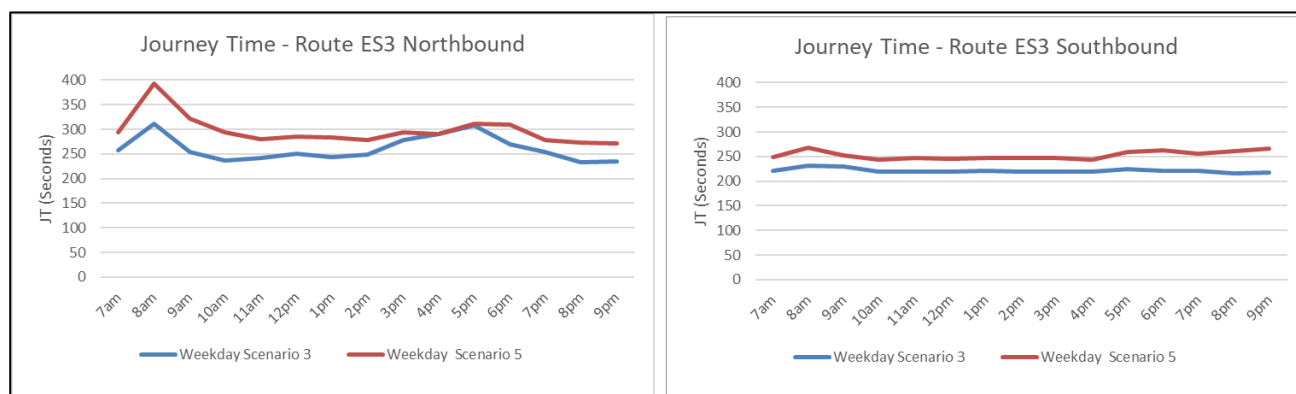
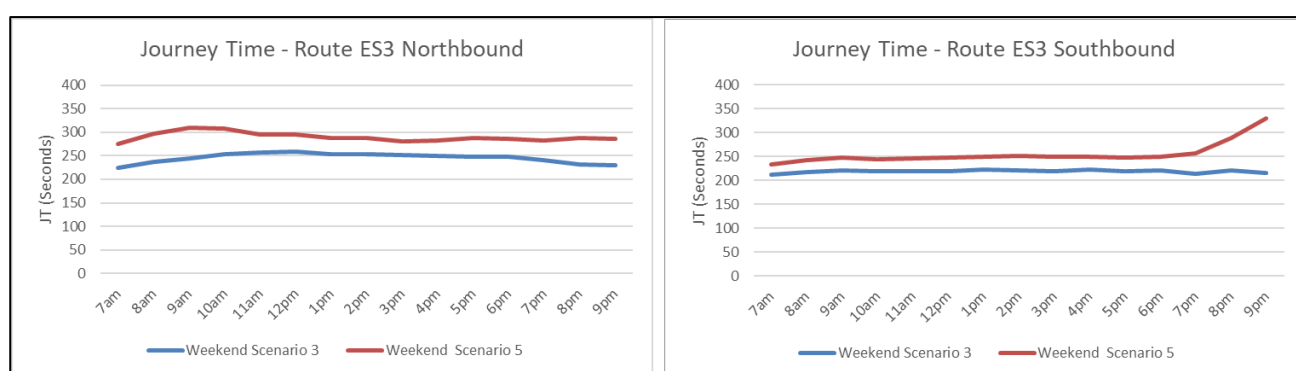


Figure 10-8: Route ES3 – ‘Busy’ Saturday – Journey Time

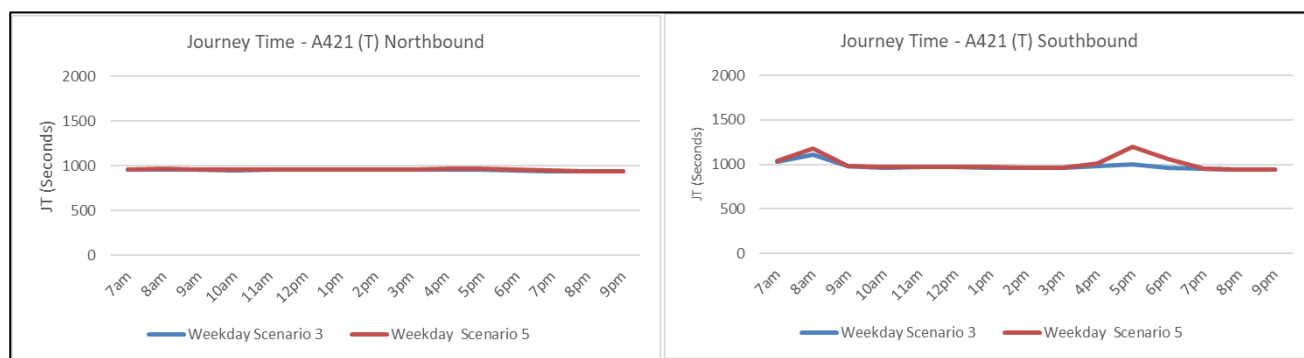


- 10.32 On a ‘Busy’ Saturday as can be seen in **Figure 10-8**, journey times are predicted to increase in both directions with a 59-second increase predicted in the AM peak of the northbound direction and a 39-second increase expected along the southbound direction during the PM Peak. Along the southbound direction, journey times will likely increase by 25 seconds and 28 seconds during the AM and PM Peaks respectively.

A421

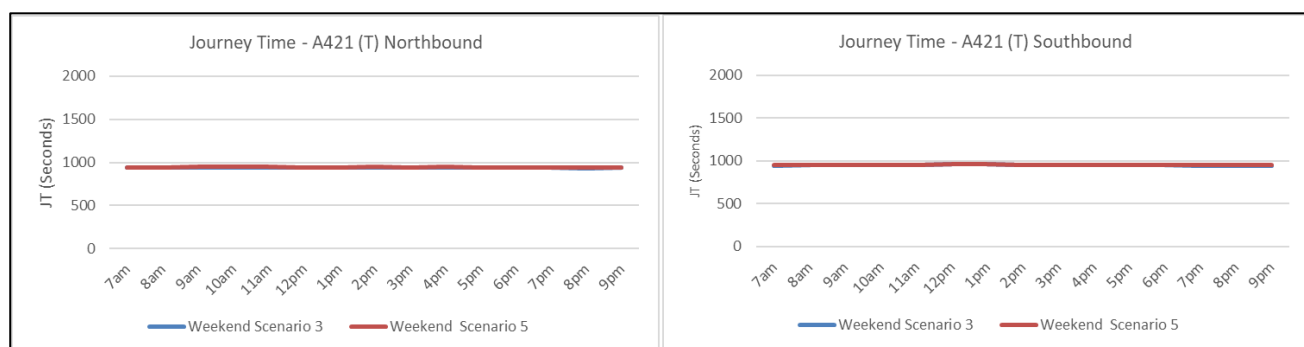
- 10.33 The A421 route modelled within this assessment, runs from M1 J13 to the A1 Black Cat junction. Following the introduction of Scenario 5, minimal increases in journey times are predicted along the A421 corridor for an ‘Average’ Weekday. Journey times are predicted to increase by 9 seconds during the AM Peak and 4 seconds during PM Peak in the northbound direction whereas an average increase of 67 seconds and 194 seconds are predicted in the southbound direction for the AM and PM Peaks respectively.
- 10.34 **Figure 10-9** illustrates the journey time predicted across the day on the A421 route on an ‘Average’ Weekday.

Figure 10-9: A421 – ‘Average’ Weekday – Journey Time



- 10.35 The largest increase in journey time on an ‘Average’ Weekday as a result Scenario 5 is +127 seconds between 17:00 - 18:00 in the southbound direction. This is not considered a material journey time increase considering that trips along the entire length of the A421 between the Black Cat junction and M1 J13 are likely to form part of much longer journeys.
- 10.36 On a ‘Busy’ Saturday, the Proposed Development in Scenario 5 is predicted to lead to only minimal increases in journey times in the northbound and southbound directions along the A421. This is shown in **Figure 10-10**.

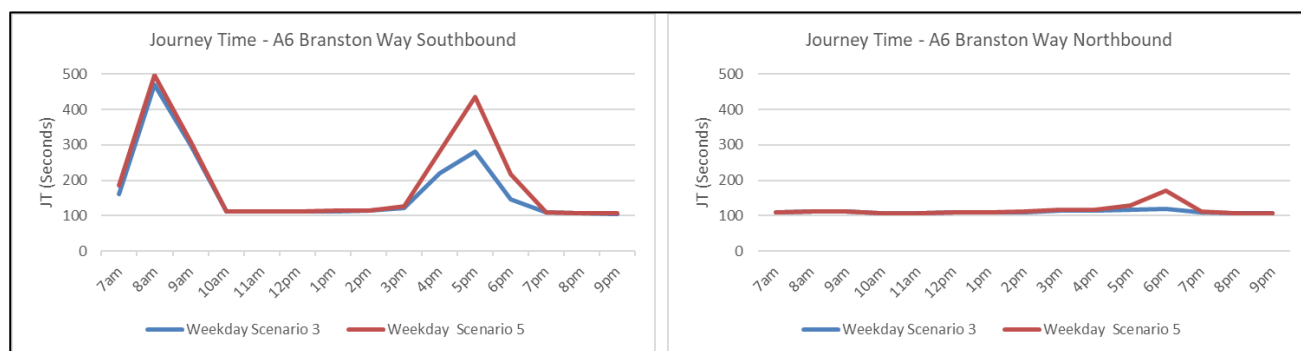
Figure 10-10: A421 – ‘Busy’ Saturday – Journey Time



A6 Branston Way

- 10.37 The A6 Branston Way route modelled within this assessment runs from the A421 Marsh Leys Interchange to the Cemetery Road roundabout. On an ‘Average’ Weekday, journey times along A6 Branston Way are predicted to increase by 27 seconds in the AM Peak and by 153 seconds during the PM peak in the southbound direction. In the northbound direction, journey times are predicted to increase by 50 seconds in the PM peak. Average journey time increase across a whole weekday is predicted to be around 24 seconds in the southbound direction and 5 seconds in the northbound direction.⁴The journey times across an ‘Average’ Weekday for the Reference Case and Scenario 5 are illustrated in **Figure 10-11**.

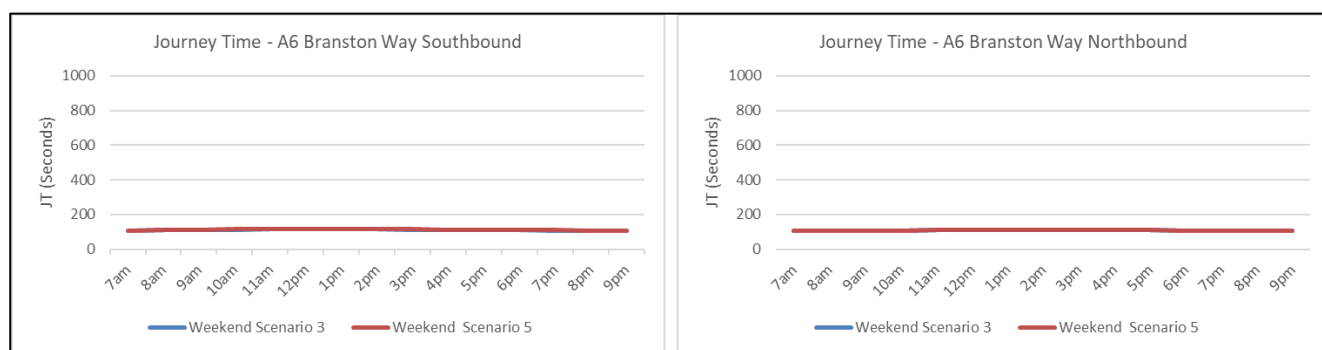
Figure 10-11: A6 Branston Way – ‘Average’ Weekday – Journey Time



10.38 The most significant increase in journey times in the southbound direction on an ‘Average’ Weekday is 153 seconds between 17:00 - 18:00. This predicted increase remains relatively low when considered in the context of a longer trip along strategic routes (from the A421, along the A6). In the southbound direction, the development is predicted to lead to negligible changes in journey times across the day.

10.39 On a ‘Busy’ Saturday, minimal increases in journey times are predicted in both directions with a no change predicted in the AM peak for both the southbound and northbound directions whereas for the PM Peak, journey time will increase by one second in the southbound direction and see no change in the northbound direction. This is shown in **Figure 10-12**.

Figure 10-12: A6 Branston Way – ‘Busy’ Saturday – Journey Time

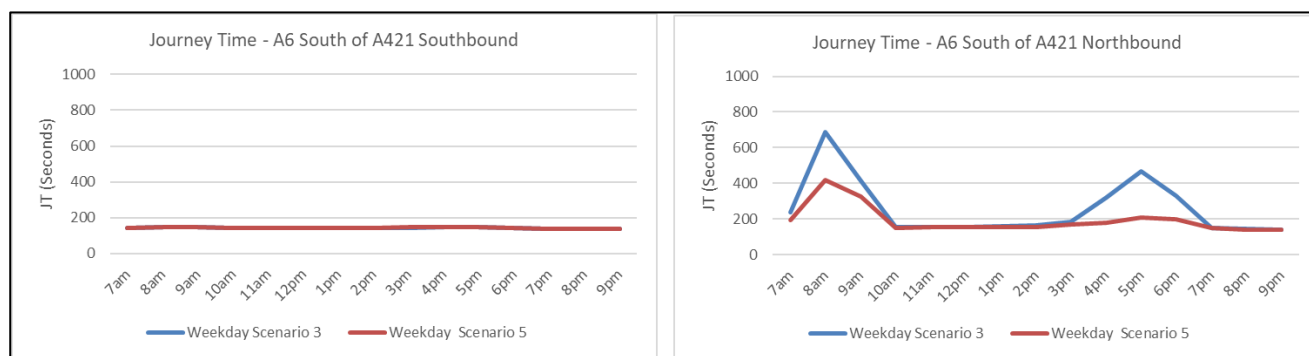


A6 South of A421

10.40 The A6 South of the A421 route modelled within this assessment, runs from the A421 Elstow Interchange to the A6/Luton Road junction south of Wilstead. It can be seen in **Figures 10.13** and **10.14** that the Proposed Development in Scenario 5 will not affect journey times in the southbound direction on that route and would lead to journey time savings in the northbound direction for an ‘Average’ Weekday.

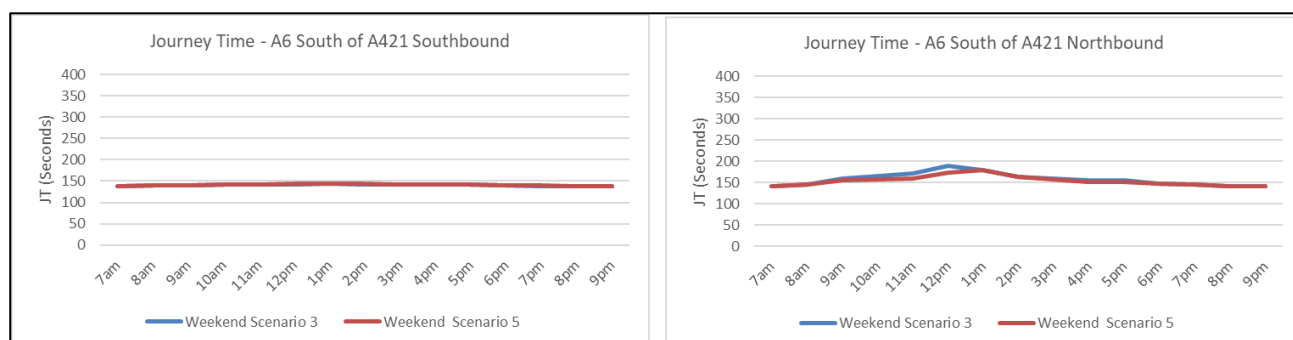
10.41 On an ‘Average’ Weekday, a reduction in journey times of 270 seconds is predicted during the AM Peak in the northbound direction and 260 seconds during the PM peak. This is likely a result of the Proposed Development creating a new route to/from the A421 south that is likely to capture trips away from the A6 northbound approach into the A421 Elstow Interchange. In the southbound direction, a marginal reduction in journey time of one second is anticipated in the AM and PM peak.

Figure 10-13: A6 South of A421 – ‘Average’ Weekday – Journey Time



- 10.42 Similarly, on a ‘Busy’ Saturday, no changes in journey time are predicted for the AM peak and PM Peaks in the southbound direction, whereas reductions in journey time of 1 second are predicted in the northbound direction for the AM peak and 4 seconds for the PM Peak. Overall, journey times will not be impacted for journeys in the southbound direction across the whole day and are predicted to reduce by 3 seconds in the northbound direction across a whole Saturday. As can be seen in **Figure 10-14**, the most notable reduction in journey times will likely be around 16 seconds between 12:00 and 13:00.

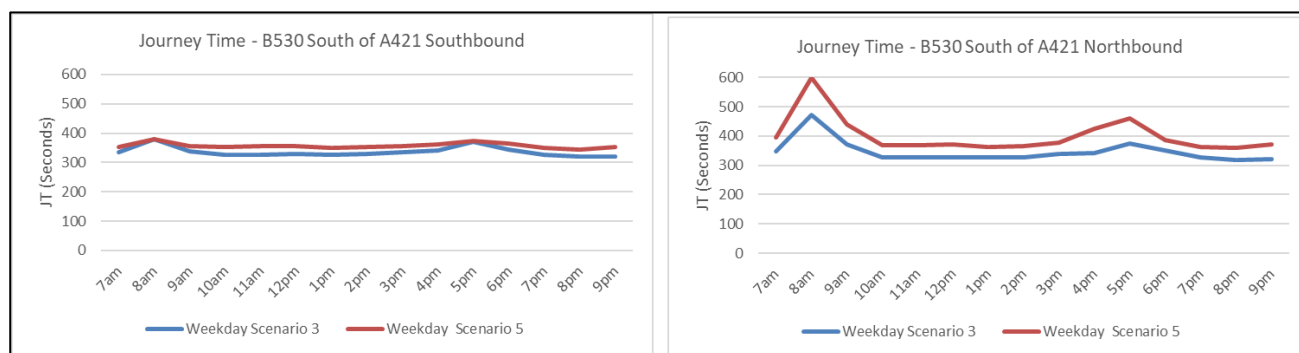
Figure 10-14: A6 South of A421 – ‘Busy’ Saturday – Journey Time



B530 South of A421

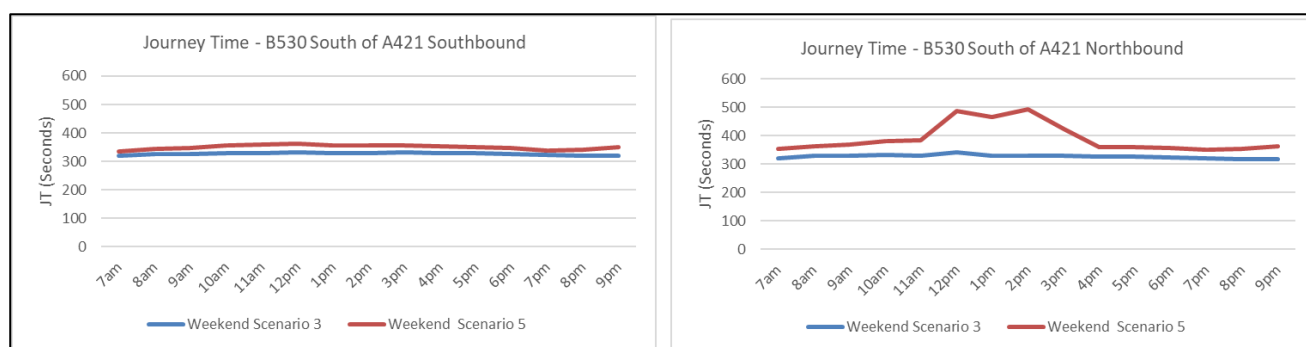
- 10.43 The B530 South of the A421 route modelled within this assessment, runs along the B530 Ampthill Road from the bridge over the A421, south of the Interchange Retail Park in Bedford, to the B530/How End junction west of Houghton Conquest. It can be seen in **Figures 10.15** and **10.16** that the Proposed Development in Scenario 5, would only lead to small increases in journey time along the route.
- 10.44 On an ‘Average’ Weekday, a reduction in journey times in the southbound direction of 1 second is predicted during the AM Peak with an increase in journey time of 4 seconds predicted during the PM peak. In the northbound direction, journey times are predicted to increase by 126 seconds during the AM Peak and 83 seconds during PM Peak. Across the whole day, journey times are predicted to increase by 21 seconds and 54 seconds in the southbound and northbound directions respectively. This is likely to be as a result of the introduction of a traffic signal-controlled junction on the B530 at Manor Road, as a result of the Proposed Development and the creation of a western plaza access to the Full Wixams Station. This level of increase is not considering material.
- 10.45 The journey times predicted across the day in Scenario 3 and Scenario 5 are illustrated in **Figure 10-15** for an ‘Average’ weekday and **Figure 10-16** for a ‘Busy’ Saturday.

Figure 10-15: B530 South of A421 – ‘Average’ Weekday – Journey Time



10.46 On a ‘Busy’ Saturday, the Proposed Development in Scenario 5 is predicted to lead to an increase in journey times in the southbound direction of 17 seconds in the AM peak and 20 seconds in the PM Peak. In the northbound direction, journey time will likely increase by 34 seconds for the AM peak and 34 seconds for the PM Peak. Across the whole day, journey times are predicted to increase by 23 seconds and 64 seconds in the southbound and northbound directions respectively. This is shown in **Figure 10-16**.

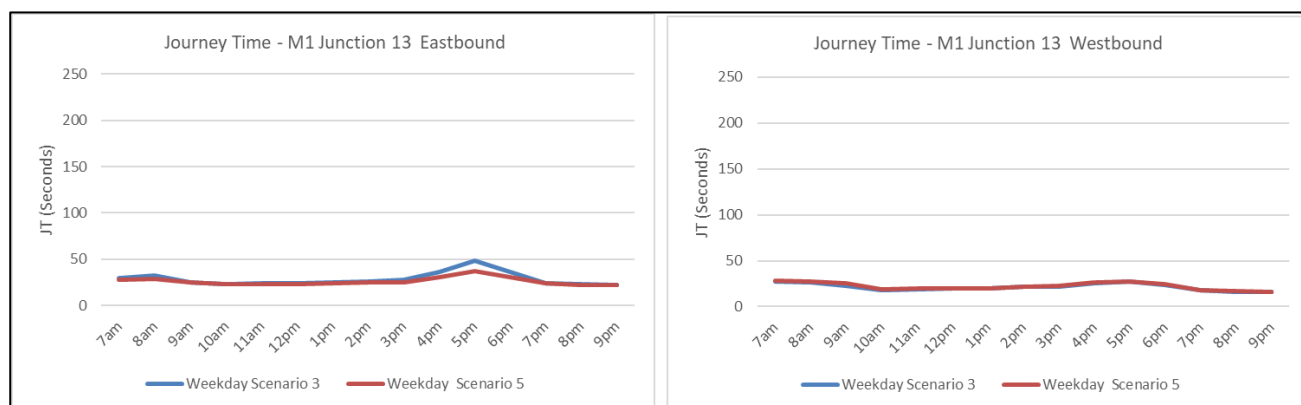
Figure 10-16: B530 South of A421 – ‘Busy’ Saturday – Journey Time



M1 Junction 13 Off-slip

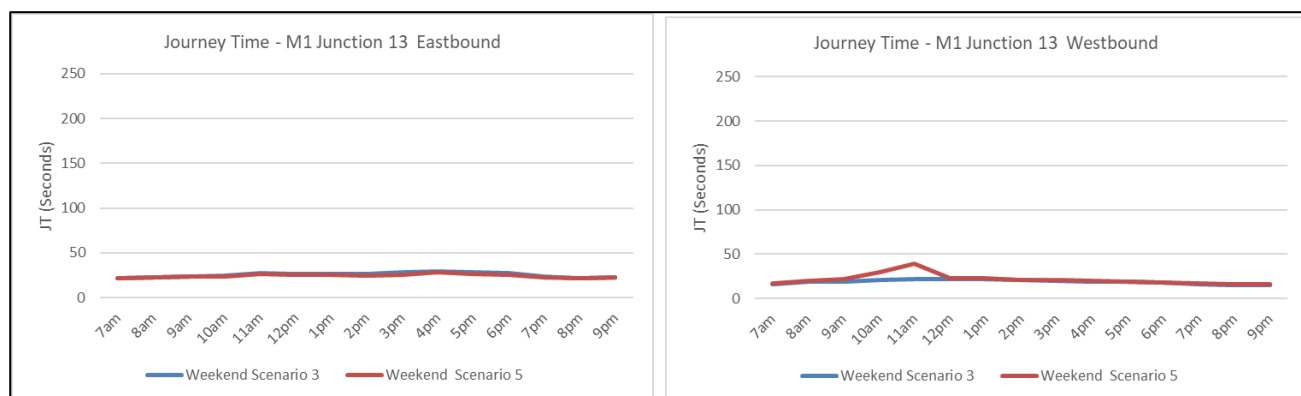
10.47 On an ‘Average’ Weekday, the Proposed Development in Scenario 5 is predicted to lead to journey time savings in the eastbound direction of 3 seconds during the AM Peak and reduce further to 11 seconds during the PM peak. In the westbound direction, journey times would increase marginally by only a second during the AM peak with no changes in journey time expected for the PM peak. **Figure 10-17** illustrates the predicted journey times across an ‘Average’ Weekday.

Figure 10-17: M1 J13 off slips – ‘Average’ Weekday – Journey Time



10.48 On a ‘Busy’ Saturday, the Proposed Development in Scenario 5 is predicted to result in a reduction in journey time of about a second across the day in the eastbound direction with no changes to journey time expected in the westbound direction.

Figure 10-18: M1 J13 Off Slips – ‘Busy’ Saturday – Journey Time



A421 Salford Road Off-slip

10.49 As can be seen on **Figure 10-19**, the Proposed Development in the Primary Opening Year, would not affect journey times on an ‘Average’ Weekday in both northbound and southbound directions during the AM peaks. In the PM peak in the southbound direction an increase of 14 seconds is expected along the off slip as shown in **Figure 10-19**.

Figure 10-19: A421/Salford Road Junction – Average Weekday - Journey Time

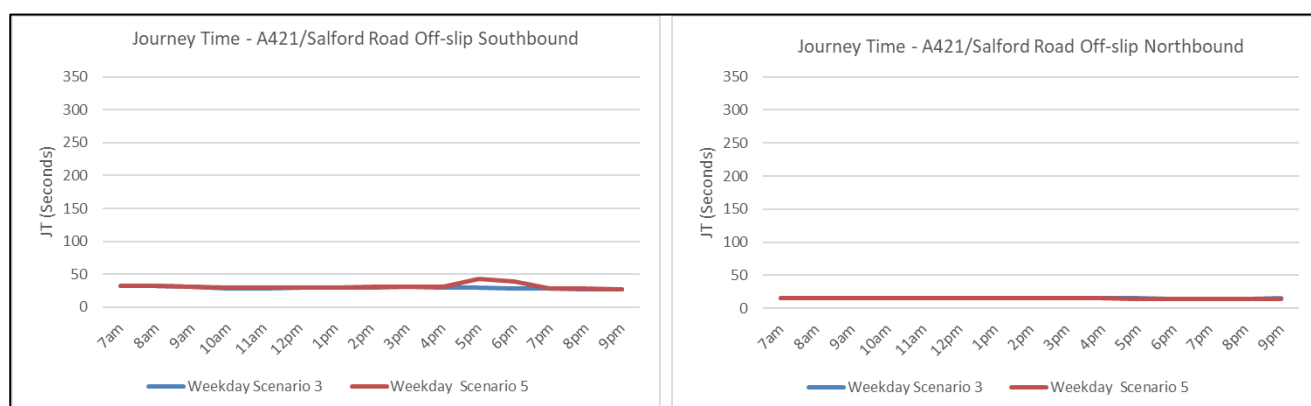
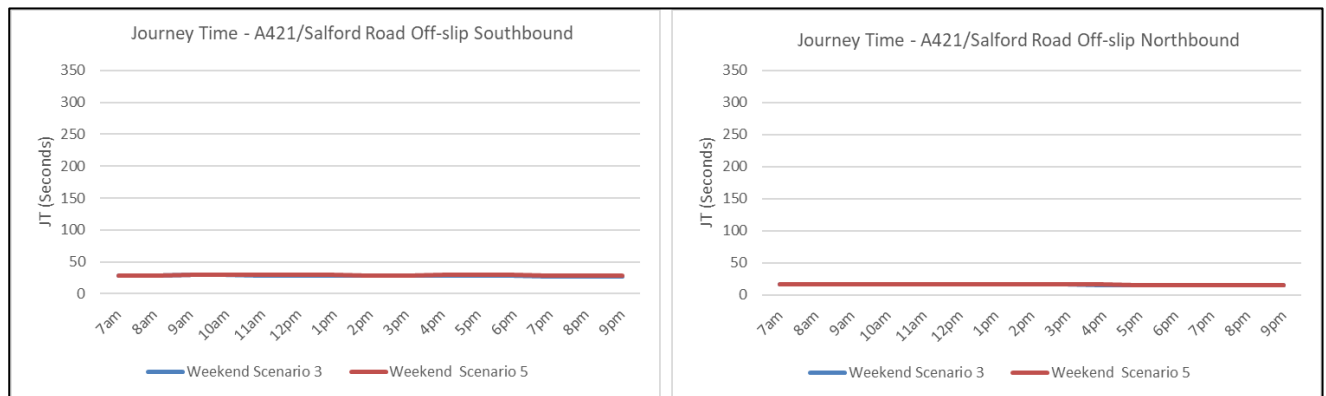


Figure 10-20: A421/Salford Road Junction - Busy Saturday - Journey Time

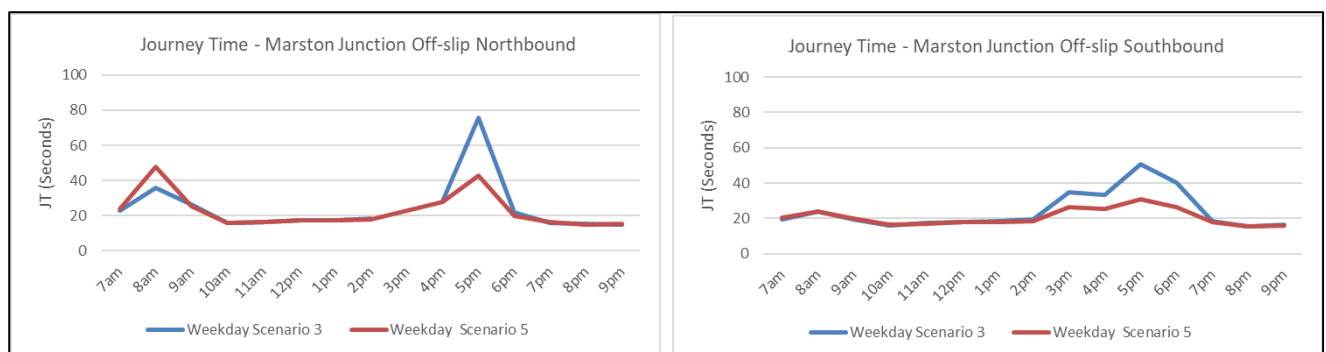


- 10.50 Similarly for a Busy Saturday, journey times will not be affected along the on-slip road (northbound) during the AM and PM Peaks. Along the off-slip (southbound), journey times will not be affected during the AM peak by the Proposed Development in the Primary Opening Year. However, a marginal increase in journey time of one second is expected during the PM peak.

A421 Marston Moretaine Interchange

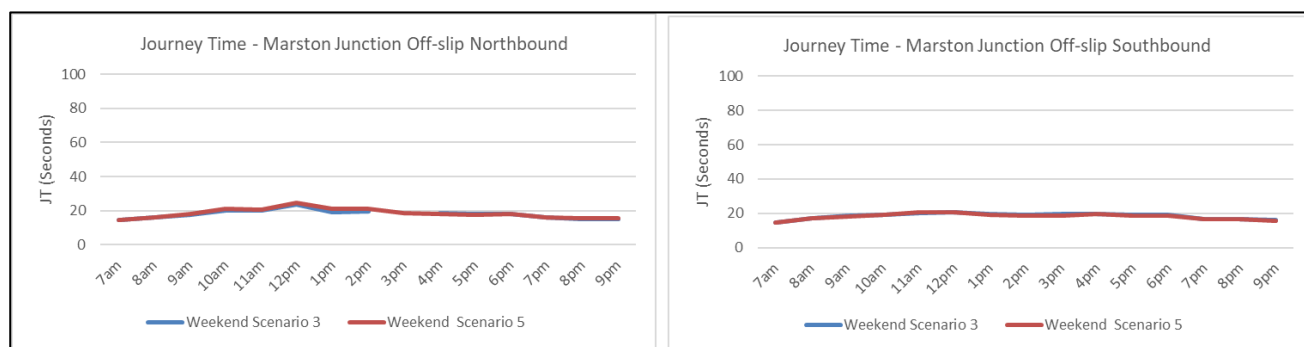
- 10.51 It can be seen on **Figure 10-21** that the Proposed Development in Scenario 5, would result in journey time savings on the off-slip roads at the A421 Marston Moretaine Interchange.
- 10.52 On an 'Average' Weekday in Scenario 5, journey times are predicted to reduce by less than a second and 3 seconds across the whole day in the northbound and southbound direction respectively. During Peaks, journey times are predicted to increase by 12 seconds for the AM peak in the northbound direction and to remain unchanged for the same period in the southbound direction whereas for the PM Peak, journey times are predicted to reduce by 33 seconds and 20 seconds for the northbound and southbound direction respectively. This is likely to be as a result of the additional highway infrastructure proposed to support the development, which would create a new junction on the A421 to Stewartby and Wixams to be used as an alternative to the A421 Marston Moretaine junction.

Figure 10-21: A421 Marston Moretaine off slips – 'Average' Weekday – Journey Time



- 10.53 For a 'Busy' Saturday, no changes in journey time are predicted for the AM peak in both northbound and southbound directions whereas a marginal journey time reduction of one second is expected during the PM peak in both directions along the route. **Figure 10-22** illustrates the journey times across the day for a 'Busy' Saturday.

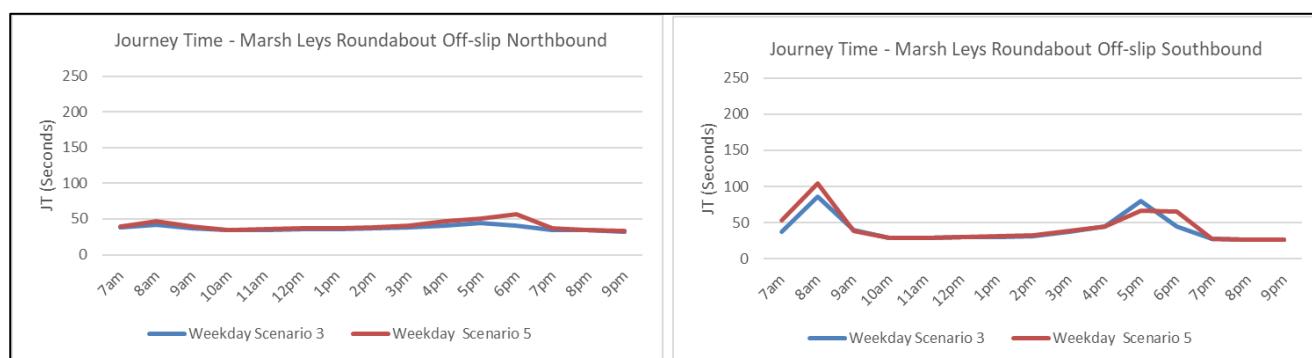
Figure 10-22: A421 Marston Moretaine Off Slips – ‘Busy’ Saturday – Journey Time



A421 Marsh Leys Interchange

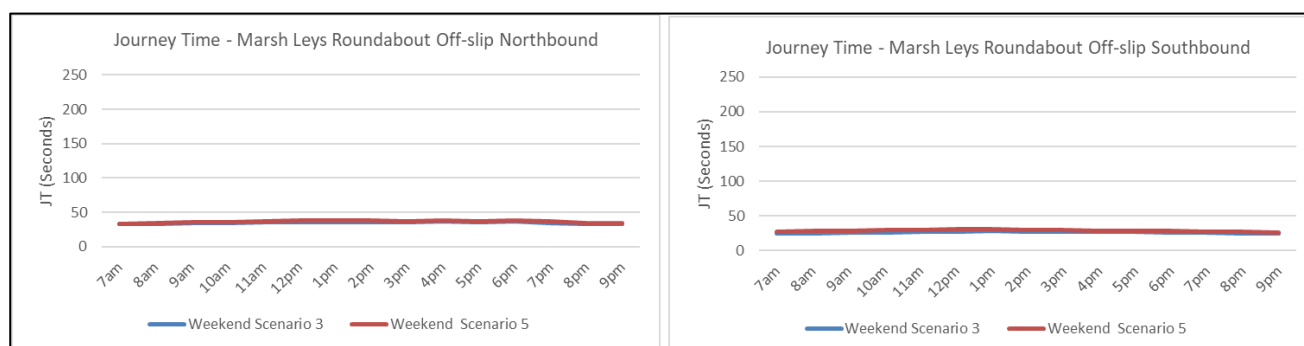
- 10.54 On a Weekday, it can be seen in **Figure 10-23** that journey time on the off-slip roads at A421 Marsh Leys Interchange will increase across a whole day with average journey time increases of 3 second expected in the northbound direction and 3 second predicted in the southbound direction. These changes are not material.

Figure 10-23: A421 Marsh Leys Off-slips – ‘Average’ Weekday – Journey Time



- 10.55 On a ‘Busy’ Saturday, marginal changes in journey time are predicted across the day of about a second in the northbound direction and an average of two seconds in the southbound direction. This change is not considered material. **Figure 10-24** illustrates the journey times across the day for a ‘Busy’ Saturday.

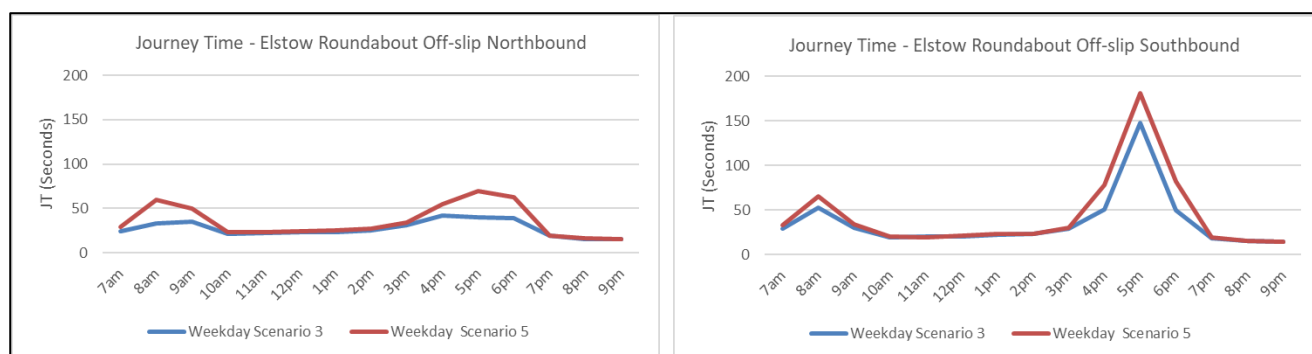
Figure 10-24: A421 Marsh Leys Off-slips – ‘Busy’ Saturday – Journey Time



A421 Elstow Interchange

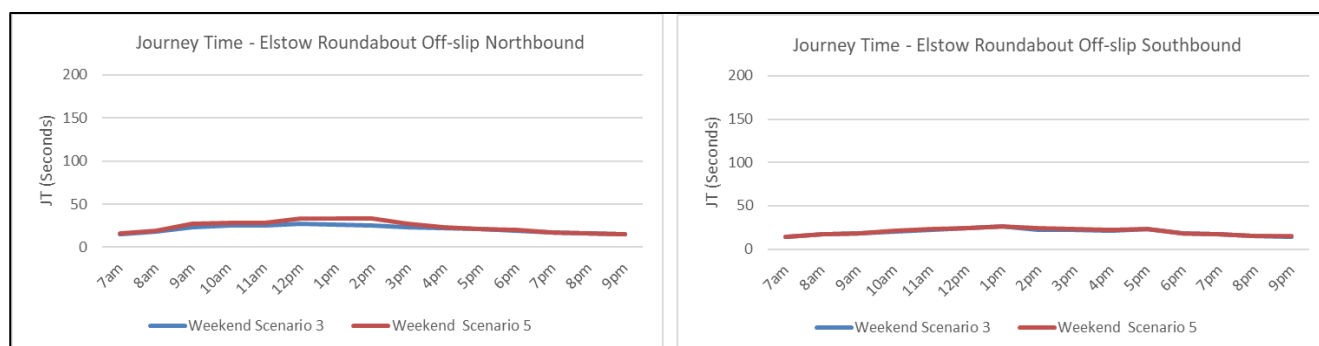
- 10.56 On an 'Average' Weekday, the Proposed Development in Scenario 5 is predicted to increase journey time in the northbound direction by 8 seconds across the whole day and by 8 seconds in the southbound direction. The most significant changes to journey time on the southbound off-slip road is modelled to be an increase in journey time of 34 seconds which would likely occur between 17:00 – 18:00. See **Figure 10-25**.

Figure 10-25: A421 Elstow Off Slips – 'Average' Weekday – Journey Time



- 10.57 On a 'Busy' Saturday, the Proposed Development in Scenario 5 is predicted to increase journey time marginally on the northbound off slip by an average of 3 seconds across the day with an average increase in journey time of 1 second across the day anticipated in the southbound direction along the off-slip road. This is shown in **Figure 10-26**.

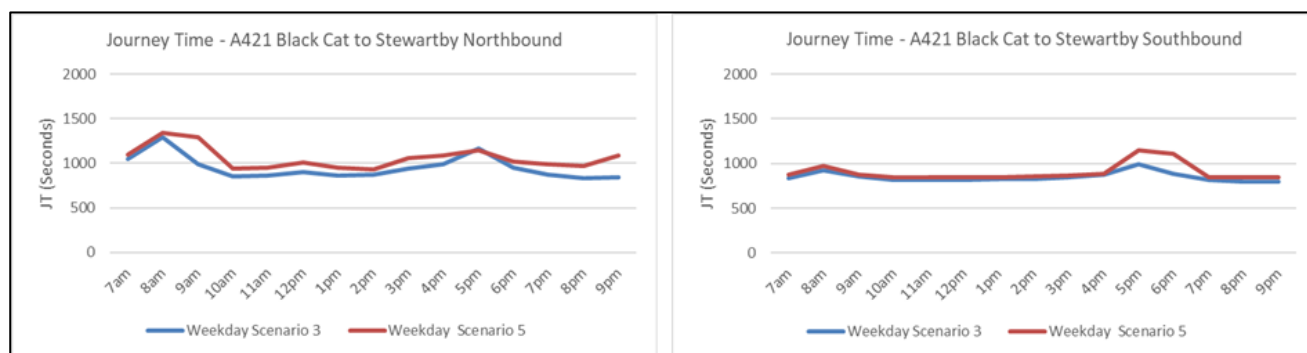
Figure 10-26: A421 Elstow Off Slips – 'Busy' Saturday – Journey Time



A421 Black Cat to Stewartby

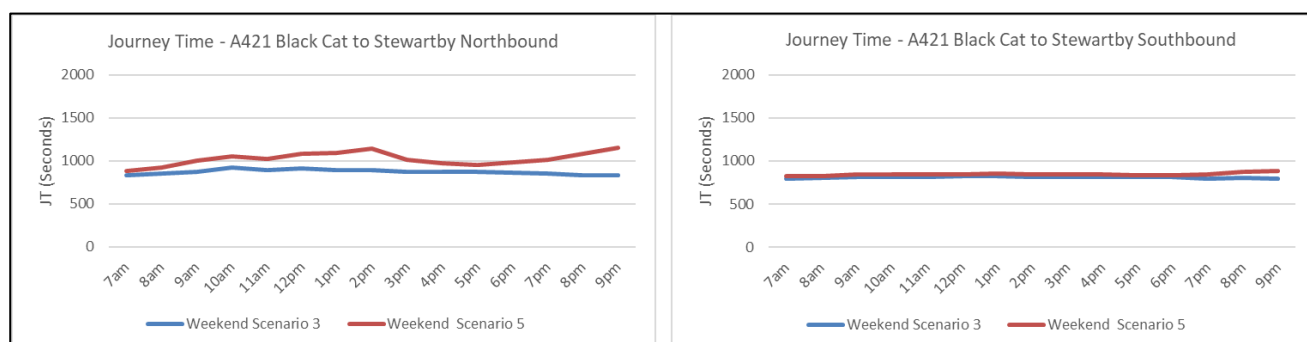
- 10.58 It can be seen in **Figure 10-27** and **Figure 10-28** that with the introduction of the Proposed Development in Scenario 5, some changes in journey time are predicted on the route between the A421/A1 Black Cat junction and Stewartby on an 'Average' Weekday and on a 'Busy' Saturday. This route illustrates the effect of the development on a longer route originating/ending in the centre of Stewartby.

Figure 10-27: A421 Black Cat to Stewartby – ‘Average’ Weekday – Journey Time



- 10.59 On an 'Average' Weekday, journey times in the northbound direction are predicted to increase by 49 seconds in the AM Peak and reduce by 25 seconds during the PM peak. In the southbound direction, journey times are expected to increase by 45 seconds in the AM Peak and 151 seconds in the PM Peak of an 'Average' Weekday.
- 10.60 Between 21:00 and 22:00 on an 'Average' Weekday, the increase in journey time in the southbound direction is predicted to reach up to 249 seconds reflecting the effect of traffic leaving the Proposed Development and heading north. Again, such an increase is not considered material, particularly outside of the core Peak of background movement on the highway network.
- 10.61 On a 'Busy' Saturday, a journey time increase of 74 seconds is predicted in the northbound direction in the AM peak and 84 seconds in the PM peak. In the southbound direction, an increase of 24 seconds is predicted in the AM peak and 24 seconds in the PM Peak. The most significant journey time changes along this route on a 'Busy' Saturday is predicted to occur between 21:00 – 22:00 in the northbound direction with a journey time increase of 317 seconds as can be seen in **Figure 10-28**.

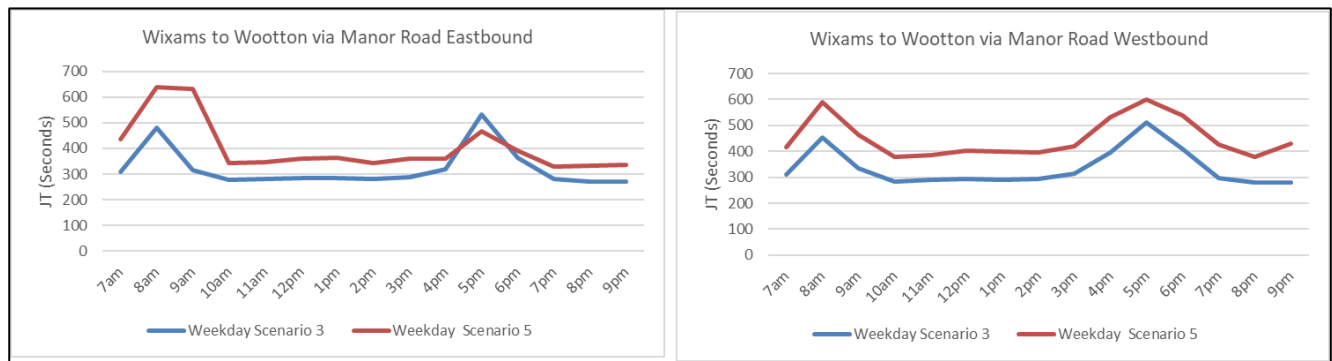
Figure 10-28: A421 Black Cat to Stewartby – 'Busy' Saturday – Journey Time



Wixams to Wootton via Manor Road

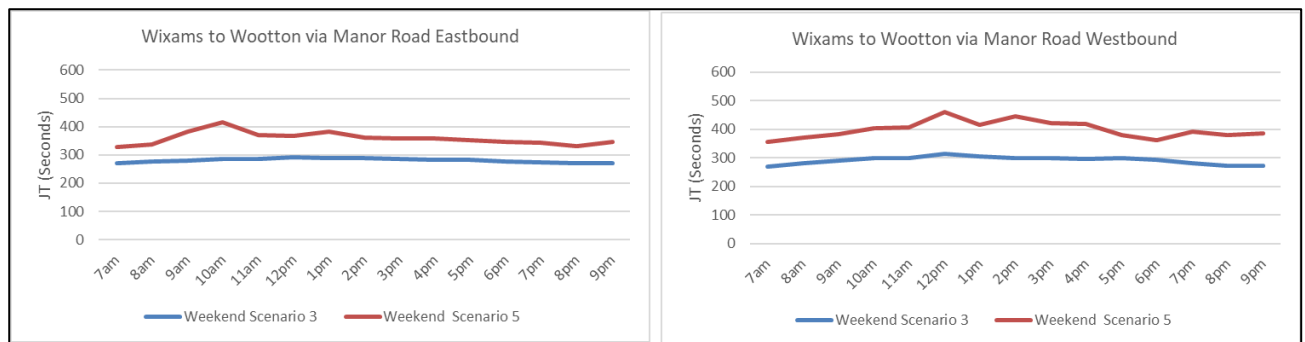
- 10.62 On an 'Average' Weekday with the introduction of the Proposed Development in Scenario 5, minor changes to journey time along the route are predicted. Journey times in the eastbound direction are predicted to increase by 157 seconds in the AM Peak with a commensurate reduction in journey times of 64 seconds likely to occur during the PM peak. In the westbound direction, journey times are expected to increase by 135 seconds in the AM Peak and a reduction of 88 seconds in the PM Peak of an 'Average' Weekday. This is shown in **Figure 10-29**.

Figure 10-29: Wixams to Wootton via Manor Road – ‘Average’ Weekday – Journey Time



- 10.63 On a ‘Busy’ Saturday, journey times are predicted to increase in the eastbound direction by 61 seconds during the AM Peak and 69 seconds during the PM peak, with the Proposed Development in Scenario 5. In the westbound direction, journey times are predicted to increase by 87 seconds in the AM Peak and 83 seconds during the PM Peak.

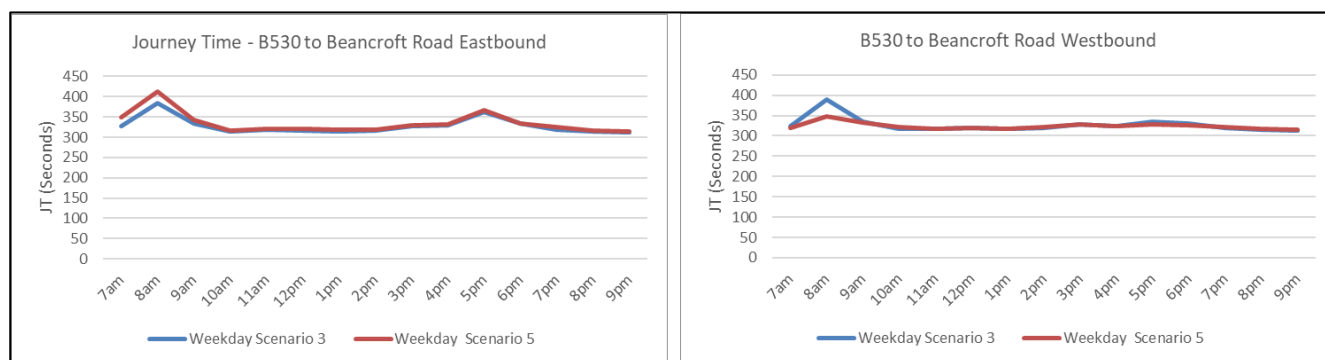
Figure 10-30: Wixams to Wootton via Manor Road – ‘Busy’ Saturday – Journey Time



B530 to Beancroft Road via Green Lane

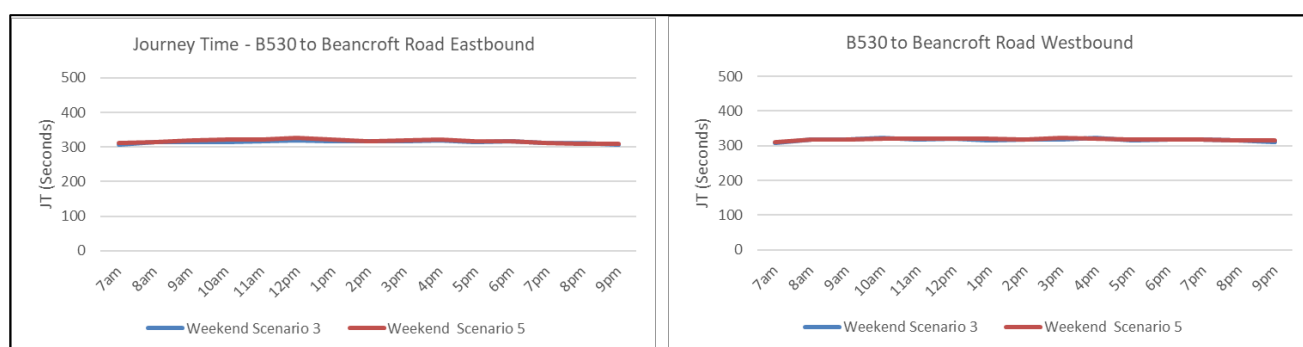
- 10.64 The B530 to Beancroft Road route modelled within this assessment runs from Beancroft Road west of the A421 to Green Lane and Stewartby Way. It can be seen in **Figure 10-31** and **Figure 10-32** that with the introduction of the Proposed Development in Scenario 5, journey times will be marginally affected on both an ‘Average’ Weekday and a ‘Busy’ Saturday. This route runs along Stewartby Way, Green Lane, then along the C94 to Marston Moretaine and finally across the A421 Marston Moretaine interchange to Beancroft Road going north west. It illustrates the effect of the development on another local route across the Marston Vale.
- 10.65 On an ‘Average’ Weekday, an increase in journey times of 27 seconds is expected during the AM Peak in the eastbound direction and 5 seconds during the PM peak. In the southbound direction, journey times are predicted to reduce by 42 seconds during the AM peak and by 5 seconds during the PM peak. This is illustrated on **Figure 10-31**.

Figure 10-31: B530 to Beancroft Road via Green Lane – ‘Average’ Weekday – Journey Time



- 10.66 On a ‘Busy’ Saturday, in Scenario 5, in the eastbound direction, it is predicted that with the introduction of the Proposed Development, a minimal increase in journey time may likely materialise with predicted increases of +1-3 seconds. These predicted increases are not considered material.

Figure 10-32: B530 to Beancroft Road via Green Lane – ‘Busy’ Saturday – Journey Time



Journey Time Summary

- 10.67 The Journey Time assessment presented here shows that the introduction of the Proposed Development in Scenario 5 is predicted, overall, not to materially affect journey times on key routes through the modelled road network around the Site. There are some punctual variations that are worth noting, but the assessment carried out does not highlight any significant and consistent increase in journey time on any of the routes studied. The main variations worth noting are: On the A6 Branston Way, journey time would increase by 153 seconds northbound in the PM peak. This predicted increase remains relatively low if considered in the context of a longer trip along strategic routes (from the A421, along the A6).
- 10.68 On the A6 south of the A421, the Proposed Development would lead to a reduction in journey time in the typical weekday peak periods in the northbound direction (by 270 seconds in the AM peak and by 260 seconds in the PM peak), likely due to the development delivering a new alternative route to the A421 to/from Wixams.
- The Proposed Development would not materially affect journey times on the slip roads at M1 J13, or at the A421 Salford Road off slip.

- b. The Proposed Development would lead to a small reduction in journey times on the slip roads at the A421 Marston Moretaine Interchange in the typical weekday PM peak (by 33 seconds on the northbound off slip and by 20 seconds on the southbound off slip), most likely as a result of the development delivering an alternative access to/from the A421 south in and out of the Marston Vale area, north of Marston Moretaine.
- c. The Proposed Development would only marginally affect journey times at the A421 Marsh Leys Interchange, increasing journey time by +21 seconds on the northbound off slip in the PM peak.
- d. The Proposed Development would lead to increases in journey time on the eastbound off slip at the A421 Elstow Interchange in the typical weekday peak periods. The predicted increases are in the region of half a minute, so not material.
- e. Journey times across the day on routes across the Marston Vale locally (Wixams to Wootton via Manor Road and B530 to Beancroft Road via Green Lane) are not significantly affected as a result of the Proposed Development.

Queue Assessment on the SRN

- 10.69 Estimation of queuing is not a good metric to use when making judgements about traffic effect. This is for a number of reasons. These include that there is tendency for mathematical queue lengths to fluctuate between model runs, that there is a practical and real life day to day variance in queuing which means that measured results cannot be relied upon, and that an individual's perception of a queue differs from person to person (it is subjective) which doesn't compare well to a defined mathematical interpretation.
- 10.70 For these reasons it is not appropriate to place significant weight on queuing when considering effect. Instead journey time is the more appropriate measure, as reported above. This is more pertinent and relevant to the real world.
- 10.71 However, queuing specifically in respect of safety has been considered.
- 10.72 There is no significant evidential link between queuing per se and safety. – i.e. queuing per se does not significantly change the safety characteristics of the highway except in specific circumstance. Specific circumstance is often considered to be where queuing extends back from slip roads onto the mainline of a carriageway.
- 10.73 Therefore, the effect of the Planning Proposal on queuing, as defined by the traffic model in the Future Year Case (Scenario 5) compared to the Reference Case (Scenario 3), on the slip roads of the M1 J13, A521 Marston Moretaine Interchange and at the two adjacent A6/A421 junctions, Marsh Leys and Elstow has been looked at. The detailed results, including queuing plots at five minute intervals across the assessed day, are in **Annex 13**.
- 10.74 As is already known and reported, the two A421/A6 junctions experience congestion at some times of the day, with in some circumstances queuing onto the A421 mainline. It is understood that NH has aspirations to make relatively minor improvements to these junctions to improve the flow of traffic at peak times.

- 10.75 The Planning Proposal makes no significant difference to the character of performance of those existing junctions, including to the extent and period of queuing onto the A421 mainline. This is a reasonable conclusion from the journey time analysis, and is corroborated by the queuing analysis. Therefore, improvement of these junctions is not necessary or appropriate in the context of the Planning Proposal.
- 10.76 However, UDX does see value to the Planning Proposal in the improvement of these junctions. Therefore, it understands and supports NH's aspirations.

Summary of Impact Assessment in Scenario 5

- 10.77 The traffic impact assessment presented in this section demonstrates that the Proposed Development would not have a significant impact on the operation of the road network considered in this study, in Scenario 5. The Total Network statistics provided by the model demonstrate that, overall, although the number of trips within the road network modelled will increase as a result of the Proposed Development, these trips will be able to traverse the modelled area, and the same proportion of trips will be completed as are completed in Scenario 3.
- 10.78 The review of journey times on key routes through the model shows that some routes may experience some increases in journey time, but these are not material. The Proposed Development would be supported by significant new transport infrastructure including the delivery of new slip roads on and off the A421 and a new route through the Marston Vale area which will have a beneficial effect on journey time for some trips. It is likely that this new road infrastructure will benefit trips between the A421 and the Wixams area, providing an alternative route to the A421 Elstow Interchange. The new slip roads also offer an alternative route to traffic currently using the A421 Marston Moretaine Interchange and as such bring benefits in traffic conditions in Marston Moretaine, as well as an alternative to the A421 Marsh Leys Interchange.

Sensitivity Tests

- 10.79 As set out at the beginning of this section, a number of sensitivity tests have been undertaken to look at the potential effects of certain decisions. These are set out below:
- 10.80 Scenario 5a which is the Reference Case plus Development plus full EWR. This is a Scenario of the existing road network and traffic, plus traffic associated with agreed committed developments, plus Future Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Cambridge with a new station delivered within the Site and the A421 Junction being complete. For clarity this scenario considers full development of the Lake Zone and the West Gateway Zone.
- 10.81 Scenario 5b which is the Reference Case plus Development plus removal of Rail Discount. This is a Scenario of the existing road network and traffic, plus traffic associated with agreed committed developments, plus Future Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only with a shuttle bus service operating between Milton Keynes and the Site and the A421 Junction being complete. For clarity this scenario considers full development of the Lake Zone and the West Gateway Zone. In this scenario, there is no rail discount applied for visitors.

10.82 Scenario 5c which is the Reference Case plus Development plus M1 Junction 13 as a constraint. This is a Scenario of the existing road network and traffic, plus traffic associated with agreed committed developments, plus Future Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only with a shuttle bus service operating between Milton Keynes and the Site and the A421 Junction being complete. For clarity, this scenario considers full development of the Lake Zone or West Gateway Zone. This scenario is based on a version of the micro-simulation model that considers likely suppressed demand that would naturally occur at M1J13 as a response to existing and predicted capacity constraints at the junction.

Scenario 5a – Future Year - Reference Case plus Development plus full EWR

10.83 This section considers a sensitivity test assessing the implications of the Proposed Development in the Future Year including the complete EWR Route (Scenario 5a) compared to Scenario 5 (with EWR terminating at Milton Keynes).

10.84 The Future Year - Reference Case plus Development plus full EWR, hereafter referred to as 'Scenario 5a', comprises the existing road network and traffic along with the traffic impacts associated with committed developments, the open Full Wixams Station, EWR running between Oxford and Cambridge and the potential new EWR station within the Site delivered, and the A421 Junction. This scenario considers the full development of the Lake Zone and the West Gateway Zone.

10.85 This section reports on the key statistics output from the Paramics model (Total Network Statistics) describing the general operation of the network around the Site only.

10.86 This is done for:

- a. An 'Average' weekday; and
- b. A 'Busy' Saturday.

10.87 This assessment is based on detailed outputs from the Paramics model.

Total Network Statistics

10.88 This section considers Total Network Statistics which records the total number of completed trips, the total time taken by all vehicles to pass through the network and calculates the average speed per vehicle and average delay per vehicle.

10.89 **Table 10-5** provides a summary of the completed trips through the modelled network and latent demand (i.e. trips that are not completed).

Table 10-5: Completed Trips and Latent Demand

	Scenario 5			Scenario 5a		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
Completed Trips (Average Weekday)	92,492	152,494	99,641	92,289	152,541	99,609
Completed Trips (Busy Saturday)	57,435	177,130	77,812	57,231	176,827	77,620
% Completed Trips (Average Weekday)	99%	100%	99%	99%	100%	99%
% Completed Trips (Busy Saturday)	96%	101%	100%	96%	101%	100%

- 10.90 The analysis shows that on an 'Average' Weekday and on a 'Busy' Saturday, a similar number of vehicular trips are completed through the modelled network for both AM and PM peaks.
- 10.91 **Table 10-5** shows that, with the introduction of the complete EWR route between Oxford and Cambridge plus the potential EWR station in the Future Year, the number of completed trips through the model reduces, as a result of a number of additional trips to/from the Proposed Development being made by rail and not by car. Therefore, the traffic impact of the Proposed Development is slightly reduced. However, the predicted difference in vehicular trips through the network between the two scenarios tested here is in the order of 1%, which is not material.
- 10.92 **Table 10-6** provides mean vehicle speeds and average delay across the network modelled.

Table 10-6: Mean Vehicle Speed (kph)

Time	Scenario 5			Scenario 5a		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
Average Weekday	59	74	62	59	74	62
Busy Saturday	79	72	76	79	73	76

- 10.93 **Table 10-6** shows that in all time periods there is a negligible change in mean speeds and as such this demonstrates that the completion of EWR plus the opening of the potential EWR station within the Site while reducing demands has a limited effect on the speeds on the highway network.
- 10.94 **Table 10-7** details the likely delays to be experienced in the two scenarios compared here.

Table 10-7: Average Delay in Seconds – ‘Average’ Weekday and ‘Busy’ Saturday

Time	Scenario 5			Scenario 5a		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
Average Weekday	457	332	414	458	335	414
Busy Saturday	323	339	334	321	337	331

- 10.95 **Table 10-7** demonstrates that the average delay likely to be encountered on the network does not vary materially between Scenario 5 and Scenario 5a.
- 10.96 Overall, the model shows that the introduction of EWR services plus the opening of the potential EWR station within the Site would reduce demands slightly on the road network but not sufficiently to result in a perceptible beneficial effect on the road network and therefore would not affect the assessment of the impacts of the Proposed Development in Scenario 5.
- 10.97 The journey times within the model reflect the overall network statistics which show that there are no material differences to journey times across the modelled area between Scenario 5a and 5. This confirms that the delivery of the Proposed Development is not reliant on the delivery of future phases of EWR over and above the committed link and services between Oxford and Milton Keynes.

Scenario 5b – Future Year - Reference Case plus Development plus removal of Rail Discount

- 10.98 This section considers a sensitivity test in assessing the traffic implications of the following assessments:
- Future Year - Reference Case plus Development referred to as Scenario 5; and
 - Future Year - Reference Case plus Development plus Removal of Rail Discount referred to as Scenario 5b.
- 10.99 Scenario 5b considers the existing road network and traffic plus traffic associated with agreed committed developments plus Future Year related demands from the Site. This is based on the Full Wixams Station being open, EWR running between Oxford and Milton Keynes only with a shuttle bus service operating between Milton Keynes and the Site and the A421 Junction being complete. For clarity this scenario considers full development of the Lake Zone and West Gateway Zone. In this scenario, there is no rail discount applied for visitors.
- 10.100 This section reports on the key statistics output from the Paramics model (Total Network Statistics) describing the general operation of the network around the Site. It then provides more detailed information including journey time on key routes and delay on the network. This section considers the difference in impacts between Scenario 5 and Scenario 5b.

10.101 This is done for:

- a. An 'Average' weekday; and
- b. A 'Busy' Saturday.

10.102 This assessment is based on detailed outputs from the Paramics model.

Total Network Statistics

10.103 The first set of results to be reported is the Total Network Statistics. This records the total number of completed trips, the total time taken by all vehicles to pass through the network and calculates the average speed per vehicle and average delay per vehicle.

10.104 **Table 10-8** provides a summary of the completed trips through the modelled network and latent demand (i.e. trips that are not completed) for an 'Average' Weekday and a 'Busy' Saturday comparing Scenario 5 and Scenario 5b.

Table 10-8: Completed Trips and Latent Demand

	Scenario 5			Scenario 5b		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
Completed Trips (Average Weekday)	92,492	152,494	99,641	93,103	152,754	99,890
Completed Trips (Busy Saturday)	57,435	177,130	77,812	57,774	177,475	78,024
% Completed Trips (Average Weekday)	99%	101%	99%	99%	101%	99%
% Completed Trips (Busy Saturday)	96%	101%	100%	96%	101%	100%

10.105 The analysis shows that on an 'Average' Weekday and on a 'Busy' Saturday, a significant number of trips are completed through the modelled network for all time periods considered.

10.106 From **Table 10-8**, it can be deduced that in Scenario 5b, the proportion of completed trips through the network for all time periods including AM peak, Interpeak and PM peaks will be very similar across board for an Average Weekday and a Busy Saturday.

10.107 In Scenario 5b, the proportion of completed trips is expected to remain unchanged for the AM peak, Interpeak and PM peak of an Average Weekday and a Busy Saturday. As a result, the conclusions are that there are no material differences between each scenario.

10.108 **Table 10-9** provides a comparison between mean vehicle speeds across the network modelled for Scenario 5 and Scenario 5b.

Table 10-9: Mean Vehicle Speed (kph)

Network Mean Speed	Scenario 5			Scenario 5b		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
Average Weekday	59	74	62	58	74	61
Busy Saturday	79	72	76	79	72	76

10.109 **Table 10-9** shows that on a 'Busy' Saturday, in all time periods reported, there is no change in average vehicular speeds accompanying Scenario 5b. On an Average weekday, the changes in speed are marginal (-1kph). Therefore, there are no material differences in terms of vehicle speed through the modelled network between Scenario 5 and Scenario 5b.

10.110 **Table 10-10** details the likely delays to be experienced between Scenario 5 and Scenario 5b.

Table 10-10: Average Delay in Seconds – 'Average' Weekday and 'Busy' Saturday

Network Mean Delay	Scenario 5			Scenario 5b		
	07:00-10:00	10:00-16:00	16:00-19:00	07:00-10:00	10:00-16:00	16:00-19:00
Average Weekday	457	332	414	463	334	424
Busy Saturday	323	339	334	325	340	336

10.111 **Table 10-10** demonstrates that very minimal delays will accompany Scenario 5b when compared to Scenario 5. The maximum delay likely to be experienced during the peaks will occur during the PM peak of an Average Weekday and will not exceed 10 seconds. The least delay through the network is modelled to be experienced during the interpeak of a Busy Saturday with delays lasting one second more than in Scenario 5.

10.112 Overall, the model shows that with Scenario 5b, the difference in average delays on the network across the whole day including the AM peak, Interpeak and PM peaks would not exceed 10 second. This is negligible as conditions on the wider road network will remain unchanged in Scenario 5b compared to Scenario 5.

Journey Times

10.113 The following paragraphs set out the difference in journey times along sections of the wider highway network around the Site between Scenario 5 and Scenario 5b as set out previously in the section.

10.114 **Table 10-11** provides an overall summary of the average journey times along the key routes considered within the model for an 'Average' Weekday and a 'Busy Saturday across the entire modelled period (07:00 to 22:00).

Table 10-11: Journey Times Comparison by Route (in seconds)

Route	‘Average Weekday’		‘Busy Saturday’	
	Scenario 5	Scenario 5b	Scenario 5	Scenario 5b
Route ES1 Northbound	1052	1053	1052	1056
Route ES1 Southbound	1106	1109	1080	1083
Route ES2 Northbound	455	464	361	361
Route ES2 Southbound	463	466	290	291
Route ES3 Northbound	297	297	256	256
Route ES3 Southbound	253	255	0	0
Route 1 – A421 – Northbound	957	957	955	958
Route 1 - A421 - Southbound	1007	1009	112	112
Route 2 - A6 Branston Way – Southbound	196	199	108	108
Route 2 - A6 Branston Way - Northbound	115	119	141	141
Route 3 - A6 South of A421 - Southbound	144	144	154	154
Route 3 - A6 South of A421 - Northbound	193	197	350	350
Route 4 - B530 South of A421 - Southbound	357	360	391	393
Route 4 - B530 South of A421 - Northbound	400	403	24	24
M1 J13 Off-Slip Eastbound	26	26	21	22
M1 J13 Off-Slip Westbound	22	23	29	29
A421/Salford Road Off-slip SB	32	33	18	19
A421 Marston Moretaine Junction Off-slip Northbound	23	24	18	18
A421 Marston Moretaine Junction Off-slip Southbound	21	21	36	36
A421 Marsh Leys Roundabout Off-slip Northbound	40	42	28	28
A421 Marsh Leys Roundabout Off-slip Southbound	43	44	24	24
A421 Elstow Roundabout Off-slip Eastbound	36	35	20	20
A421 Elstow Roundabout Off-slip Westbound	44	45	17	17
Route A5 - A421 Black Cat to Stewartby Southbound	1059	1070	845	847

Route	'Average Weekday'		'Busy Saturday'	
	Scenario 5	Scenario 5b	Scenario 5	Scenario 5b
Route A5 - Stewartby to A421 Black Cat Northbound	900	907	571	573
Route A8 - Wixams to Wootton via Manor Road Westbound	403	403	398	404
Route A8 - Wootton to Wixams via Manor Road Eastbound	451	457	317	317
Route A9 - B530 to Beancroft Road via Green Lane Westbound	335	336	318	319
Route A9 - Beancroft Road to B530 via Green Lane Eastbound	324	324	390	390

10.115 The data summarised in **Table 10-11** suggests that Scenario 5b would not affect journey times adversely on the key routes through the modelled wider road network.

10.116 Journey times across all routes for a whole weekday will increase by an average of two seconds with Scenario 5b whereas for a whole Saturday journey times will increase only one second.

10.117 Changes in journey times across the network have now been analysed for each route considered with line charts provided to show the changing trend through an 'Average Weekday' or 'Busy Saturday'. References to a whole day implies the whole modelled period of day spanning 07:00 – 22:00. The blue lines represent Scenario 5 whereas the red lines represent Scenario 5b.

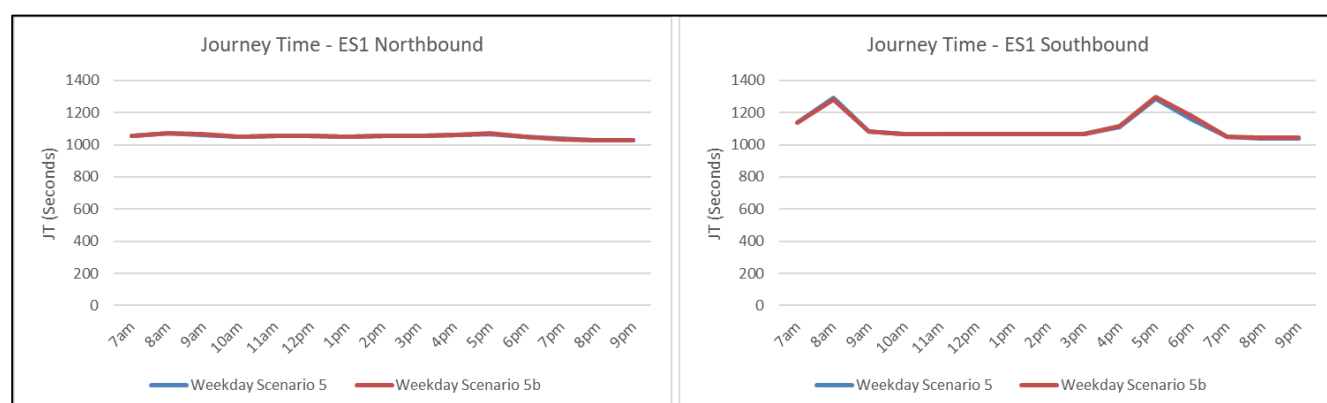
Route ES1

10.118 The ES1 route modelled within this assessment, runs from the M1 underbridge with Cranfield Road/Wavendon Road eastbound to M1 J13 and then northbound along the A421 towards the A1 Black Cat junction. Following Scenario 5b, minimal changes in journey times are expected along the ES1 route for both an Average Weekday and a Busy Saturday.

10.119 For a weekday, journey times are expected to change minimally during the AM peak. An increase of 1 second is likely in the northbound direction and reduction by 4 seconds in the southbound direction. During the PM peak, journey times are expected to increase by 3 seconds along the northbound direction and increase by 13 seconds along the southbound direction.

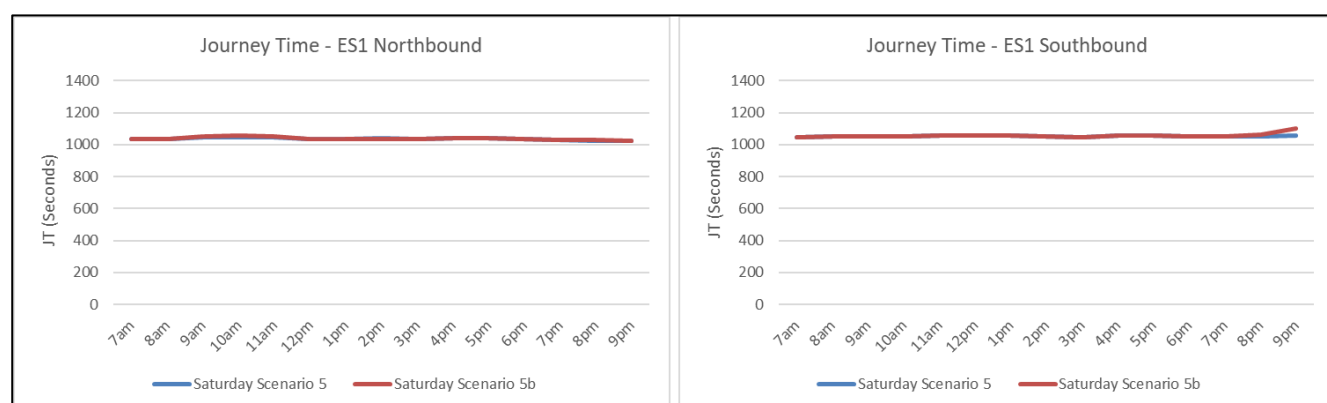
10.120 These changes in journey times are illustrated in **Figure 10-33**.

Figure 10-33: Route ES1 – ‘Average’ Weekday – Journey Time



- 10.121 For a Busy Saturday, Scenario 5b is modelled to increase journey times by 2 seconds in the northbound direction and 1 second in the southbound direction during the AM peak. For the PM peak, journey times will remain unchanged in the northbound and southbound direction.
- 10.122 The most significant journey time change from Scenario 5 to Scenario 5b is on Saturday where it is likely to be an increase in journey time in the southbound direction by 42 seconds between 21:00 – 22:00 as captured in **Figure 10-34**.

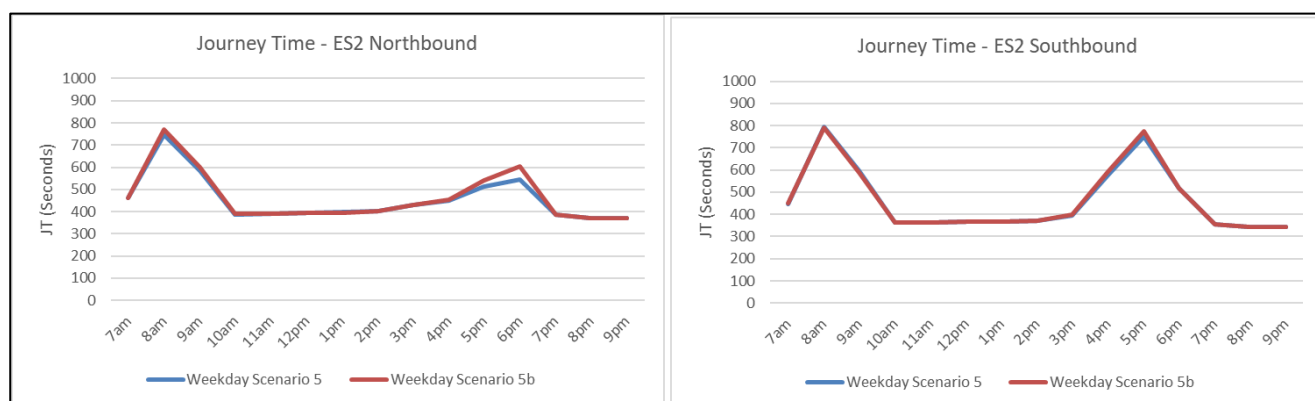
Figure 10-34: Route ES1 – ‘Busy’ Saturday – Journey Time



Route ES2

- 10.123 The ES2 route modelled within this assessment, runs from along the A6 from its junction with Cemetery Road southeast bound to join the A421 to the Elstow Interchange where it then turns southeast towards Wixams. Following Scenario 5b, minimal changes in journey times are expected along the ES2 corridor for both an Average Weekday and a Busy Saturday.
- 10.124 For a weekday, journey times are expected to increase by 13 seconds in the northbound direction and reduce by 2 seconds in the southbound direction for the AM peak. During the PM peak, journey times are expected to increase by 30 seconds and 13 seconds in the northbound and southbound directions respectively.
- 10.125 The hourly trends in journey time changes are depicted in **Figure 10-35**.

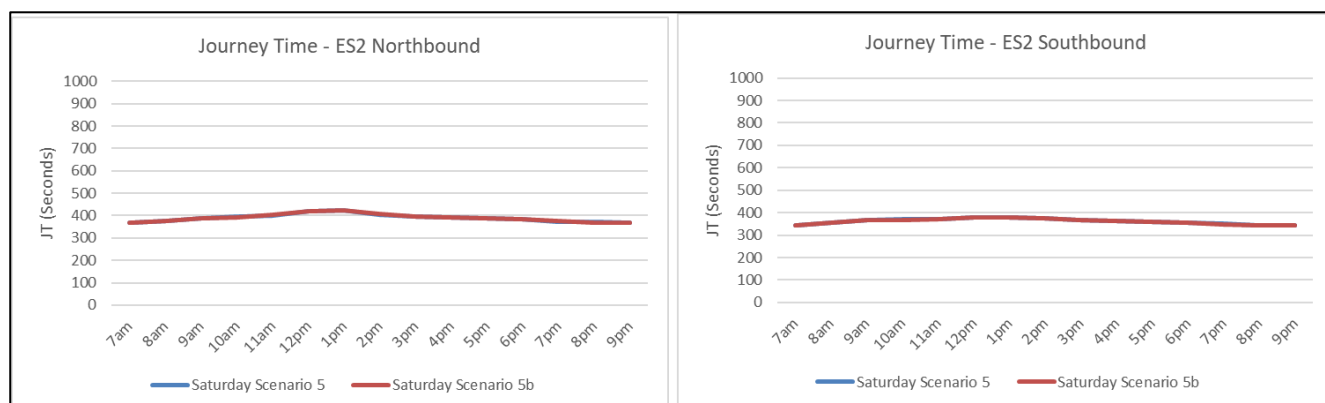
Figure 10-35: Route ES2 – ‘Average’ Weekday – Journey Time



10.126 For a Busy Saturday, Scenario 5b is modelled to result in no changes to journey times in the northbound and southbound directions during both the AM peak and PM peak.

10.127 These trends are captured in **Figure 10-36**.

Figure 10-36: Route ES2 – ‘Busy’ Saturday – Journey Time

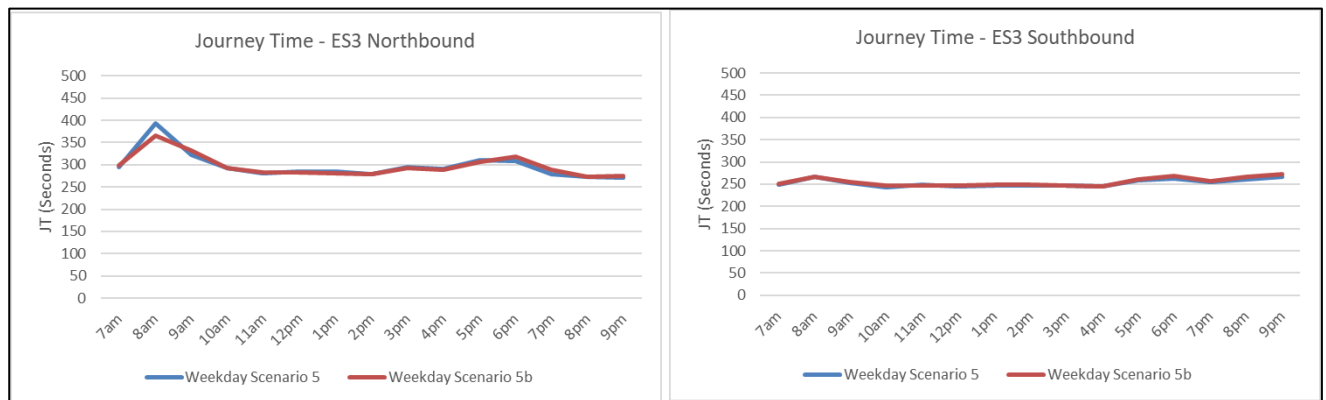


Route ES3

10.128 Following Scenario 5b, significant reductions in journey times are expected along the ES3 corridor for both an Average Weekday and a Busy Saturday.

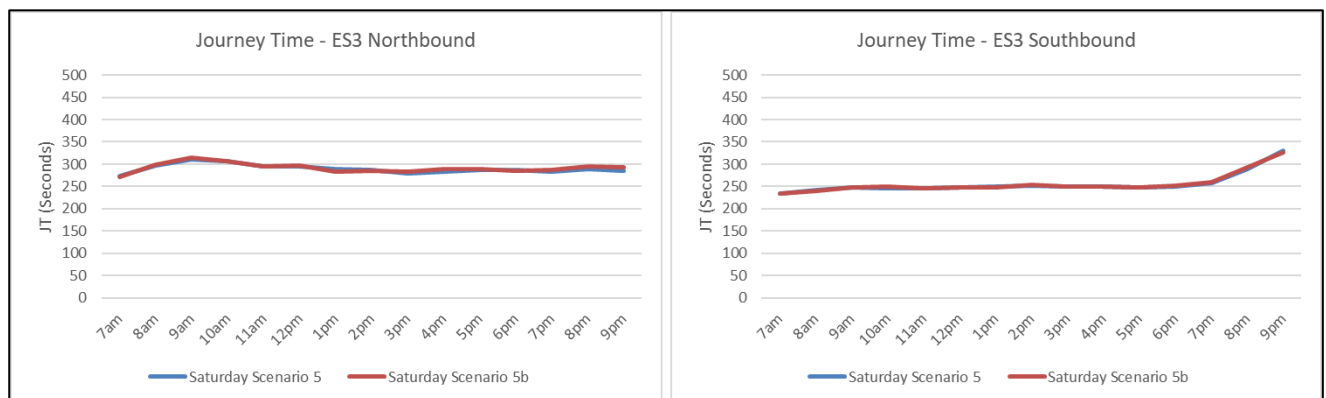
10.129 For a weekday, journey times are expected to reduce by 4 seconds and increase by 1 second for the AM peak in the northbound and southbound directions respectively. During the PM peak, journey times are expected to increase by 1 second and 3 seconds in the northbound and southbound directions respectively.

Figure 10-37: Route ES3 – ‘Average’ Weekday – Journey Time



10.130 For a Busy Saturday, Scenario 5b journey times are expected to increase by 1 second and reduce by 1 second for the AM peak in the northbound and southbound directions respectively. For the PM peak, journey times will increase by 2 seconds in the northbound direction and remain unchanged in the southbound direction. This is depicted in **Figure 10-38**.

Figure 10-38: Route ES3 – ‘Busy’ Saturday – Journey Time



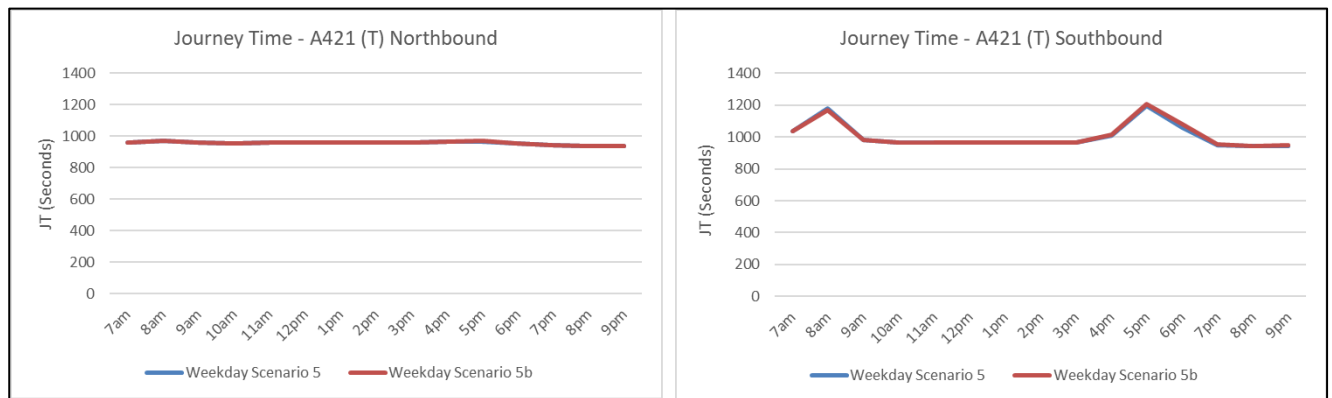
A421

10.131 The A421 route modelled within this assessment, runs from M1 J13 to the A1 Black Cat junction. Following Scenario 5b, minimal changes in journey times are expected along the A421 corridor for both an Average Weekday and a Busy Saturday.

10.132 For a weekday, journey times are expected to reduce by 1 second and 3 seconds for the AM peak in the northbound and southbound directions respectively. During the PM peak, journey times are expected to increase by 3 seconds along the northbound direction and by 13 seconds, with a maximum decrease of 23 seconds from 18:00-19:00 along the southbound direction.

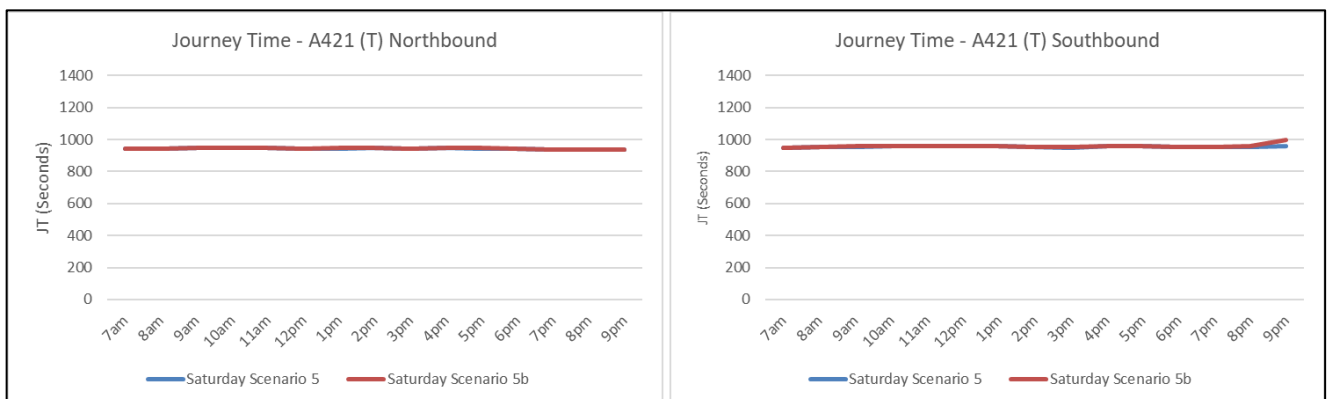
10.133 The hourly trends in journey time changes are depicted in **Figure 10-39**.

Figure 10-39: A421 – ‘Average’ Weekday – Journey Time



10.134 For a Busy Saturday, Scenario 5b is modelled to result in no changes to journey times in the northbound direction for both the AM peak and PM peaks. In the southbound direction, journey times will only be increased marginally by 1 second during both peak periods. The most significant journey time change from Scenario 5 to Scenario 5b is on Saturday where there is likely to be an increase in journey time in the southbound direction of 40 seconds between 21:00 – 22:00 as captured in **Figure 10-40**.

Figure 10-40: A421 – ‘Busy’ Saturday – Journey Time



A6 Branston Way

10.135 Between Scenario 5 and Scenario 5b weekday journey times along southbound direction of A6 Branston Way are expected to increase by an average of 2 seconds during the AM peak and by 14 seconds during the PM peak. However, in the northbound direction, journey times will remain unchanged during the AM peak and increase by 16 seconds during the PM peak.

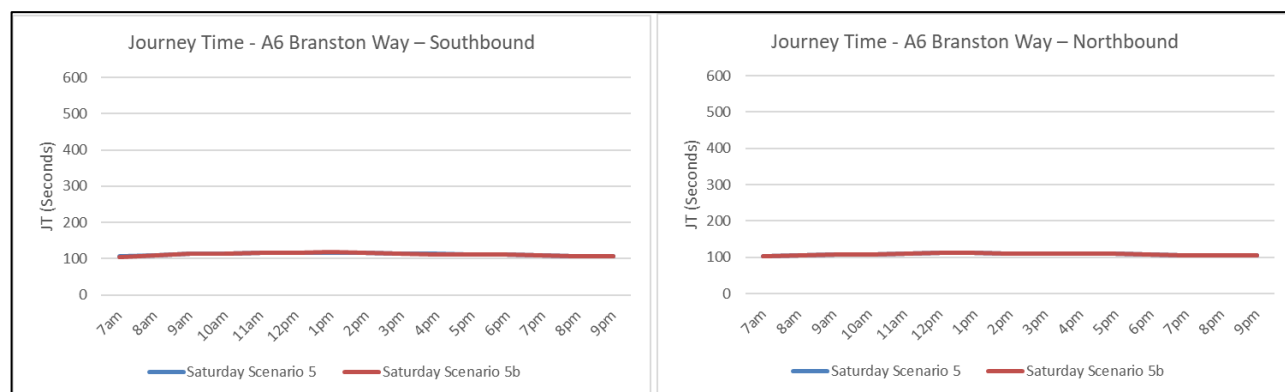
10.136 The hourly trends in journey time changes between Scenario 5 and Scenario 5b is depicted in **Figure 10-41**.

Figure 10-41: A6 Branston Way – ‘Average’ Weekday – Journey Time



10.137 For a Busy Saturday, between Scenario 5 and Scenario 5b, journey times along A6 Branston Way are expected to remain unchanged during the AM peak and PM peak in the northbound direction and southbound directions. These trends are shown in **Figure 10-42**.

Figure 10-42: A6 Branston Way – ‘Busy’ Saturday – Journey Time

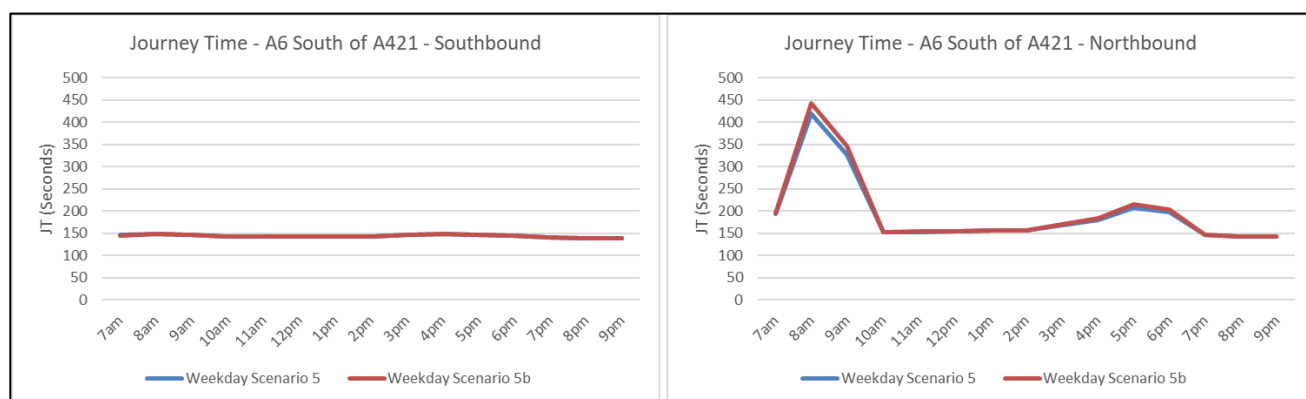


A6 South of A421

10.138 The A6 south of the A421 route modelled within this assessment, runs from the M1 junction 13 to Black Cat roundabout. It can be seen in **Figures 10.43 and 10.44** that the changes between Scenario 5 and Scenario 5b would not affect journey times adversely.

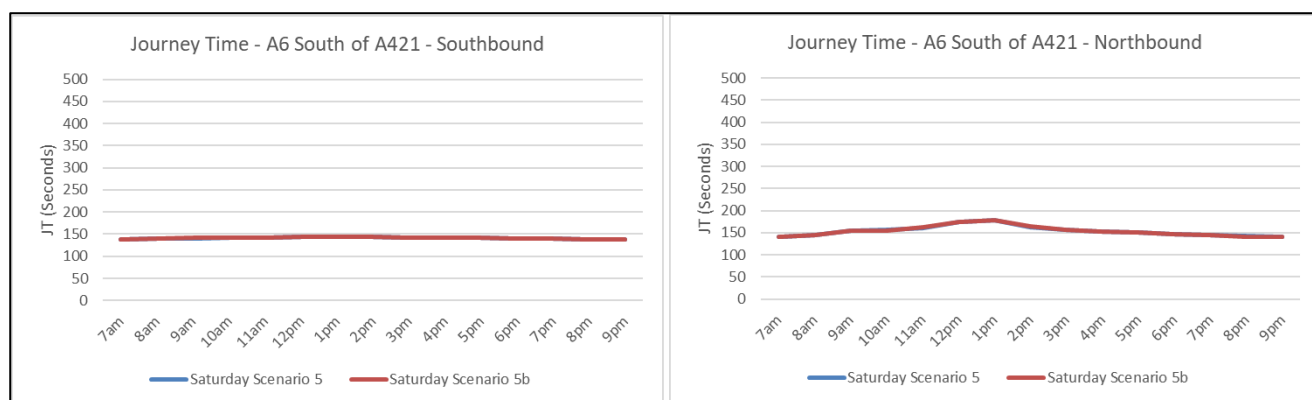
10.139 For an Average Weekday, between Scenario 5 and Scenario 5b journey times will remain unchanged along the southbound direction for both the AM peak and PM peaks of the day. In the northbound direction, increases of 15 seconds and 5 seconds are expected for journey times during the AM peak and PM peaks respectively.

Figure 10-43: A6 South of A421 – ‘Average’ Weekday – Journey Time



10.140 Similarly, for a Busy Saturday, journey times will remain unchanged in the northbound and southbound directions for both the AM peak and PM peaks of the day.

Figure 10-44: A6 South of A421 – ‘Busy’ Saturday – Journey Time

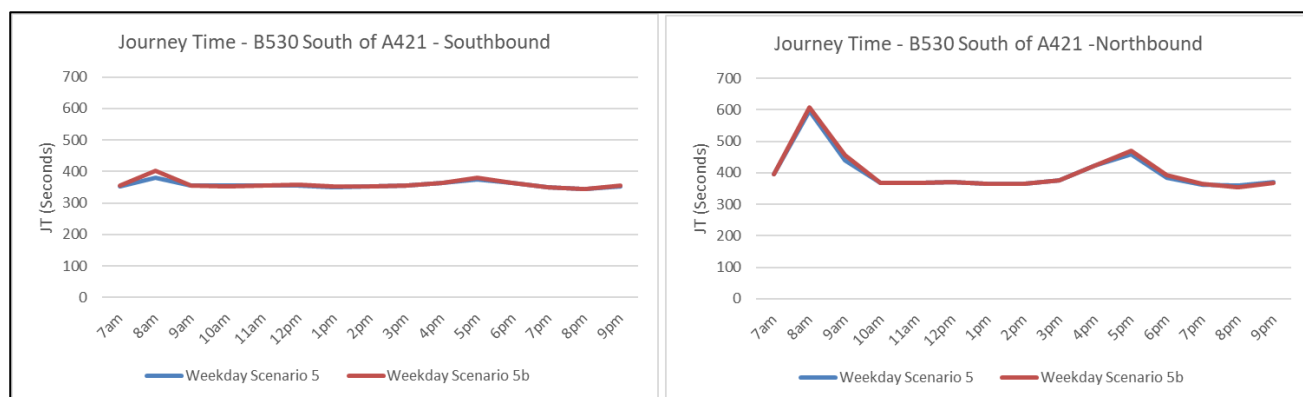


B530 South of A421

10.141 For an Average Weekday, journey times along the southbound direction will increase by 8 seconds and 2 seconds for the AM peak and PM peaks respectively. In the northbound direction, journey times will increase by 9 seconds during the AM peak and 3 seconds during the PM peak.

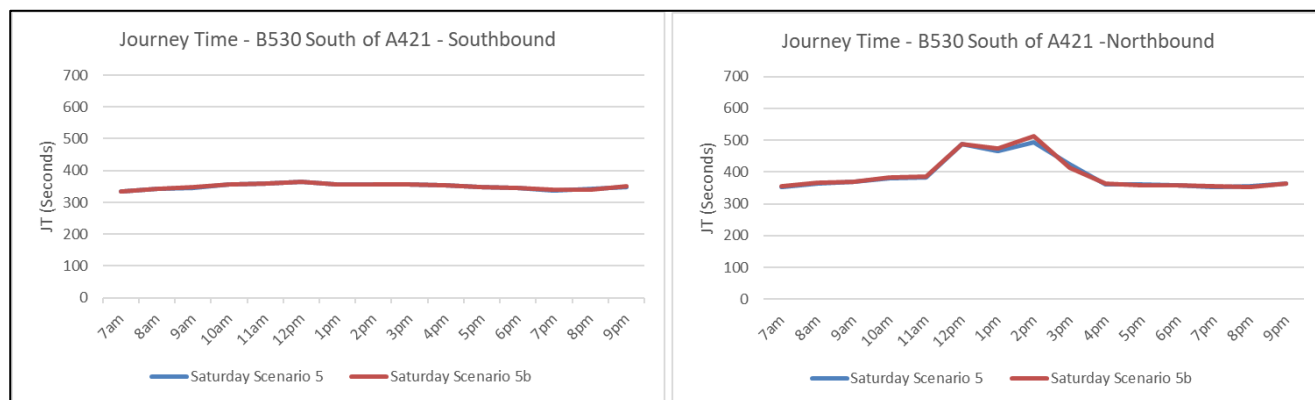
10.142 The hourly trends in journey time changes are shown in **Figure 10-45** for an ‘Average’ weekday and **Figure 10-46** for a ‘Busy’ Saturday.

Figure 10-45: B530 South of A421 – ‘Average’ Weekday – Journey Time



10.143 On a Saturday, a comparison between Scenario 5 and Scenario 5b is predicted to lead to an increase in journey time of 1 second in the southbound direction during the AM with no changes expected for the PM peak. In the northbound direction however, journey times will remain unchanged during the AM peak with a marginal increase of 1 second likely to be experienced during the PM peak as shown in **Figure 10-46**.

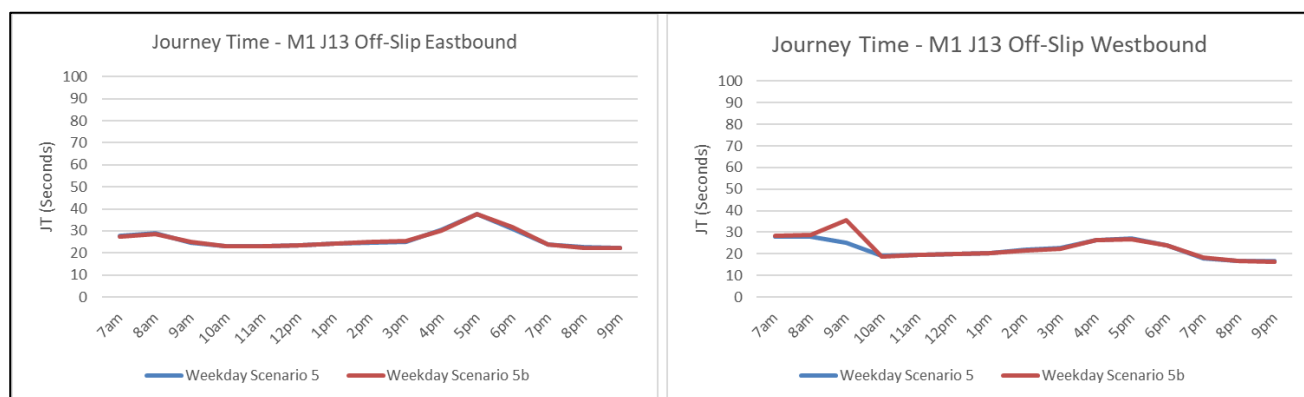
Figure 10-46: B530 South of A421 – ‘Busy’ Saturday – Journey Time



M1 Junction 13

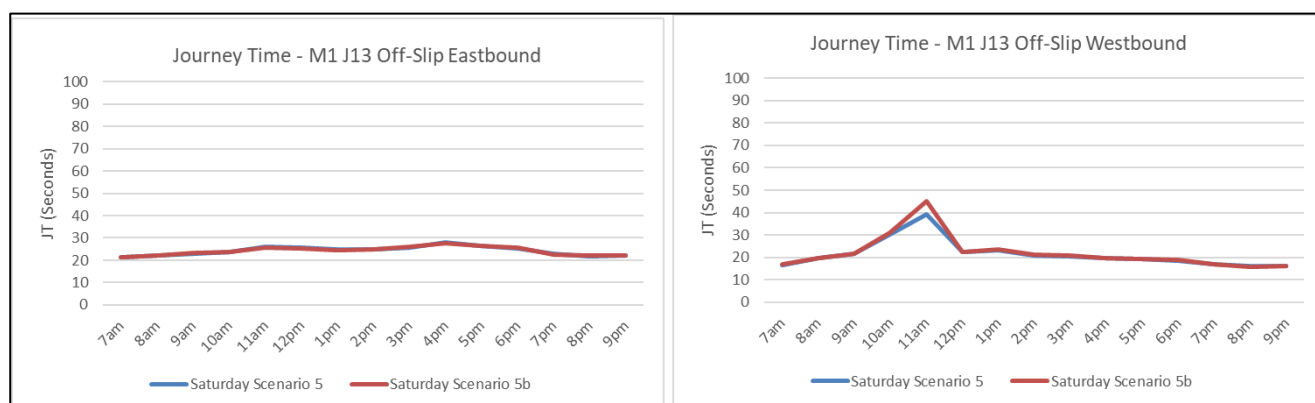
10.144 On a Weekday, with the difference between Scenario 5 and Scenario 5b modelled, it is not expected to affect journey times in the eastbound direction during the peaks. In the westbound direction, journey times will increase by 4 seconds during the 08:00-10:00 and remain unchanged during the PM peak. **Figure 10-47** provides the hourly trends in journey time changes.

Figure 10-47: M1 J13 off slips – ‘Average’ Weekday – Journey Time



10.145 On a Saturday, a comparison between Scenario 5 and Scenario 5b indicated it will not affect journey times during peaks along both the eastbound and westbound directions.

Figure 10-48: M1 J13 Off Slips – ‘Busy’ Saturday – Journey Time



A421/Salford Road

10.146 As can be seen in **Figure 10-49**, the change from Scenario 5 to 5b, would not result in changes to journey time for the northbound traffic at the main interchanges along the A421 for an Average Weekday. Along the southbound direction, journey times will remain unchanged during the AM peak and increase by 4 seconds during the PM peak with a maximum increase of 9 seconds from 18:00-19:00.

10.147 For a Busy Saturday journey time are expected to remain unchanged in the northbound and southbound directions between Scenario 5 and Scenario 5b. This is captured in **Figure 10-50**.

Figure 10-49: A421 Southbound Off-slip Salford Road – ‘Average Weekday’ - Journey Time

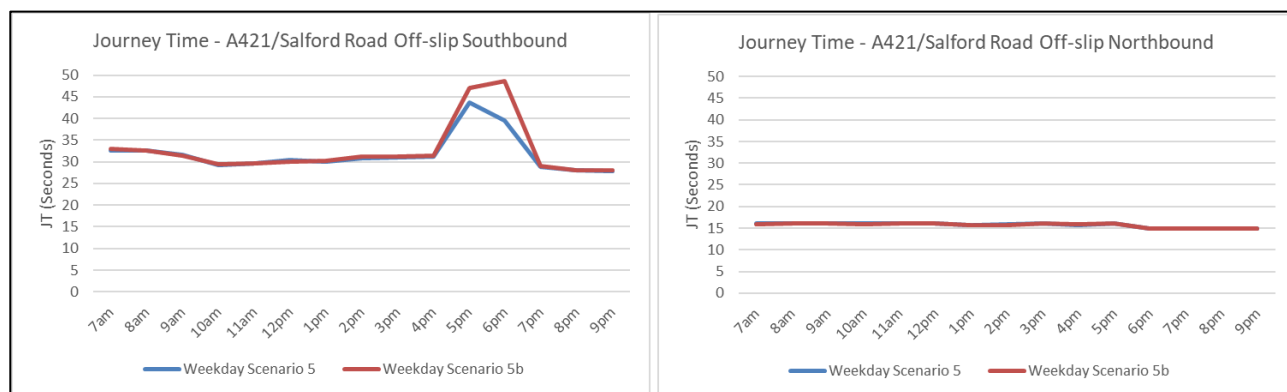
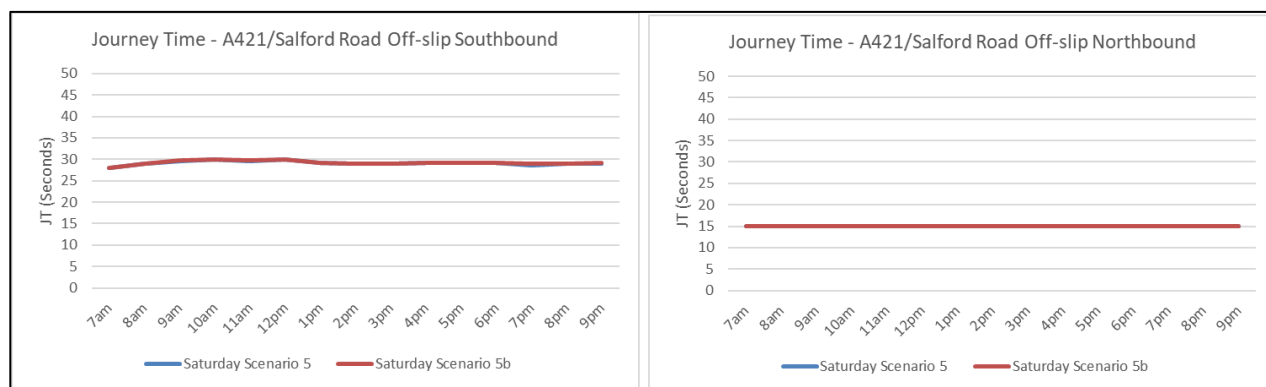


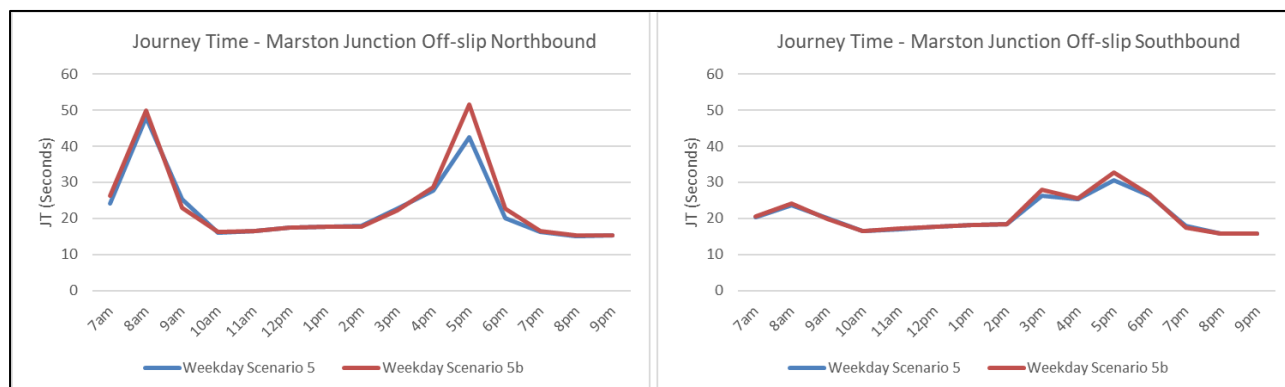
Figure 10-50: A421 Southbound Off-Slip Salford Road – ‘Busy Saturday’ - Journey Time



Marston Junction

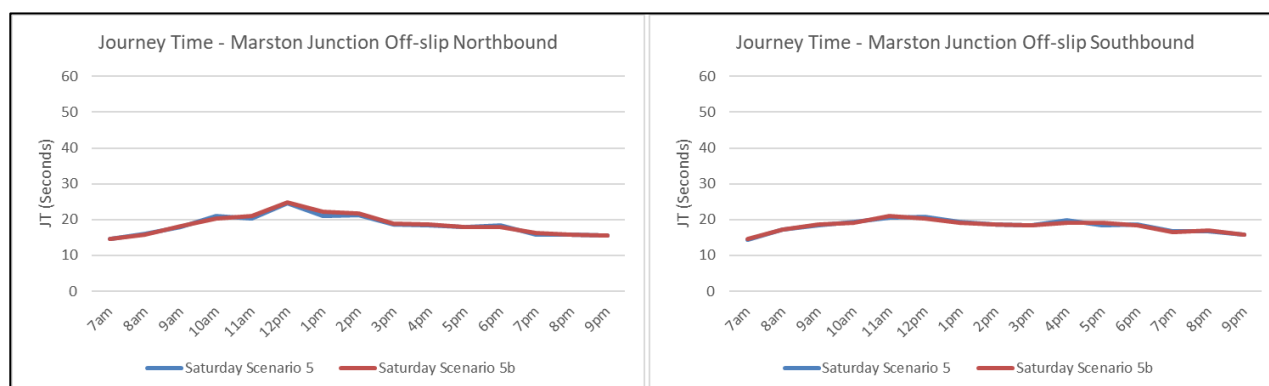
10.148 In a comparison between Scenario 5 and Scenario 5b, weekday journey times along the northbound Marston Junction slip road will be increased by 1 second during the AM peak and by 4 seconds during the PM peak. In the southbound direction, journey times will remain unchanged during the AM peak and will be increased by 1 second during the PM peak. These are captured in **Figure 10-51**

Figure 10-51: A421 Marston Moretaine off slips – ‘Average’ Weekday – Journey Time



10.149 For a ‘Busy’ Saturday, no change in journey time is expected in both northbound and southbound directions between Scenario 5 and Scenario 5b. **Figure 10-52** shows the modelled hourly trends for a ‘Busy Saturday’.

Figure 10-52: A421 Marston Moretaine Off Slips – ‘Busy’ Saturday – Journey Time

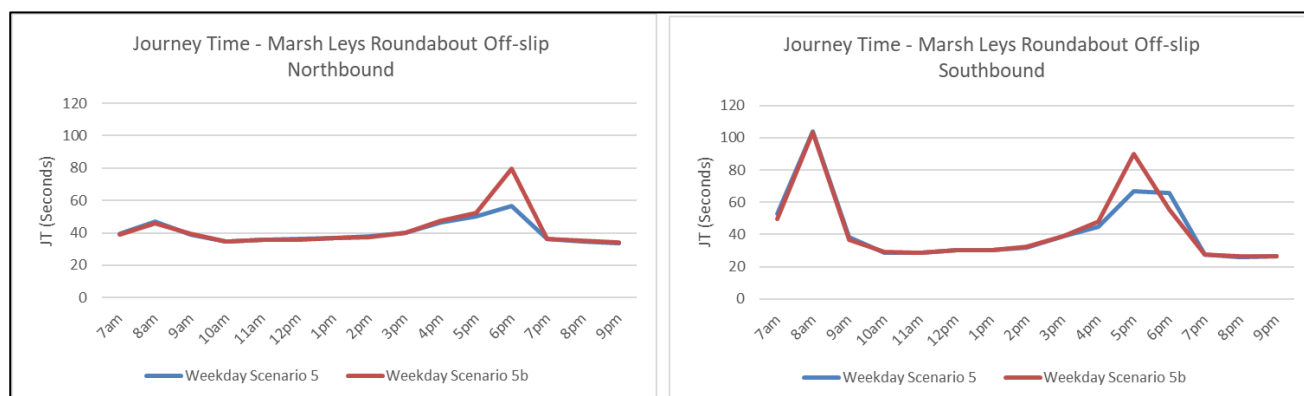


Marsh Leys Roundabout

10.150 Between Scenario 5 and Scenario 5b, weekday journey times on the off-slip roads along the A421 Marsh Leys Interchange off-slip roads remain unchanged during the AM peak and increase by 9 seconds during the PM peak in the northbound direction whereas along the southbound direction, Journey times will reduce by 2 seconds during the AM peak and increase by 5 seconds during the PM peak. except for the northbound direction during the AM peak where journey time is expected to remain unchanged. A maximum increase of 23 seconds and maximum decrease of 10 seconds are likely on a weekday along the southbound direction.

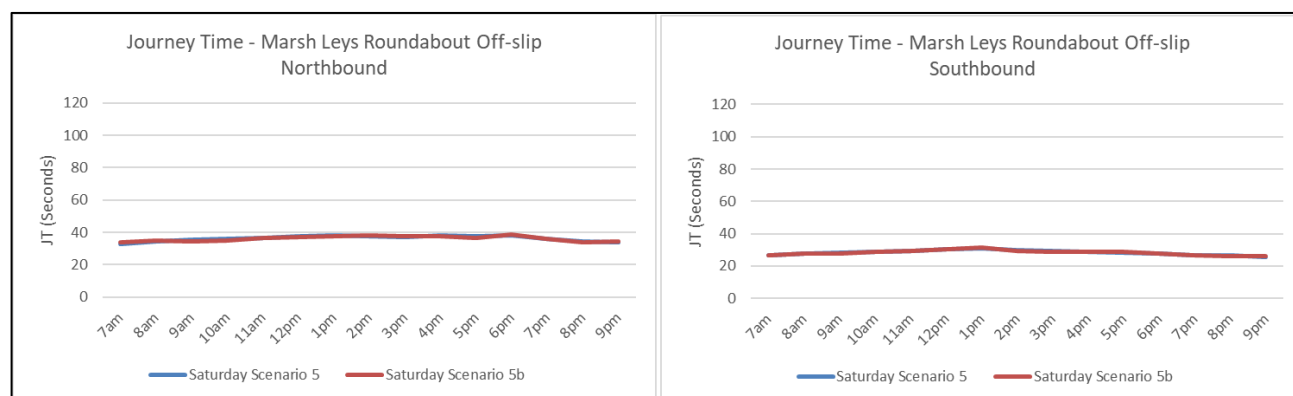
10.151 The hourly trends in journey time changes following Scenario 5 compared against Scenario 5b is depicted in **Figure 10-53**.

Figure 10-53: A421 Marsh Leys Off Slips – ‘Average’ Weekday – Journey Time



10.152 On a Saturday, between Scenario 5 and Scenario 5b it is predicted to lead to no changes in journey times in both northbound and southbound directions. **Figure 10-54** shows the hourly trends in journey time changes for a Saturday.

Figure 10-54: A421 Marsh Leys off slips – ‘Busy’ Saturday – Journey Time

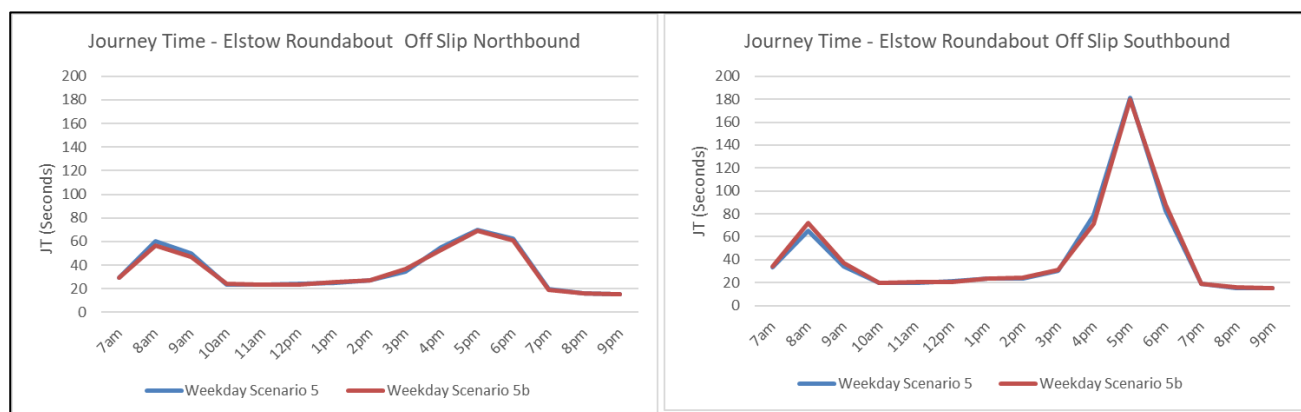


Elstow Roundabout

10.153 Between Scenario 5 and Scenario 5b, weekday journey times on the off-slip roads at the Elstow Roundabout are expected to reduce during the AM peak and PM peaks by two seconds along the northbound. In the southbound direction, an increase of 4 seconds is likely during the AM peak whereas for the PM peak, journey times will reduce by 1 second.

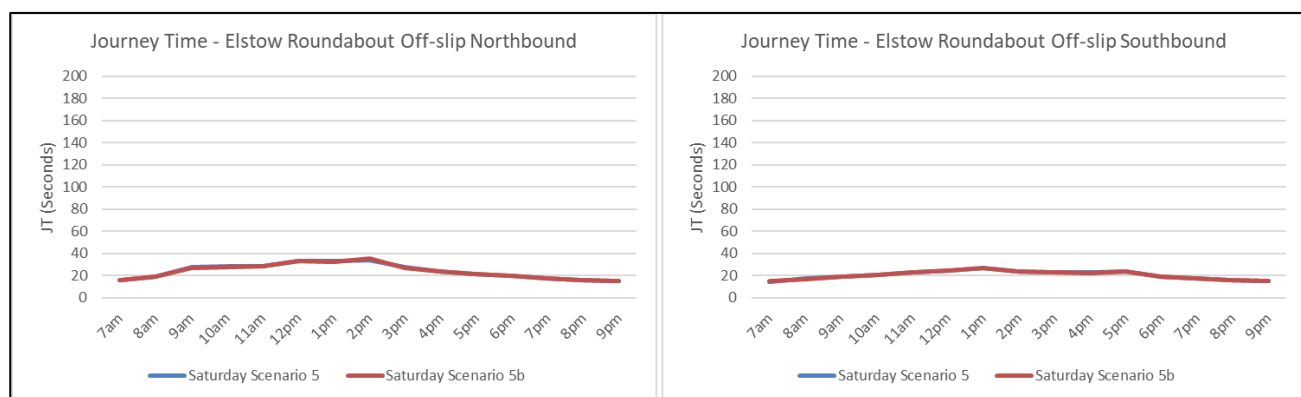
10.154 The hourly trends in journey time changes are shown in **Figure 10-55**.

Figure 10-55: A421 Elstow Off Slips – ‘Average’ Weekday – Journey Time



10.155 On a Saturday, between Scenario 5 and Scenario 5b it is predicted to lead to no changes in journey times in both the northbound and southbound directions as shown in **Figure 10-56**.

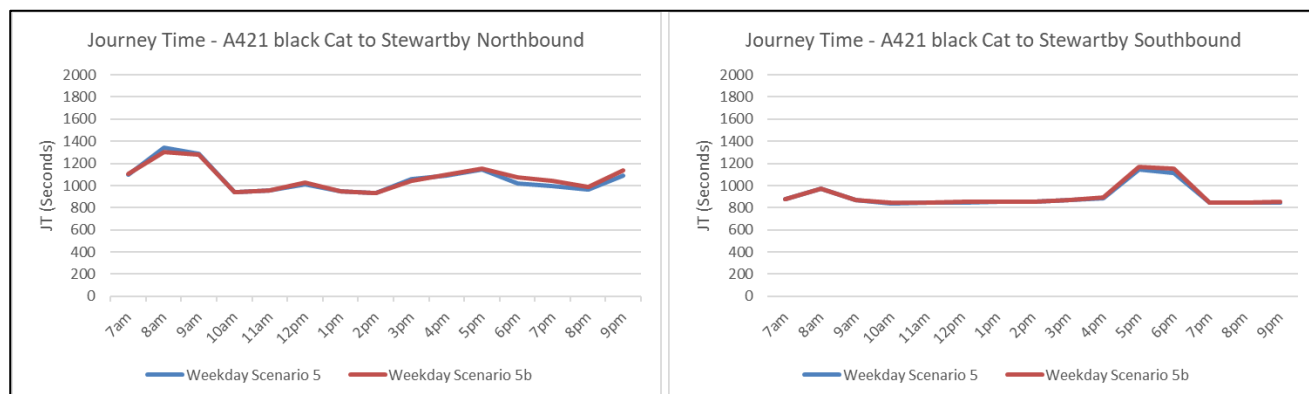
Figure 10-56: A421 Elstow Off Slips – ‘Busy’ Saturday – Journey Time



A421 Black Cat to Stewartby

10.156 It can be seen in **Figure 10-57** and **Figure 10-58** that the change from Scenario 5 and Scenario 5b would lead to some changes in journey time on the route between the A421/A1 Black Cat junction and Stewartby, on an ‘Average’ Weekday and on a ‘Busy’ Saturday.

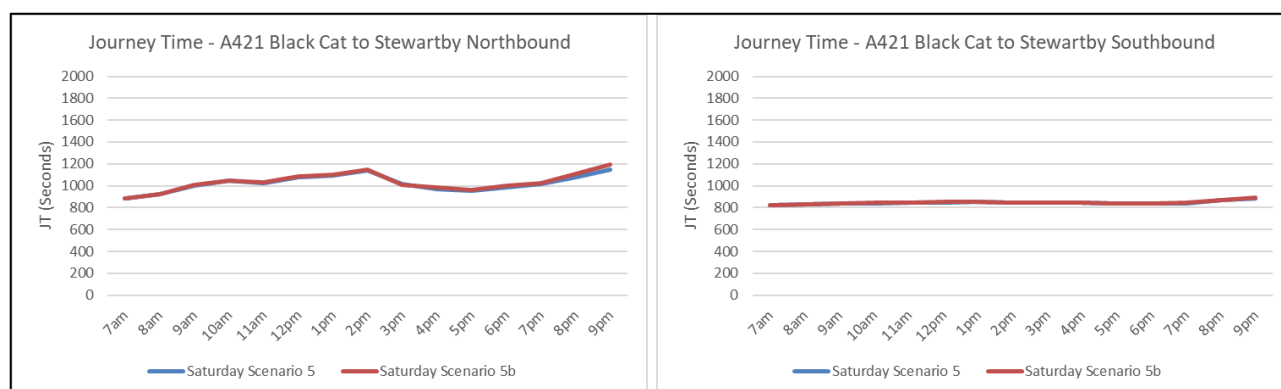
Figure 10-57: A421 Black Cat to Stewartby – ‘Average’ Weekday – Journey Time



10.157 On a Weekday, Scenario 5b is predicted to result in reduced journey time on the A421 Black Cat to Stewartby route in the northbound direction by an average of 16 seconds in the AM peak and increase by 27 seconds during the PM peak. In the southbound direction, journey times are expected to increase by 1 second in the AM peak and 25 seconds in the PM peak of an Average Weekday.

10.158 In Scenario 5b during a Busy Saturday, a journey time increment of 3 seconds is expected in the northbound direction for the AM peak and 10 seconds for the PM peak. In the southbound direction, journey times will remain unchanged in the AM peak and increase by 1 second during the PM peak as shown in **Figure 10-58**.

Figure 10-58: A421 Black Cat to Stewartby – ‘Busy’ Saturday – Journey Time

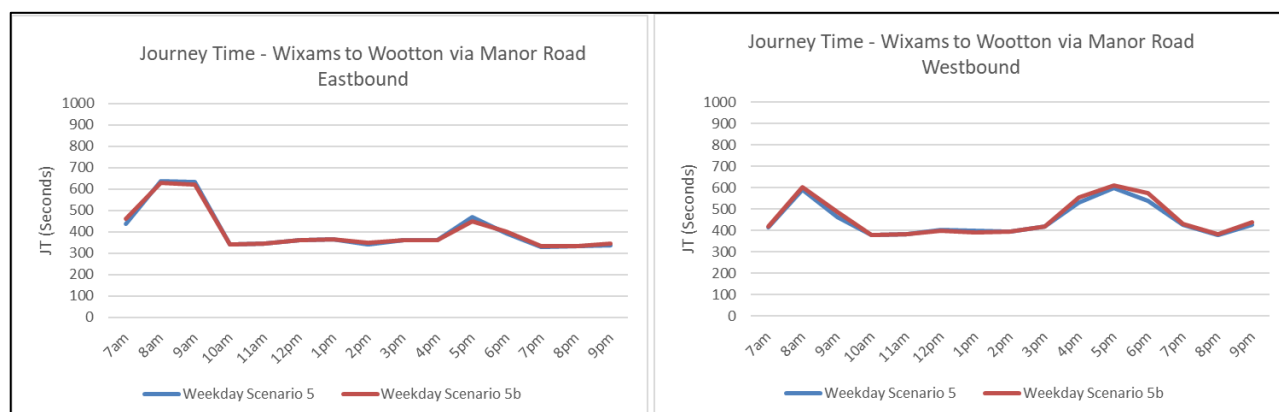


Wixams to Wootton via Manor Road

10.159 On a Weekday, Scenario 5b is predicted to result in minor changes to journey time along the Wixams to Wootton via Manor Road route in the eastbound direction with journey times increase by 2 seconds in the AM peak and reducing by 2 seconds in the PM with a maximum reduction of 17 seconds occurring between 17:00 – 18:00. In the westbound direction, journey times are expected to increase by 13 seconds in the AM peak and by 22 seconds during the PM peak, with a maximum increase of 34 seconds between 18:00-19:00 on an Average Weekday. These are not material changes.

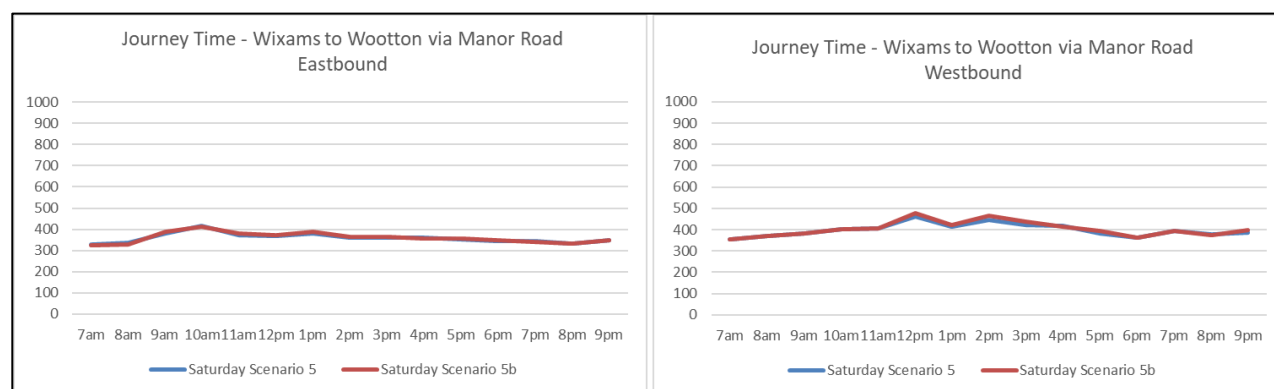
10.160 These trends are captured in **Figure 10-59**.

Figure 10-59: Wixams to Wootton via Manor Road – ‘Average’ Weekday – Journey Time



10.161 On a Saturday, Scenario 5b is predicted to lead to a journey time increase in the eastbound direction of 1 second during the AM peak and 8 seconds during the PM peak. Along the westbound direction, Scenario 5b would lead to a marginal increase in journey time of 1 second during the AM peak and a marginal reduction of 7 seconds during the PM peak. These are not material changes.

Figure 10-60: Wixams to Wootton via Manor Road – ‘Busy’ Saturday – Journey Time



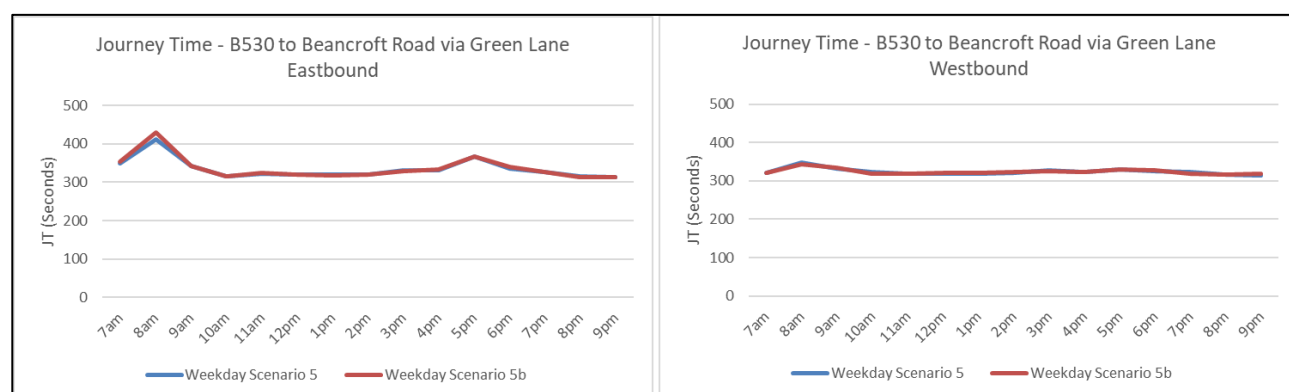
B530 to Beancroft Road

10.162 The B530 to Beancroft Road route modelled within this assessment runs from Beancroft Road west of the A421 to Green Lane and Stewartby Way. It can be seen in **Figure 10-61** and **Figure 10-62** that Scenario 5b, would lead to small changes in journey time for both an ‘Average’ Weekday and a ‘Busy’ Saturday which are not material.

10.163 On an Average Weekday, Scenario 5b is predicted to result in increased journey time on the B530 to Beancroft Road route in the eastbound direction by 7 seconds during the AM peak and an increase of 2 seconds in the PM peak in this direction. In the westbound direction, journey times are expected to reduce by 1 second during the AM peak and increase by 1 second during the PM peak of an Average Weekday.

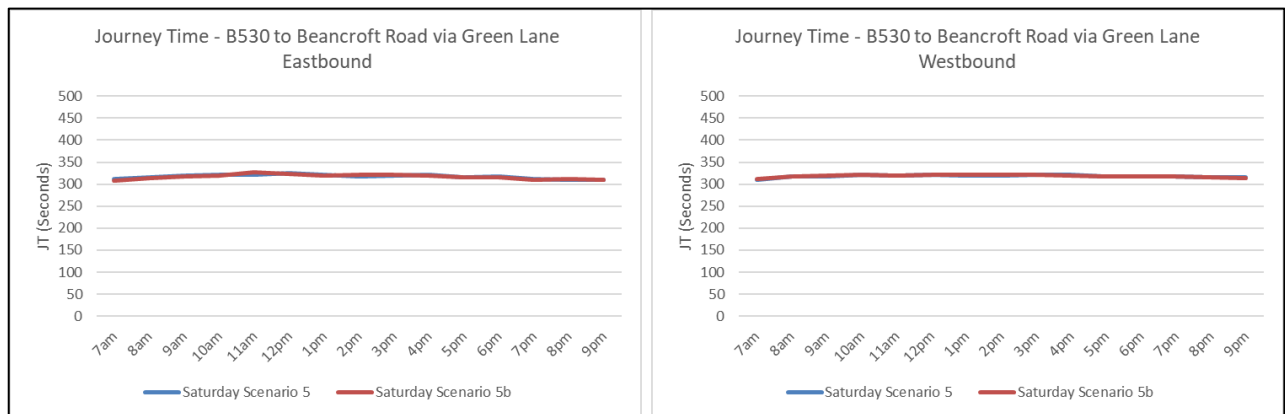
10.164 The hourly trends in journey time changes can be seen in **Figure 10-61**.

Figure 10-61: B530 to Beancroft Road via Green Lane – ‘Average’ Weekday – Journey Time



10.165 On a Saturday, Scenario 5b is predicted to lead to journey time reduction in the eastbound direction of 1 second during the AM and PM peaks. Along the westbound direction, journey times will increase by 2 seconds in the AM peak but will reduce by 1 second during the PM peak. These predicted increases are not considered material.

Figure 10-62: B530 to Beancroft Road via Green Lane – ‘Busy’ Saturday – Journey Time



Journey Time Summary

10.166 The Journey Time assessment presented here shows that Scenario 5b is not predicted to significantly or noticeably affect journey times.

Scenario 5b Conclusion

10.167 The network and assessments are not sensitive to whether or not peak or off peak rail fares are applied.

Scenario 5c – Future Year - Reference Case plus Development plus M1 Junction 13 as a Constraint

10.168 The M1 Junction 13 is known to currently experience congestion, particularly in the morning and evening peak commuter periods. The Proposed Development traffic for the main part will avoid these background peak periods. The peak demands are largely outside of the typical background peaks. There will though be some effect. Those effects will not be to a degree that would result in a change to the nature of the existing congestion at the junction or the performance of the junction in those periods.

10.169 Separately, it is understood that the DfT and National Highways are working on identifying capacity improvements at the M1J13 to enable more traffic to pass through the junction. It is not known at this stage precisely what these improvements entail, but there is a reasonable prospect that future improvements will come forward that will allow a greater volume of traffic to pass through the junction and hence into the network local to the Planning Proposal.

10.170 It must be noted that the DfT/NH studies at M1J13 are not linked to the Proposed Development. These studies predate any suggestion of a development of the nature proposed at the Site. Furthermore, any capacity improvement schemes at M1J13 are not necessary in NPPF policy terms to make the Proposed Development acceptable and the development is not reliant upon future improvements to M1 J13.

10.171 When developing future year scenarios within the Paramics model, the model initially identified M1 J13 as a limiting factor on the amount of traffic passing into the rest of the model at some times of the day.

- 10.172 The congestion and queueing returned by initial runs of the model occurred in the Reference Case model. The consequence of this was that the model's predictions for traffic flows on the A421 could, at times, be underestimations compared with unfettered flow through M1 J13. The result being that the proposed new A421 slip roads may have less vehicles incident upon them at sometimes compared with the case where there is unfettered flow through M1 J13.
- 10.173 In order to undertake a robust assessment of the operation of the road network near the Site and in particular to demonstrate the ability of the proposed site access infrastructure from the A421 to accommodate future traffic demand, the capacity constraint at M1J13 has been 'released' within the model in the Core Scenarios. I.e, the model assumes more traffic on the local network at certain times than can currently get there. For the purpose of assessing the local network, the Core scenarios presented in this assessment are based on a constraint release approach in which the model for the M1J13 has been amended to allow broadly unfettered demand. For the purpose of assessment, this enables the releasing of traffic through to the core of the modelled area to test the new infrastructure.
- 10.174 In addition, we understand that National Highways is investigating capacity enhancements to M1 J13, and so there is at least prospect that this constraint will be released in the future in practice, making it prudent to allow for it. The capacity release mechanism used in the assessment was discussed, reviewed and approved by DfT/NH to ensure it would release sufficient traffic to test the proposed junction on the A421.
- 10.175 As a sense check, and to specifically address M1 J13 as opposed to the network local to the Planning Proposal, assessments considered the effect of the Planning Proposal at the junction itself with no change. The result was no noticeable difference between suppressed demand proportions in the Reference Case and the Development Case. This is consistent with the minimal nature of Planning Proposal traffic demands in those background peak periods, and that these demands are not incident on those parts of the junction that experience greatest congestion at those times.
- 10.176 The alternative modelling approach considered in the assessment has been to run the model without the constraint release at M1J13 used in the Core scenarios. Congestion at the junction is a constraint and inconvenience to drivers. Naturally, drivers will seek to minimise their inconvenience, encountered on a typical day-to-day basis. As inconvenience increases there is a greater tendency for drivers to make other choices, therefore adding to the existing pool of 'suppressed demand'. One of those choices will be journey time. In practice, this can mean delaying a journey by 30 minutes or starting a journey 30 minutes earlier in order to reduce journey time/use time more efficiently for another task or not travel at all.
- 10.177 By running the model without the constraint release at M1J13, it was possible within the model to adjust demand matrices to establish the degree to which trips would need to change time period in order to reach an equilibrium between realistic congestion at M1J13 and released traffic onto the A421. The trips moved are considered to represent the 'suppressed demand' at the junction in the sense that these trips would not be able to travel when they were would there be free flow and no congestion. The micro-simulation model relies here on manual inputs.
- 10.178 This Scenario 5c assessment presents an estimation of the change in level of suppressed demand that could be reasonably expected at M1 J13 as a result both of the change due to the Reference Case traffic, and then the Development Case traffic.

Methodology

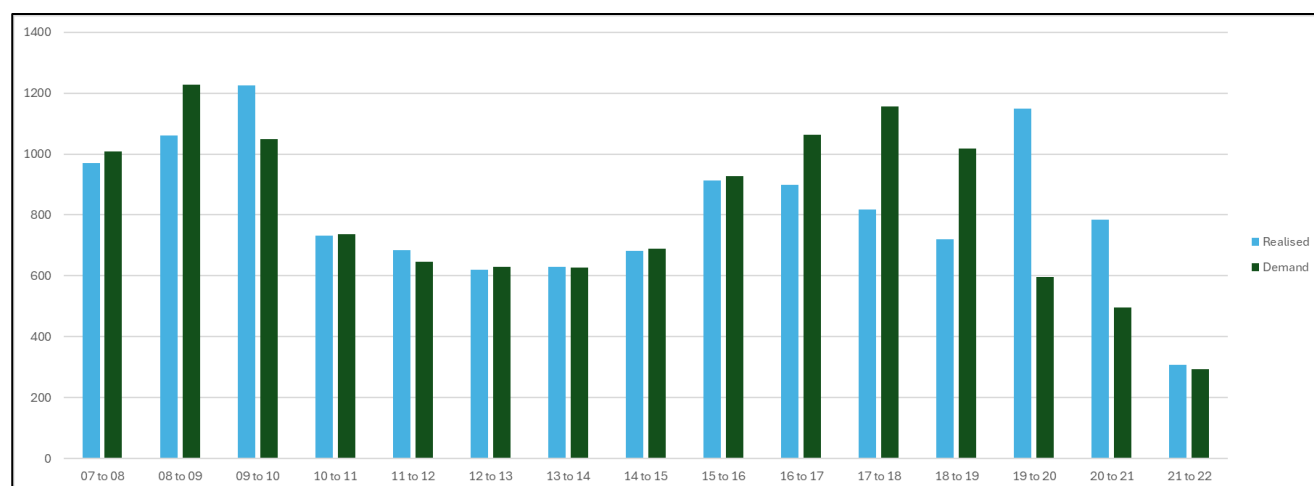
- 10.179 The approach taken in this sensitivity test has been to find a way to quantify the level of suppressed demand that would occur at M1 J13 to achieve a balance between levels of congestion at M1 J13 and realistic traffic volumes on the A421. The method applied focuses on adjustments confined to traffic entering the model network from the M1 southbound/eastbound mainline. Note that this is a notional mathematical assessment, and not intended to replicate actual or forecast reality.
- 10.180 In reality, drivers across the network would likely alter their trip patterns until a new equilibrium is reached with regards travel times and other factors which influence convenience levels (such as departure time, route choice, etc.).
- 10.181 Microsimulation models are deterministic, meaning such influences and responses are omitted from the model. They require manual adjustment to the model if they are to be accounted for. In this instance, the extent of the adjustments has been kept to a minimum for simplicity, with a focus on the M1 eastbound approach.
- 10.182 The methodology has made use of traffic flow data from both the Reference Case and Development traffic flows from the Development Case. It considers several steps, to estimate the likely level of suppressed demand, initially looking at the difference between 'realised' traffic flows (the ones that are modelled to actually go through the junction) and the 'demand' traffic flows (the ones that want to go through the junction), and then applying further adjustments to reduce any residual queue to a level that is realistic.
- 10.183 The methodology applied three iterations:
- a. Iteration 1: The traffic volumes 'realised' within the Reference Model, exiting the M1 eastbound at M1 J13 were compared to the hourly 'demand' at the same location. The difference between 'realised' and 'demand' represents the initial element of 'supressed demand' on the link (demand which would like to get through in the hour but is not able to). Correspondingly, that initial 'supressed demand', when identified at significant levels, was moved. In this case, a simple assumption was made that it moved temporally, but in practice one of many other decisions would be made.
 - b. Iteration 2: The outcome of Iteration 1 was a different set of Reference Case matrices with trips moved to other hours. In Iteration 2, the Reference Case model was rerun with the amended matrices. It was identified that the 'realised' traffic flows in the model were now much closer to the 'demand' traffic flow levels. However, queueing remained within the model. Therefore, for Iteration 2, the extent of queueing within the modified Reference Case model was identified, by way of the hourly maximum, and an allowance was made for some of those trips which were in a queued state to also shift to different hours, working towards a new equilibrium.
 - c. Iteration 3: Iteration 3 was a duplicate of Iteration 2 but adding the Proposed Development traffic demand to modified Reference Case matrices. Where queuing was predicted, the queues were balanced out across different hours as per Iteration 2.

Iteration 1 - Overview

10.184 As highlighted previously, for simplicity at this stage, all iterations of peak spreading only considered adjustments to traffic volumes exiting M1 via J13 from the west of the junction (i.e. M1 J13 eastbound off slip). This is because it is this queue that represents the largest constraint to traffic flows in the area.

10.185 Iteration 1 of the process assessed the difference between the assigned demand in this location and the modelled volumes achieved within each hour. This is presented within **Figure 10-63**.

Figure 10-63: Demand vs. Realised Flows Exiting M1 eastbound into J13



10.186 This analysis demonstrated that the initial suppressed demand is primarily confined to the PM period. The effect is most prominent within the period of 16:00 to 19:00 where there is a notable difference between the level of demand exiting the M1 and the number of trips which actually exit in the same hours.

10.187 **Figure 10-63** shows that the demand is higher than the realised flows for the three hours between 16.00 and 19.00, with a correction ensuing within the next two hours (19:00 to 21:00) where the model releases the initial suppressed demand artificially when capacity becomes available.

10.188 Traffic flows were then manually adjusted within the PM period as per **Table 10-12**.

Table 10-12: Hourly Adjustments during PM Period – Iteration 1 – Ref Case

Hour	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	21 to 22
Adjustment	137.93	184.57	-92.50	-364.70	-124.00	113.00	86.56	59.14
Proportion	23.73%	31.76%	-15.92%	-62.75%	-21.34%	19.44%	14.89%	10.18%

10.189 This illustrates that around 580 trips were suppressed in the PM peak. These were reassigned to the shoulder hours based on the demand proportions in each hour. Since 15:00 to 16:00 is the next busiest hour, the largest shift is assigned to that hour and the lowest is assigned to the 21:00 to 22:00 hour since this is the quietest hour for existing demand levels. Note that this is simply a mathematical exercise, and not intended to represent reality.

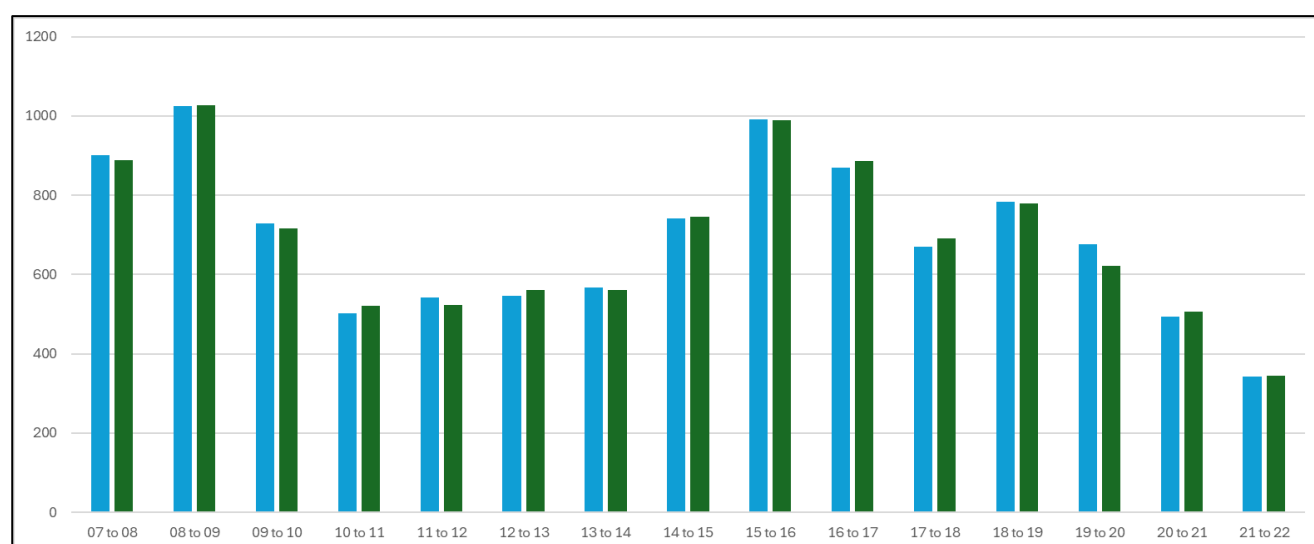
10.190 In reality, the relationship would be less linear than this, demand would shift dynamically in different hours, in different ways and at different levels in response to the congestion on the network. However, this approach is a mathematical proxy to identify a new equilibrium for M1J13.

10.191 The resulting changes were applied to the background demand matrix (Matrix Level 1) to obtain a modified set of Reference Case matrices to take through Iteration 2 and 3 of the method.

Iteration 2 - Overview

10.192 Having assigned the adjusted demands from Iteration 1 to the Reference Case, an assessment was completed for the same sets of traffic flows (realised versus demand) and it was established that a much closer match between the two sets of flows had been achieved. This is presented within **Figure 10-64**.

Figure 10-64: Demand vs. Realised Flows Exiting M1 eastbound into J13 - Post iteration 1



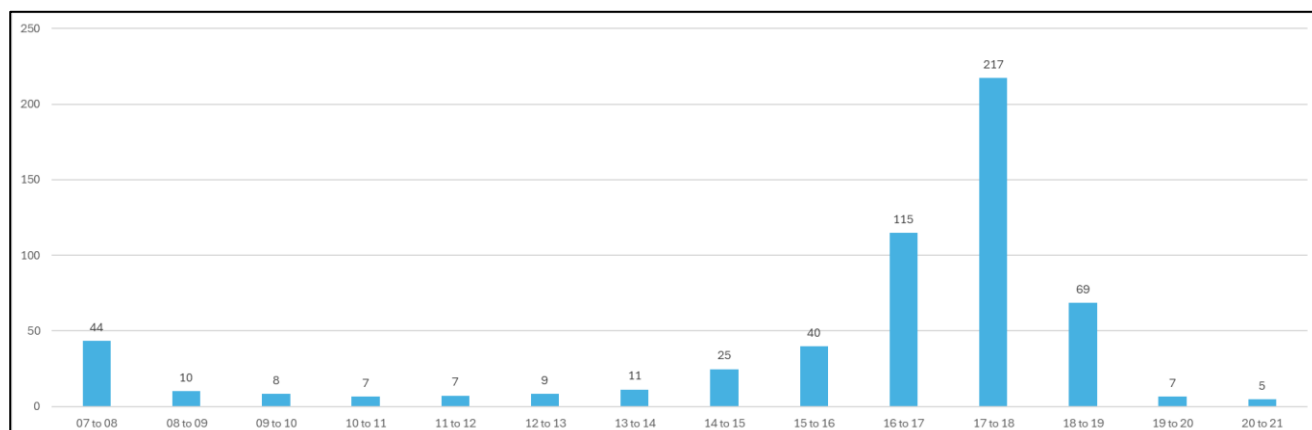
10.193 However, even after the Iteration 1 matrix adjustment was applied, queueing remained within the model on the M1 eastbound approach which was likely to suppress traffic volumes to a further extent.

10.194 In order to achieve a new equilibrium at M1J13, some additional traffic was reassigned in response to the queueing observed on the model network.

10.195 The level of traffic to reassign was therefore informed by the magnitude of queues observed on the M1 eastbound approach into J13.

10.196 The number being moved is artificially constrained but, for the purpose of this analysis, this approach was considered suitable as a means of exploring the level of suppressed demand at M1J13. The queueing identified on the network after modelling the Iteration 1 demands, expressed as the average hourly maximum queue length in vehicles, is illustrated within **Figure 10-65**.

Figure 10-65: Average Maximum Queue Length (Reference Case, Vehicles) M1 eastbound off slip – Post Iteration 1



10.197 As with the previous analysis of the initial suppressed demand, modelled queuing seems to be an issue mainly within the PM period. In this instance, it was considered prudent to shift the demand in the period 1600 to 1800 based on the queueing levels returned by the model. However, as the queueing in the 1500 to 1600 hour appears to occur towards the end of that hour, 1500 to 1600 demands were included in the calculation to address the occurrence of queueing across the entire PM period. For the same reason, when assigning demand to alternate hours, the 1800 to 1900 hour was excluded (i.e. no more traffic was added in to that hour).

10.198 75% of the demand observed through analysis of the maximum queue lengths was reassigned to the less busy PM hours, in this instance the period 1900 to 2200. As with the previous iteration, the assignment of additional traffic was applied proportionally based on the quantum of demand already contained within each hour. This translated into the hourly adjustments presented within **Table 10-13**.

Table 10-13: Hourly Adjustments during PM Period – Iteration 2 – Reference Case

Hour	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	21 to 22
Adjustment	0	-30	-86	-163	0	118	96	65
Proportion	0%	-11%	-31%	-58%	0%	42%	34%	23%

10.199 This illustrates that, within the Reference Case, around a further 279 ‘suppressed’ trips were reassigned out of the periods which contributed to the largest queueing levels and into the less congested periods.

10.200 This further shift in traffic demand was applied to the background demand matrix (Matrix Level 1) within the Reference Case matrices.

10.201 The approach above is useful in finalising a demand set for the Reference Case inclusive of ‘suppressed demand’. A similar approach has also been adopted for the Development Case (Iteration 3) but using Development Case queueing levels as the determining factor when calculating how much demand to shift out of the congested periods. The Iteration 3 approach is explained in more detail in the following section.

10.202 The suppressed demands identified here are confined for mathematical simplicity to the M1 eastbound off slip into M1 J13. The changes to the traffic demand matrices in the model are applied to the Matrix Level 1. Matrix level 1 assigns between 7,500 and 26,000 trips to the model by hour. At any one time, the maximum amount of demand within Matrix Level 1 which shifts as a consequence of both iteration 1 and 2 of the method followed is 2% of the total demand contained within the matrix level.

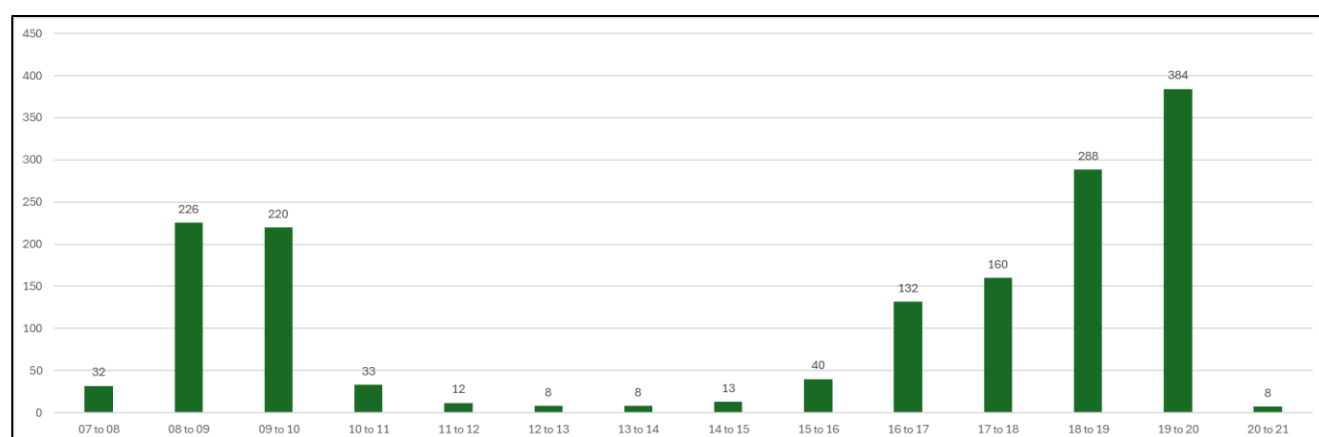
10.203 A variation of 2% or less is likely to be less than the level of variation in traffic flows which occurs naturally through daily variation. As such, the method applied here provides a realistic representation of how traffic demand and therefore suppressed demand is likely to adjust dynamically to traffic conditions on the ground. It also demonstrates that the M1 J13 has the capacity to accommodate the total predicted demand in the Reference Case with effectively little adjustments to initially predicted demands.

10.204 The modified Reference Case matrices obtained should be assumed to represent Reference Case demands in the event that traffic reassigns to minimise inconveniences on the network. In the assessment presented here, this is confined to traffic exiting the M1 eastbound for simplicity given this is the most notable constraint in the initial model results at M1 J13, but it should be recognised that in reality a much larger number of trips at M1 J13 (from different approaches into the junction) could potentially consider shifting as a consequence of the constraints that they may encounter at the junction. These additional trips have not been considered through the modelling for the purpose of keeping the approach simple.

Iteration 3 - Overview

10.205 In this iteration, the modified Matrix level 1 output through Iteration 1 and Iteration 2 have been used to create a modified Development Case set of matrices. Adding Development traffic demand reintroduces queueing on the network within the model. This queueing expressed as the average hourly maximum queue length in vehicles, is illustrated within **Figure 10-66**.

Figure 10-66: Average Maximum Queue Length (Development Case, Vehicles) M1 eastbound – Post Iteration 2



10.206 **Figure 10-66** illustrates that, with modified Development Case traffic, queueing occurs during the AM and PM periods and so adjustments to both periods have been made to achieve a new equilibrium at M1J13.

- 10.207 Demand adjustments were therefore considered appropriate for the 08:00 to 10:00 and 15:00 to 20:00 time periods. Given more hours are involved in the analysis this time, the magnitude of shift was reduced from the 75% of queue levels adopted in Iteration 2 to 50%. Thus 50% of the number of vehicles stored in the queues following Iteration 1 have been reassigned to hours where the level of commuter travel convenience is higher (i.e. congestion is lower).
- 10.208 The level of reassignment into the shoulder hours was again applied proportionally, however, as the number of hours with reserve capacity are less in this Iteration than the previous iterations (i.e. the shift is being input to fewer hours as a proportion of the total hours used in the analysis), the demand was assigned in equal proportions this time (e.g. 20% in each of the 5 PM hours and 33.33% in each of the proposed AM hours).
- 10.209 The process was applied for both AM and PM periods with the queueing levels between 08:00 to 10:00 used to inform the AM shift. Correspondingly, the queueing identified in the 15:00 to 20:00 hours determined the amount of shift to induce in the PM period.
- 10.210 The resultant hourly adjustments effected during the AM and PM time periods are presented within the following **Table 10-14** and **Table 10-15**, respectively:

Table 10-14: Hourly Adjustments during AM Period – Iteration 3 – Development Case (in trips)

Hour	06 to 07	07 to 08	08 to 09	09 to 10	10 to 11	11 to 12
Adjustment	74	0	-113	-110	74	74
Proportion	33%	0%	-51%	-49%	33%	33%

Table 10-15: Hourly Adjustments during PM Period – Iteration 3 – Development Case (in trips)

Hour	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	21 to 22
Adjustment	100	100	100	-20	-66	-80	-144	-192	100	100
Proportion	20%	20%	20%	-4%	-13%	-16%	-29%	-38%	20%	20%

- 10.211 The work carried out above results in around 223 ‘suppressed’ vehicles being moved to other hours in the AM peak hours and 500 trips in the PM peak hours.
- 10.212 When this level of shift is considered alongside the shift induced via Iteration 1, when compared to the demands contained within Matrix Level 1 only, the maximum levels of traffic shifted to or from any one hour is at most 2% and frequently lower.
- 10.213 A variation of 2% or less is likely to be less than the level of variation in traffic flows which occurs naturally through daily variation. As such, the method applied here provides a realistic representation of how traffic demand is likely to adjust dynamically to traffic conditions on the ground. It also demonstrates that the M1 J13 has the capacity to accommodate the total predicted demand in the Development Case with effectively little adjustments to initially predicted demands.

Summary of Scenario 5c

- 10.214 Within the initial runs of the model, capacity constraints at M1 J13 were observed that limit the amount of traffic which is able to access the A421 within the model. Whilst the volume of traffic across the day which is subject to this limitation is not likely to be significant, it remains the case that for the purpose of robustly testing of the infrastructure around the A421, it was considered prudent to consider this constraint to some extent.
- 10.215 As part of the modelling supporting the Core assessment in this transport assessment, the capacity constraint at M1 J13 has been released in the model to increase the amount of traffic the model assumes travels through the junction, and therefore to obtain a more robust set of predicted traffic flows on the A421. It is also a possible future scenario, given National Highways' investigation into M1 J13 capacity increases.
- 10.216 A sensitivity test has also been undertaken considering a scenario whereby constraint release would not occur at M1J13. With congestion and inconvenience at M1J13 increasing, the natural response is for drivers to adjust their travel patterns to achieve a new equilibrium between congestion at the junction and traffic released through the junction. This was replicated within the model through manual interventions to identify relative levels of 'suppressed demand' to gauge the effect of the Development. The deterministic nature of microsimulation models is that this real-life phenomenon cannot be accounted for by the software. Manual adjustments are required by the user.
- 10.217 This section of the report presents one set of adjustments which have been applied to derive a model inclusive of 'suppressed demand'.
- 10.218 The outcome of the process is that in addition to the suppressed demand already experienced at the junction, that the change in "suppressed demand" is 3.0% and 3.6% respectively in the traditional morning and evening commuter peak periods for the Reference Case (we assume no change outside of those periods). For the Future Year Development Case, the answers are 2.5% and 3.3% in the traditional commuter peak periods respectively. Within the tolerance of the model, and the network, this is the same answer.
- 10.219 This evidence corroborates and supports the professional judgement already drawn from a comparison of demand flows vs background flows and congestion at the junction, that that the Proposed Development would not significantly affect the character and nature of peak period performance at M1J13.

Closing the Level Crossing on Manor Road

- 10.220 The Proposed Development includes a number of options related to the future of the level crossing at Manor Road. It is understood that NR has plans to replace the level crossing with a road bridge, and DfT advise that this option (Option A) should be considered committed and should form the basis of this transport assessment (included within the Reference Case and the Core Scenarios). Two alternative options in respect of the future of the level crossing are also included within the Proposed Development, including the closure of the level crossing without the provision of a road bridge over the railway (Option B) and the retaining of the level crossing (Option C). Both alternative options would have potential implications on the assignment of traffic locally, with Option B having the most effect.

- 10.221 On that basis the implications of closing the level crossing, without the delivery of a road bridge in its place have been tested. Scenario 5 (Future Year), including the completed Proposed Development in the longer term has been used as the basis for assessment. Details of the assessment are provided in **Annex 7**.
- 10.222 The conclusions reached are that there is no substantial, and in most cases even noticeable, difference in the character of movement or performance of the road network as a result of closing the level crossing connection to vehicular traffic. The road network as part of the proposed Universal ERC provides better and safer alternative vehicular routes.

11 Proposed Access Junctions

- 11.1 The Proposed Development will be supported by significant investment in transport infrastructure in order to provide direct and convenient access to the Resort. This includes new road and vehicular access infrastructure to, from and within the Proposed Development in accordance with the Site Access Point Plan (see document reference 1.07.0 in the wider planning submission). Illustrative highway access plans have been developed to demonstrate that access can be gained into the Site from the existing highway infrastructure within the immediate vicinity of the Proposed Development. These illustrative highway arrangement drawings are provided in **Annex 6**. They provide details of the highway layout within the Site and are deliverable within the limits of deviation shown on the Access Parameter Plan (**Parameter Plans Access and Roadways (Document Reference 1.11.0)**).
- 11.2 For the purpose of assessment, this section tests the operation of the key junctions on this illustrative highway arrangement plans. The junctions can be described as follows:
- a. An upgrade to the B530 Ampthill Road/Manor Road junction to traffic signal operation, including a fourth arm into the Full Wixams Station proposed western 'plaza'.
 - b. A new Roundabout on Manor Road connecting the realigned section of Manor Rd to the east of the railway, Manor Rd west, Public Road A to the south and Public Road B through the Lake Zone.
 - c. A new junction onto the A421 providing direct road access into the Proposed Development from the SRN, including:
 - i. an off slip road on the eastbound carriageway of the A421 leading over the A421, over the C94 Woburn Road and then down into the Site where it connects with a proposed new internal roundabout distributing traffic within the Proposed Development – this roundabout is referred to as the A421 eastbound roundabout -
 - ii. an on slip road on the westbound carriageway of the A421 leading from a new roundabout on the C94 Woburn Road linking into the Proposed Development through the West Gateway Zone and to the A421 eastbound off slip roundabout – this roundabout is referred to as the A421 westbound roundabout - An off slip road on the westbound carriageway of the A421 leading into the same A421 westbound roundabout.
 - d. A new traffic signal-controlled junction between the C94 Woburn Road/Broadmead Road junction – this is proposed as part of the Main Construction Phase of the Proposed Development in order to manage construction access along Broadmead Road while minimising delay to local traffic. The principle of a traffic signal-controlled junction at this junction is then carried over to the Proposed Development Operational Phase.
 - e. The A421 eastbound roundabout is a 5-arm roundabout including: the A421 eastbound off slip as an entry only, an arm serving the northern section of the West Gateway Zone, a link connecting to the rest of the Proposed Development over the MVL, an access into the West Gateway Zone development zone to the south and a link road connecting to the A421 westbound roundabout.

- 11.3 The A421 westbound roundabout is a new roundabout located onto the C94 Woburn Road providing access to/from the A421 westbound carriageway on slip and off slip roads, as well as the C94 Woburn Road north and south and the internal link road to the A421 eastbound roundabout.
- 11.4 In the scenario including further development in the Lake Zone, a new junction is introduced onto the B530 Ampthill Road to provide access into the Lake Zone, and then enroute to the Resort.
- 11.5 Drawings of these illustrative highway designs can be found in **Annex 6**.
- 11.6 This section of the report confirms that the illustrative access designs supporting the Proposed Development would operate satisfactorily. This assessment is based on a review of the likely operation of the illustrative layouts for the B530/Manor Road junction, the new Manor Road roundabout, the A421 eastbound roundabout and the A421 westbound roundabout, the C94 Woburn Road/Broadmead Road junction, and the B530 Ampthill Road/Lake Zone access junction using specific local junction capacity models built within the industry standard Linsig software for traffic signal controlled junction and Junction 10 for other junction types.
- 11.7 The operation of these junctions has been tested across all development scenarios, including:
 - a. Core Scenario – Scenario 4, referred to as ‘Dev Scenario 4’; and
 - b. Core Scenario – Scenario 5, referred to as ‘Dev Scenario 5’.
- 11.8 The capacity of the illustrative highway access junctions has also been considered against the other scenarios where relevant, including:
 - a. C94 Woburn Road/Broadmead Road – the operation of this junction, once upgraded to traffic signal operation, has been tested for the Construction Scenarios (Scenario 2 and 2a) as well as for the Development scenarios (Scenario 4 and Scenario 5) -
 - b. All junctions have also been tested against traffic flow forecast on a Saturday with Peak attendance to demonstrate that even in this peak scenario, the illustrative access layouts can deliver the capacity required to accommodate the Proposed Development.

Junction Capacity Assessments

- 11.9 The tests considered a number of key hourly periods in the weekday and the Saturday as follows:
 - a. weekday:
 - i. 08.00-09.00 (background peak);
 - ii. 09.00-10.00 (peak arrivals);
 - iii. 17.00-18.00 (background peak); and
 - iv. 21.00-22.00 (peak departure).
 - b. Saturday:
 - i. 09.00-10.00 (peak arrival);

- ii. 12.00-13.00 (background peak); and
- iii. 21.00-22.00 (peak departure).

Manor Road Roundabout

11.10 Table 11-1 to Table 11-4 present the results of the tests carried out.

Table 11-1: Manor Road Roundabout – Scenario 4 – ‘Average’ Weekday

Sc 4	WKD AM (08:00-09:00)			WKD AM (09:00-10:00)			WKD PM (17:00-18:00)			WKD PM (21:00-22:00)		
Average	Queue (PCU)	Delay (S)	RFC	Queue (PCU)	Delay (S)	RFC	Queue (PCU)	Delay (S)	RFC	Queue (PCU)	Delay (S)	RFC
Manor Road North	0.4	3.45	0.27	0.3	3.37	0.24	0.2	3.02	0.17	0.1	2.77	0.08
Distributor Road North	0	0	0	0	0	0	0	0	0	0	0	0
Manor Road South	0.2	2.05	0.13	0.2	2.49	0.12	0.2	1.89	0.14	0.3	2.25	0.18
Distributor Road South	0.1	2.18	0.09	0.2	2.6	0.1	0.1	2.02	0.06	0.2	2.97	0.08

Table 11-2: Manor Road Roundabout – Scenario 4 – ‘Busy’ Saturday

Sc 4	SAT AM (09:00-10:00)			SAT IP (12:00-13:00)			SAT PM (21:00-22:00)		
Busy	Queue (PCU)	Delay (S)	RFC	Queue (PCU)	Delay (S)	RFC	Queue (PCU)	Delay (S)	RFC
Manor Road North	0.3	3.25	0.2	0.2	3.02	0.19	0.1	2.82	0.07
Distributor Road North	0	0	0	0	0	0	0	0	0
Manor Road South	0.3	2.8	0.15	0.2	2.01	0.18	0.4	2.56	0.23
Distributor Road South	0.3	3.07	0.14	0.1	2.2	0.07	0.3	3.32	0.14

Table 11-3: Manor Road Roundabout – Scenario 5 – ‘Average’ Weekday

Sc 5	WKD AM (08:00-09:00)			WKD AM (09:00-10:00)			WKD PM (17:00-18:00)			WKD PM (21:00-22:00)		
Average	Queue (PCU)	Delay (S)	RFC	Queue (PCU)	Delay (S)	RFC	Queue (PCU)	Delay (S)	RFC	Queue (PCU)	Delay (S)	RFC
Manor Road North	0.6	4.05	0.36	0.6	4.24	0.38	0.3	3.36	0.25	0.2	3.06	0.13
Distributor Road North	0	1.79	0.04	0.1	1.85	0.05	0.1	1.75	0.07	0.1	1.75	0.07
Manor Road South	0.2	2.09	0.13	0.2	2.5	0.13	0.2	1.99	0.15	0.3	2.41	0.23
Distributor Road South	0.2	2.15	0.17	0.3	2.41	0.19	0.1	2.03	0.08	0.2	2.97	0.1

Table 11-4: Manor Road Roundabout – Scenario 5 – ‘Busy’ Saturday

Sc 5	SAT AM (09:00-10:00)			SAT IP (12:00-13:00)			SAT PM (21:00-22:00)		
Busy	Queue (PCU)	Delay (S)	RFC	Queue (PCU)	Delay (S)	RFC	Queue (PCU)	Delay (S)	RFC
Manor Road North	0.6	4.12	0.36	0.4	3.48	0.29	0.2	3.26	0.15
Distributor Road North	0.1	1.88	0.05	0.1	1.78	0.05	0.2	1.95	0.14
Manor Road South	0.3	2.81	0.16	0.3	2.09	0.2	0.5	2.84	0.26
Distributor Road South	0.3	2.88	0.17	0.1	2.21	0.08	0.3	3.42	0.17

Table 11-5: Manor Road Roundabout – Scenario 5 – ‘Peak’ Saturday

Sc 5	SAT AM (09:00-10:00)			SAT IP (12:00-13:00)			SAT PM (21:00-22:00)		
Peak	Queue (PCU)	Delay (S)	RFC	Queue (PCU)	Delay (S)	RFC	Queue (PCU)	Delay (S)	RFC
Manor Road North	0.6	4.23	0.37	0.4	3.57	0.3	0.2	3.44	0.15
Distributor Road North	0.1	1.89	0.05	0.1	1.79	0.05	0.2	2.11	0.19
Manor Road South	0.3	2.79	0.17	0.3	2.1	0.21	0.5	2.95	0.28
Distributor Road South	0.3	2.86	0.18	0.1	2.23	0.09	0.4	3.37	0.2

11.11 The tests undertaken indicate that the illustrative junction on Manor Road would operate satisfactorily in all development scenarios. The highest RFC experienced on the junction would occur on Manor Road North in the Scenario 5 ‘Average’ Weekday during the 09.00-10.00 period. This arm would experience an RFC of 0.38, with a queue of 0.6 pcus and 4.24 seconds’ delay. The tests undertaken demonstrate that the illustrative junction layout would also operate satisfactorily under Peak attendance conditions.

A421 Westbound Roundabout

11.12 Table 11-6 to Table 11-10 present the results from the tests carried out.

Table 11-6: A421 Westbound Roundabout – Scenario 4 – ‘Average’ Weekday

Sc 4	WKD AM (08:00-09:00)		WKD AM (09:00-10:00)		WKD PM (17:00-18:00)		WKD PM (21:00-22:00)	
Average	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
A421 SB Off Left Left2	58.1	5.1	52.3	3.8	61.0	6.0	29.3	1.4
Circ (W) Ahead	42.3	4.4	25.7	2.2	51.3	5.3	19.4	1.6
Circ (W) Right Ahead	43.7	4.4	27.3	2.1	49.6	5.2	20.6	1.7
Bedford Rd (N) Ahead Left	79.0	7.7	57.4	3.0	51.7	2.0	25.9	0.2
Resort exit Ahead Left	21.3	0.9	8.7	0.4	33.9	1.9	28.3	2.7
Resort exit Ahead	38.9	1.8	34.4	1.8	54.0	3.4	38.8	3.1
Circ (E) Ahead	47.3	1.8	36.2	1.7	50.9	2.6	38.3	1.9
Circ (E) Right	32.3	2.7	23.1	2.0	22.1	1.9	28.8	2.2
Bedford Rd (S) Ahead Left	55.7	1.1	39.1	0.3	49.4	1.5	27.3	0.7
Overall Junction PRC (%)	13.9		56.8		47.5		132.0	

Table 11-7: A421 Westbound Roundabout – Scenario 4 – ‘Busy’ Saturday

Sc 4	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Busy	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
A421 SB Off Left Left2	47.7	4.2	45.2	3.3	26.5	1.2
Circ (W) Ahead	44.4	3.2	24.1	2.1	17.7	1.4
Circ (W) Right Ahead	48.3	2.7	25.1	2.0	25.5	2.1
Bedford Rd (N) Ahead Left	42.6	1.3	47.3	1.4	24.0	0.3
Resort exit Ahead Left	9.1	0.5	7.1	0.3	44.7	4.7
Resort exit Ahead	32.4	2.1	28.3	1.5	54.3	4.6
Circ (E) Ahead	23.2	1.8	29.5	1.2	48.7	2.2
Circ (E) Right	20.2	1.8	23.2	1.9	36.8	2.3
Bedford Rd (S) Ahead Left	34.2	0.3	41.1	0.3	22.9	0.6
Overall Junction PRC (%)	86.3		90.3		65.7	

Table 11-8: A421 Westbound Roundabout – Scenario 5 – ‘Average’ Weekday

Sc 5	WKD AM (08:00-09:00)		WKD AM (09:00-10:00)		WKD PM (17:00-18:00)		WKD PM (21:00-22:00)	
Average	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
A421 SB Off Left Left2	62.7	5.6	61.7	4.8	63.0	5.8	32.9	1.5
Circ (W) Ahead	44.2	4.9	25.9	2.2	61.1	6.4	19.9	1.6
Circ (W) Right Ahead	46.4	5.0	28.2	1.9	57.5	6.2	22.4	1.8
Bedford Rd (N) Ahead Left	84.8	9.5	62.7	4.0	55.5	2.5	33.1	0.5
Resort exit Ahead Left	27.3	1.4	11.1	0.6	39.8	2.9	34.3	3.5
Resort exit Ahead	42.4	2.3	40.3	2.3	55.5	4.4	46.2	3.8
Circ (E) Ahead	49.2	1.9	36.8	2.0	55.0	1.9	40.5	2.0
Circ (E) Right	36.1	3.5	26.4	2.6	28.0	2.7	45.6	3.6
Bedford Rd (S) Ahead Left	60.6	1.8	36.4	0.3	49.8	1.9	26.7	0.7
Overall Junction PRC (%)	6.1		43.5		42.9		94.8	

Table 11-9: A421 Westbound Roundabout – Scenario 5 – ‘Busy’ Saturday

Sc 5	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Busy	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
A421 SB Off Left Left2	58.8	6.0	44.7	3.3	29.7	1.3
Circ (W) Ahead	55.6	4.1	25.7	2.3	15.9	1.1
Circ (W) Right Ahead	58.5	3.8	31.2	2.1	33.9	2.1
Bedford Rd (N) Ahead Left	47.3	1.9	49.9	1.7	34.5	0.6
Resort exit Ahead Left	10.5	0.9	16.9	1.2	64.4	8.7
Resort exit Ahead	24.9	1.9	33.2	2.4	73.7	7.7
Circ (E) Ahead	30.6	2.0	34.9	1.8	37.4	2.1
Circ (E) Right	29.7	2.9	28.1	2.7	66.6	5.1
Bedford Rd (S) Ahead Left	35.6	0.3	39.4	0.7	20.2	0.7
Overall Junction PRC (%)	53.1		80.4		22.1	

Table 11-10: A421 Westbound Roundabout – Scenario 5 – ‘Peak’ Saturday

Sc 5	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Peak	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
A421 SB Off Left Left2	72.1	9.7	47.2	3.4	38.9	1.8
Circ (W) Ahead	64.6	4.6	25.7	2.4	14.0	1.4
Circ (W) Right Ahead	68.7	4.4	31.9	2.2	42.0	4.0
Bedford Rd (N) Ahead Left	52.2	2.6	48.2	1.8	33.4	0.6
Resort exit Ahead Left	11.8	0.9	18.2	1.4	88.0	18.2
Resort exit Ahead	28.7	2.2	36.4	2.8	89.0	13.5
Circ (E) Ahead	30.1	2.1	36.6	1.7	41.1	1.7
Circ (E) Right	29.4	2.9	28.8	2.9	77.8	5.9
Bedford Rd (S) Ahead Left	35.9	0.4	39.9	0.8	21.7	0.8
Overall Junction PRC (%)	24.8		86.7		1.1	

11.13 The tests undertaken indicate that the illustrative A421 westbound roundabout junction would operate satisfactorily in all development scenarios considered. Predicted PRCs would remain positive. This is also the case with Peak attendance. Predicted queues would remain low and especially on the A421 westbound off slip road, with a maximum predicted mean max queue (MMQ) of 9.7 pcus, comfortably within the length of slip road allowed for in the illustrative design. This demonstrates that traffic queueing on the A421 westbound off slip road would not queue back into the A421 mainline.

A421 Eastbound Roundabout

11.14 Table 11-11 to Table 11-15 present the results from the tests carried out.

Table 11-11: A421 Eastbound Roundabout – Scenario 4 – ‘Average’ Weekday

Sc 4	WKD AM (08:00-09:00)		WKD AM (09:00-10:00)		WKD PM (17:00-18:00)		WKD PM (21:00-22:00)	
Average	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
from Jcn 5 Left	22.7	1.5	31.5	2.2	5.0	0.2	9.6	0.5
from Jcn 5 Left	22.7	1.5	31.3	2.2	3.2	0.1	0.8	0.0
Circ (SW) Ahead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A421 NB Off-slip Ahead Left	21.6	2.0	33.3	3.4	10.4	0.8	6.6	0.5
A421 NB Off-slip Ahead	22.7	2.1	33.6	3.4	11.9	1.0	6.2	0.5
Circ (NW) Right Ahead	18.4	0.0	25.8	0.0	3.7	0.0	7.6	0.0
Circ (NW) Right	18.4	0.0	25.6	0.0	2.4	0.0	0.6	0.0
North Access Ahead Left	6.5	0.0	13.1	0.2	1.7	0.0	6.3	0.0
Resort exit Ahead Left	5.6	0.4	5.9	0.3	17.3	1.5	31.0	3.0
Resort exit Ahead	5.6	0.4	5.9	0.3	17.3	1.5	30.9	3.0
Circ (E) Right Ahead	12.2	0.5	13.1	0.8	17.2	0.9	27.6	1.5
South Access Ahead Left	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
to resort	20.9	1.1	30.1	1.6	9.4	0.2	4.6	0.1
to resort	18.9	0.7	32.8	1.5	1.9	0.1	2.0	0.0
Overall Junction PRC (%)	296.5		167.9		420.2		190.3	

Table 11-12: A421 Eastbound Roundabout – Scenario 4 – ‘Busy’ Saturday

Sc 4	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Busy	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
from Jcn 5 Left	50.5	3.9	10.3	0.5	8.8	0.7
from Jcn 5 Left	50.3	3.8	10.0	0.5	0.9	0.1
Circ (SW) Ahead	0.0	0.0	0.0	0.0	0.0	0.0
A421 NB Off-slip Ahead Left	49.2	5.7	13.0	1.1	9.3	0.8
A421 NB Off-slip Ahead	48.9	5.5	12.4	1.0	9.3	0.8
Circ (NW) Right Ahead	41.4	0.0	7.8	0.0	7.6	0.0
Circ (NW) Right	41.2	0.0	7.5	0.0	0.8	0.0
North Access Ahead Left	27.6	0.8	1.1	0.0	11.3	0.1
Resort exit Ahead Left	11.2	0.5	4.9	0.4	53.0	6.3
Resort exit Ahead	10.8	0.5	4.7	0.4	53.0	6.3
Circ (E) Right Ahead	15.8	1.0	10.2	0.5	35.6	2.1
South Access Ahead Left	0.0	0.0	0.0	0.0	0.0	0.0
to resort	43.6	2.4	13.1	0.5	3.8	0.1
to resort	53.5	2.7	9.2	0.6	4.1	0.0
Overall Junction PRC (%)	68.2		587.0		69.8	

Table 11-13: A421 Eastbound Roundabout – Scenario 5 – ‘Average’ Weekday

Sc 5	WKD AM (08:00-09:00)		WKD AM (09:00-10:00)		WKD PM (17:00-18:00)		WKD PM (21:00-22:00)	
	Average	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)
from Jcn 5 Left		32.6	2.7	42.7	3.4	10.6	0.5	10.2
from Jcn 5 Left		32.8	2.7	43.5	3.5	15.7	0.8	7.0
Circ (SW) Ahead		0.2	0.0	0.2	0.0	0.2	0.0	0.0
A421 NB Off-slip Ahead Left		32.5	3.2	44.8	4.8	14.1	1.2	8.0
A421 NB Off-slip Ahead		33.8	3.4	45.9	5.1	18.0	1.5	8.3
Circ (NW) Right Ahead		27.8	0.0	35.8	0.1	8.5	0.0	8.0
Circ (NW) Right		28.0	0.0	36.5	0.1	11.9	0.0	5.5
North Access Ahead Left		5.9	0.1	13.0	0.3	2.2	0.0	7.0
Resort exit Ahead Left		8.9	0.5	9.6	0.5	26.5	2.2	36.9
Resort exit Ahead		8.6	0.5	9.6	0.5	26.5	2.2	36.9
Circ (E) Right Ahead		15.9	0.7	17.2	0.8	27.3	1.1	34.4
South Access Ahead Left		5.9	0.0	6.2	0.0	8.8	0.1	6.9
to resort		33.9	1.6	45.5	2.5	13.9	0.5	6.0
to resort		24.9	0.8	38.1	1.8	0.3	0.0	2.0
Overall Junction PRC (%)		166.3		96.1		239.6		143.9

Table 11-14: A421 Eastbound Roundabout – Scenario 5 – ‘Busy’ Saturday

Sc 5	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Busy	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
from Jcn 5 Left	67.2	5.7	16.6	1.0	6.5	0.5
from Jcn 5 Left	67.7	5.8	20.8	1.3	3.3	0.3
Circ (SW) Ahead	0.1	0.0	0.0	0.0	0.4	0.0
A421 NB Off-slip Ahead Left	67.0	9.0	20.4	1.9	29.7	1.8
A421 NB Off-slip Ahead	67.4	9.1	20.5	1.9	29.7	1.8
Circ (NW) Right Ahead	55.1	0.1	13.2	0.0	6.1	0.0
Circ (NW) Right	55.6	0.1	16.6	0.0	3.0	0.0
North Access Ahead Left	35.3	1.3	2.5	0.0	13.7	0.1
Resort exit Ahead Left	11.8	0.5	11.2	1.0	71.1	10.6
Resort exit Ahead	12.1	0.6	11.2	1.0	71.1	10.6
Circ (E) Right Ahead	21.2	0.9	20.5	1.0	47.2	2.4
South Access Ahead Left	6.0	0.0	9.1	0.1	11.1	0.4
to resort	66.1	4.9	20.3	1.0	7.1	0.2
to resort	65.6	4.5	10.6	0.5	4.8	0.0
Overall Junction PRC (%)	32.9		332.7		26.6	

Table 11-15: A421 Eastbound Roundabout – Scenario 5 – ‘Peak’ Saturday

Sc 5	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Peak	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
from Jcn 5 Left	83.7	8.9	20.2	1.3	7.9	0.6
from Jcn 5 Left	83.5	8.9	23.2	1.5	4.1	0.3
Circ (SW) Ahead	0.1	0.0	0.0	0.0	0.5	0.0
A421 NB Off-slip Ahead Left	85.0	14.7	24.1	2.3	41.1	2.2
A421 NB Off-slip Ahead	85.2	14.8	24.5	2.3	41.1	2.2
Circ (NW) Right Ahead	69.3	0.1	16.3	0.0	7.3	0.0
Circ (NW) Right	69.3	0.1	18.8	0.0	3.7	0.0
North Access Ahead Left	67.8	3.2	3.4	0.0	18.8	0.1
Resort exit Ahead Left	11.2	0.5	13.5	1.2	95.9	25.9
Resort exit Ahead	11.2	0.5	13.4	1.2	95.8	25.8
Circ (E) Right Ahead	24.2	1.0	23.6	1.2	59.3	3.6
South Access Ahead Left	6.2	0.0	9.5	0.1	17.2	0.7
to resort	83.2	7.4	23.8	1.3	8.3	0.2
to resort	85.6	8.5	14.5	0.8	6.0	0.1
Overall Junction PRC (%)	5.6		267.3		-6.6	

11.15 The tests undertaken indicate that the illustrative A421 eastbound roundabout junction would operate satisfactorily in all development scenarios considered. Predicted PRCs would remain positive in all core scenarios tested. With ‘Peak’ attendance, the junction is predicted to operate with a positive PRC in the Saturday AM and IP periods. In the PM period, the PRC returned is negative at -6.6%. The reason for this is that the degree of saturation predicted on the Resort exit arm of the junction would exceed slightly 90% at 95.9% indicating a small queue forming from time to time. The predicted delay and MMQ associated with this would remain small however and within the storage length available on this arm of the junction and would therefore not be significant.

11.16 Furthermore, the maximum MMQ predicted on the A421 eastbound off slip road is 14.8 pcus, and within the storage available on the slip road. Therefore, it is demonstrated that the predicted MMQ on the slip road would not block back into the A421 mainline.

B530 Ampthill Road/Manor Road

11.17 Table 11-16 to Table 11-20 present the results from the tests carried out.

Table 11-16: B530 Ampthill Road/Manor Road – Scenario 4 – ‘Average’ Weekday

Sc 4	WKD AM (08:00-09:00)		WKD AM (09:00-10:00)		WKD PM (17:00-18:00)		WKD PM (21:00-22:00)	
Average	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
B530(N) Left	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B530(N) Ahead Right	50.9	8.8	42.6	6.7	62.0	11.9	20.7	2.9
Station Access Left Ahead	15.9	0.7	29.8	1.6	8.5	0.4	14.1	1.2
Station Access Right Ahead	16.5	0.8	29.8	1.6	8.5	0.4	14.1	1.2
B530(S) Ahead Left	83.8	15.1	60.0	6.5	68.8	8.1	37.4	3.7
B530(S) Right	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manor Rd (W) Left	62.6	3.7	38.4	2.2	38.9	2.0	35.7	3.3
Manor Rd (W) Ahead	29.8	1.6	55.5	3.5	15.2	0.8	27.0	2.5
Manor Rd (W) Right	53.4	4.1	43.6	3.2	68.9	6.9	37.0	2.6
Overall Junction PRC (%)	7.4		50.0		30.6		140.6	

Table 11-17: B530 Ampthill Road/Manor Road – Scenario 4 – ‘Busy’ Saturday

Sc 4	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Busy	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
B530(N) Left	0.0	0.0	0.0	0.0	0.0	0.0
B530(N) Ahead Right	41.3	6.3	46.1	7.7	20.1	2.5
Station Access Left Ahead	24.4	2.3	11.4	0.5	16.4	1.9
Station Access Right Ahead	24.6	2.3	11.4	0.5	16.6	1.9
B530(S) Ahead Left	50.4	5.4	49.8	5.1	33.2	3.2
B530(S) Right	0.0	0.0	0.0	0.0	0.0	0.0
Manor Rd (W) Left	1.9	0.2	14.2	0.7	20.4	2.4
Manor Rd (W) Ahead	48.6	5.1	19.2	1.0	32.3	4.1
Manor Rd (W) Right	31.1	2.2	46.7	3.8	32.6	2.4
Overall Junction PRC (%)	78.6		80.7		171.1	

Table 11-18: B530 Ampthill Road/Manor Road – Scenario 5 – ‘Average’ Weekday

Sc 5	WKD AM (08:00-09:00)		WKD AM (09:00-10:00)		WKD PM (17:00-18:00)		WKD PM (21:00-22:00)	
Average	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
B530(N) Left	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B530(N) Ahead Right	52.4	9.4	41.9	6.7	65.6	13.1	20.6	2.9
Station Access Left Ahead	16.5	0.8	29.3	1.5	8.5	0.4	18.2	1.3
Station Access Right Ahead	16.5	0.8	29.3	1.5	8.5	0.4	18.5	1.3
B530(S) Ahead Left	84.2	15.2	63.5	7.0	66.6	7.7	36.5	3.6
B530(S) Right	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manor Rd (W) Left	1.6	0.1	2.8	0.1	6.8	0.3	33.8	2.6
Manor Rd (W) Ahead	30.3	1.6	55.0	3.5	15.2	0.8	33.9	2.7
Manor Rd (W) Right	49.2	3.7	47.8	3.6	67.3	6.7	37.0	2.9
Overall Junction PRC (%)	6.9		41.7		33.7		143.2	

Table 11-19: B530 Ampthill Road/Manor Road – Scenario 5 – ‘Busy’ Saturday

Sc 5	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Busy	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
B530(N) Left	0.0	0.0	0.0	0.0	0.0	0.0
B530(N) Ahead Right	40.4	6.2	47.5	8.0	47.5	8.0
Station Access Left Ahead	25.8	2.3	11.4	0.5	11.4	0.5
Station Access Right Ahead	26.0	2.3	11.9	0.5	11.9	0.5
B530(S) Ahead Left	53.2	5.7	47.8	4.9	47.8	4.9
B530(S) Right	0.0	0.0	0.0	0.0	0.0	0.0
Manor Rd (W) Left	0.7	0.1	10.0	0.5	10.0	0.5
Manor Rd (W) Ahead	51.0	5.2	19.7	1.0	19.7	1.0
Manor Rd (W) Right	31.1	2.2	47.8	4.3	47.8	4.3
Overall Junction PRC (%)	69.2		88.3		88.3	

Table 11-20: B530 Ampthill Road/Manor Road – Scenario 5 – ‘Peak’ Saturday

Sc 5	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Peak	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
B530(N) Left	0.0	0.0	0.0	0.0	0.0	0.0
B530(N) Ahead Right	39.5	6.1	39.5	6.1	22.9	2.8
Station Access Left Ahead	26.0	2.3	26.0	2.3	17.0	2.0
Station Access Right Ahead	26.3	2.3	26.3	2.3	17.2	2.0
B530(S) Ahead Left	54.9	6.0	54.9	6.0	36.5	3.5
B530(S) Right	0.0	0.0	0.0	0.0	0.0	0.0
Manor Rd (W) Left	0.7	0.1	0.7	0.1	35.2	4.3
Manor Rd (W) Ahead	51.0	5.2	51.0	5.2	33.3	4.2
Manor Rd (W) Right	30.4	2.1	30.4	2.1	36.4	3.2
Overall Junction PRC (%)	63.9		63.9		146.6	

11.18 The tests undertaken indicate that the illustrative B530 Ampthill Road/Manor Road junction would operate satisfactorily in all development scenarios considered. Predicted PRCs would remain positive. Predicted queues would remain low with the longest queue about 15.2 pcus on the ‘B530(S) Ahead Left’ in some tests, which is within the length of road provided for queuing in the design.

B530 Ampthill Road/Lake Zone Access

11.19 **Table 11-21** to **Table 11-23** present the results from the tests carried out. This junction has only been assessed in the Scenario 5 scenario as it is not in operation in the Scenario 4 scenario.

Table 11-21: B530 Ampthill Road/Lake Zone Access – Scenario 5 – ‘Average’ Weekday

Sc 5	WKD AM (08:00-09:00)		WKD AM (09:00-10:00)		WKD PM (17:00-18:00)		WKD PM (21:00-22:00)	
Average	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
B530 (N) Ahead Right	51.3	4.8	60.0	3.9	46.6	6.0	16.2	1.4
B530 (S) Ahead Left	84.9	20.4	64.5	11.5	63.6	11.5	43.8	6.6
Link Rd Left Right	41.9	4.2	25.6	2.5	38.4	3.8	41.5	4.1
Overall Junction PRC (%)	6.0		39.5		41.5		105.5	

Table 11-22: B530 Ampthill Road/Lake Zone Access – Scenario 5 – ‘Busy’ Saturday

Sc 5	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Busy	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
B530 (N) Ahead Right	45.0	3.2	42.4	4.1	11.0	0.9
B530 (S) Ahead Left	46.8	7.0	42.3	6.9	42.5	6.2
Link Rd Left Right	13.1	1.3	16.7	1.6	42.4	4.7
Overall Junction PRC (%)	92.3		112.3		111.8	

Table 11-23: B530 Ampthill Road/Lake Zone Access – Scenario 5 – ‘Peak’ Saturday

Sc 5	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Peak	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
B530 (N) Ahead Right	45.0	3.2	42.4	4.1	11.1	0.9
B530 (S) Ahead Left	46.3	6.8	44.2	6.6	49.2	7.7
Link Rd Left Right	12.9	1.3	17.2	1.5	48.1	5.5
Overall Junction PRC (%)	94.4		103.6		82.9	

11.20 The tests undertaken indicate that the illustrative B530 Ampthill Road/Lake Zone Access junction would operate satisfactorily in all development scenarios considered. Predicted PRCs would remain positive. Predicted queues would remain low with the longest queue about 20.4 pcus on the ‘B530 (S) Ahead Left’ in some tests, which would be within the length of road provided for queuing in the design.

C94 Woburn Road/Broadmead Road (Construction)

11.21 **Table 11-24** to **Table 11-25** present the results from the tests carried out. These test accounts for the junction’s layout during the Main Construction Phase. This includes analysis of both the peak and average flow during the construction period.

Table 11-24: C94 Woburn Road/Broadmead Road – Peak Construction - Weekday

Sc 2	WKD AM (08:00-09:00)		WKD PM (16:00-17:00)		WKD PM (17:00-18:00)	
Peak	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
Woburn Rd (N) Ahead Left	70.8	7.9	68.9	5.5	58.9	5.8
Woburn Rd (S) Ahead	24.6	2.4	61.3	4.8	50.1	4.8
Woburn Rd (S) Right	34.0	1.5	27.8	0.8	22.3	0.9
Broadmead Rd Left Right	39.2	2.6	90.0	6.2	57.5	5.2
Overall Junction PRC (%)	27.1		29.1		52.8	

Table 11-25: C94 Woburn Road/Broadmead Road – Average Construction – Weekday

Sc 2a	WKD AM (08:00-09:00)		WKD PM (16:00-17:00)		WKD PM (17:00-18:00)	
Average	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
Woburn Rd (N) Ahead Left	64.6	7.0	47.6	4.5	50.4	4.9
Woburn Rd (S) Ahead	19.8	1.8	48.8	4.7	37.2	3.8
Woburn Rd (S) Right	12.4	0.5	16.8	0.8	14.3	0.7
Broadmead Rd Left Right	61.2	4.0	48.7	4.2	50.8	4.5
Overall Junction PRC (%)	39.3		84.4		77.2	

11.22 The tests undertaken indicate that the illustrative C94 Woburn Road/Broadmead Rd junction would operate satisfactorily in all construction scenarios considered. Predicted PRCs would remain positive. Predicted queues would remain low with the longest queue about 7.9 passenger car units (pcu) on the 'Woburn Rd (N) Ahead Left' in some tests, which would be within the length of road provided for queuing in the design.

C94 Woburn Road/Broadmead Road (Permanent)

11.23 Table 11-26 to Table 11-30 present the results from the tests carried out.

Table 11-26: C94 Woburn Road/Broadmead Road – Scenario 4 – 'Average' Weekday

Sc 4	WKD AM (08:00-09:00)		WKD AM (09:00-10:00)		WKD PM (17:00-18:00)		WKD PM (21:00-22:00)	
Average	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
Woburn Rd (N) Ahead Left	64.4	8.3	46.9	5.1	65.1	8.5	22.6	2.0
Woburn Rd (S) Ahead	28.3	2.8	22.3	2.1	24.5	2.4	15.6	1.4
Woburn Rd (S) Right	9.0	0.3	5.8	0.2	19.4	0.6	4.3	0.2
Broadmead Rd Left Right	65.5	5.4	90.0	3.2	62.7	4.8	23.3	1.6
Overall Junction PRC (%)	37.4		91.9		38.2		286.3	

Table 11-27: C94 Woburn Road/Broadmead Road – Scenario 4 – 'Busy' Saturday

Sc 4	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Busy	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
Woburn Rd (N) Ahead Left	35.6	3.4	44.7	4.6	22.9	2.1
Woburn Rd (S) Ahead	19.4	1.8	22.3	2.1	7.6	0.7
Woburn Rd (S) Right	5.0	0.3	8.3	0.4	3.3	0.2
Broadmead Rd Left Right	35.2	2.9	45.6	3.9	21.8	1.6
Overall Junction PRC (%)	152.8		97.4		293.0	

Table 11-28: C94 Woburn Road/Broadmead Road – Scenario 5 – ‘Average’ Weekday

Sc 5	WKD AM (08:00-09:00)		WKD AM (09:00-10:00)		WKD PM (17:00-18:00)		WKD PM (21:00-22:00)	
Average	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
Woburn Rd (N) Ahead Left	66.5	8.8	44.8	4.7	62.9	8.0	21.9	2.0
Woburn Rd (S) Ahead	31.2	3.2	20.5	1.9	23.6	2.2	14.4	1.3
Woburn Rd (S) Right	9.0	0.3	5.8	0.2	17.3	0.5	4.4	0.2
Broadmead Rd Left Right	63.7	5.4	44.8	2.8	60.7	4.4	20.8	1.3
Overall Junction PRC (%)	35.3		100.9		43.1		311.0	

Table 11-29: C94 Woburn Road/Broadmead Road – Scenario 5 – ‘Busy’ Saturday

SC 5	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Busy	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
Woburn Rd (N) Ahead Left	35.2	3.4	44.3	4.6	18.0	1.5
Woburn Rd (S) Ahead	20.2	1.9	19.9	1.9	5.8	0.5
Woburn Rd (S) Right	4.7	0.2	7.4	0.3	2.7	0.2
Broadmead Rd Left Right	35.8	2.9	43.6	3.5	18.4	1.0
Overall Junction PRC (%)	151.4		103.2		389.1	

Table 11-30: C94 Woburn Road/Broadmead Road – Scenario 5 – ‘Peak’ Saturday

SC 5	SAT AM (09:00-10:00)		SAT IP (12:00-13:00)		SAT PM (21:00-22:00)	
Peak	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)
Woburn Rd (N) Ahead Left	35.9	3.5	44.6	4.7	17.3	1.4
Woburn Rd (S) Ahead	20.9	2.0	19.6	1.8	4.8	0.4
Woburn Rd (S) Right	4.7	0.2	7.3	0.3	2.6	0.1
Broadmead Rd Left Right	34.7	2.8	44.4	3.6	15.6	0.7
Overall Junction PRC (%)	150.7		101.8		420.2	

11.24 The tests undertaken indicate that the illustrative C94 Woburn Road/Broadmead Road junction would operate satisfactorily in all construction scenarios considered. Predicted PRCs would remain positive. Predicted queues would remain low with the longest queue about 8.8 passenger car units (pcu) on the ‘Woburn Rd (N) Ahead Left’ in some tests, which is within the length of road provided for queuing in the design.

Summary

- 11.25 The local assessment of individual illustrative access junctions presented in this section confirms that there is a deliverable and appropriate access design arrangement in support of the Proposed Development that would operate satisfactorily in the Primary Opening Year and Future Year under typical conditions considering 'Average' and 'Busy' attendance levels. The tests carried out also consider a 'Peak' level of attendance to demonstrate that even with the highest levels of possible demand, the illustrative access junctions operate satisfactorily.
- 11.26 In addition, the assessment carried out at the A421 Eastbound roundabout and at the A421 Westbound roundabout demonstrate that the length of slip roads provided within the designs and dimension of the junctions would be such that any queuing traffic on the new eastbound and westbound off slip roads would not queue back onto the A421 mainline.

12 Rail Network Implications

- 12.1 One of the reasons UDX identified the Site as a suitable location for their first European ERC was on the strength of opportunities that exist to connect the Proposed Development to the railway network. The planned new Wixams East Station on the MMRL creates the opportunity for rail connection on a key radial route to/from London connecting with the north of the UK (to Sheffield). London St Pancras being the London terminus station for the MMRL as well as for the Eurostar services creates a further opportunity for rail connection to Europe as well.
- 12.2 The rail opportunity identified for the Proposed Development not only relates to proximity to the rail infrastructure but also to how this infrastructure is used. The use of the radial lines in and out of London reflect a 'commuter' pattern with busy services into London in the morning and out of London in the evening, with relatively 'empty' services in the opposite direction (out of London in the morning, into London in the evening). These empty services represent significant rail capacity that the Proposed Development would make use of as trips to/from the Proposed Development would be 'counter-cyclical'. In short, the Proposed Development would fill up trains that are currently running empty.
- 12.3 Rail access therefore forms an important part of the Transport Vision for the Proposed Development.
- 12.4 This section considers the implications of the Proposed Development on the rail network. It focuses on the Full Wixams Station and the availability of rail capacity on the MMRL, the Full Wixams Station forming the main rail gateway to the Proposed Development. It provides a review of the proposals at the Full Wixams Station and the likely resulting level of service required on the Thameslink and East Midlands services to accommodate the Proposed Development.

Full Wixams Station

- 12.5 A study prepared by AtkinsRéalis on behalf of DfT that considers the implications of the Proposed Development on the Full Wixams Station, in terms of layout of the station and train service patterns is provided in **Annex 14**. The main outcomes of this study are summarised below.
- 12.6 The study is based on early Peak Attendance rail demand predictions as set out in **Tables 12-1** and **12-2**. It applies a forecast in the Primary Opening Year and in the Future Year, the same on both a weekday and a Sunday.

Table 12-1: Wixams Rail Demand Forecasts in Atkins Study – Primary Opening Year

	Wixams arrivals south	Wixams arrivals north	Wixams departures south	Wixams departures north
Daily Total	8757	541	8621	539
06:00 - 07:00	23	3	8	1
07:00 - 08:00	551	29	8	1
08:00 - 09:00	1516	77	0	0
09:00 - 10:00	3009	189	0	0
10:00 - 11:00	1817	114	6	1
11:00 - 12:00	789	41	18	2
12:00 - 13:00	441	47	68	3
13:00 - 14:00	117	3	80	4
14:00 - 15:00	211	3	160	8
15:00 - 16:00	109	6	283	18
16:00 - 17:00	52	5	495	32
17:00 - 18:00	48	5	823	60
18:00 - 19:00	48	5	1284	106
19:00 - 20:00	9	6	1658	124
20:00 - 21:00	9	6	1797	86
21:00 - 22:00	9	1	1902	90
22:00 - 23:00	0	0	25	3
23:00 - 24:00	0	0	6	1

Table 12-2: Wixams Rail Demand Forecasts in Atkins Study – Future Year

	Wixams arrivals south	Wixams arrivals north	Wixams departures south	Wixams departures north
Daily Total	15984	525	15849	523
06:00 - 07:00	28	4	10	1
07:00 - 08:00	987	30	10	1
08:00 - 09:00	2742	78	0	0
09:00 - 10:00	5404	195	0	0
10:00 - 11:00	3267	117	8	1
11:00 - 12:00	1440	42	22	3
12:00 - 13:00	723	47	141	3
13:00 - 14:00	260	3	154	5
14:00 - 15:00	490	3	304	8
15:00 - 16:00	251	2	503	18
16:00 - 17:00	124	1	863	33
17:00 - 18:00	119	0	1351	61
18:00 - 19:00	119	0	2049	106
19:00 - 20:00	10	1	2841	124
20:00 - 21:00	11	1	3561	83
21:00 - 22:00	10	1	3995	71
22:00 - 23:00	0	0	30	4
23:00 - 24:00	0	0	7	1

- 12.7 As set out in Section 2 of this report, and reflected in the AtkinsRéalis report, Bedford BC have plans currently to deliver a new railway station on the MMRL serving the Wixams garden village. This new station would be formed of 2 new platforms on the 'slow' lines on the MMRL and be served by up to 4 Thameslink 'stopping' services per hour. The journey time between Wixams and London St Pancras would be about 60 minutes.
- 12.8 The AtkinsRéalis study considered the current services operating along the line, their capacity, existing and predicted background growth in demand, and also included the predicted demand related to the Proposed Development, in order to understand any capacity implications and how best to address any potential issues. Currently, the MMRL at Wixams is made of 4 lines, as follows:
- 2 'fast' lines used by East Midlands Railway (EMR) 'fast' services, services that terminate at London St Pancras occupying specific platforms at that station; and
 - 2 'slow' lines related to the Govia Thameslink Railway (GTR) 'stopping' services, services that travel through London St Pancras on their way to lines through and south of London.

- 12.9 The AtkinsRéalis study considers ways of increasing services and therefore capacity on these two sets of services (EMR and GTR), identifying:
- a. the opportunity to expand the existing 4 trains per hour (tph) GTR service to more hours across the day, especially later in the evening, as well as including faster trains between London and the Site (45 min journey time) – This is considered achievable without impacting the rest of the network; and
 - b. the opportunity to stop the EMR services at Wixams – This is considered achievable but would require some degree of change to the timetables of services further afield. The report indicates that it would not be possible to add further EMR services due to restrictions on platforms at London St Pancras.
 - c. The study also suggests the potential to change rolling stock (and in fact the opportunity to do so considering the age of the rolling stock on the line) as another means of increasing capacity on the line.

Primary Opening Year Assessment at Wixams Station

- 12.10 The study considers the practicalities of accommodating the early predicted rail demand as set out in **Table 12-1** in the Primary Opening Year on either the GTR or the EMR services.
- 12.11 The study considers that there would be challenges in accommodating the considered rail demand using the EMR services alone but concludes that the GTR services with some improvements would be able to deliver the required capacity to accommodate the Proposed Development. This, however, suggests a journey time of about 60 minutes between Wixams and St Pancras on a majority of services.
- 12.12 The study shows that the GTR services northbound (to Wixams) would have the ability to accommodate almost all of the considered rail demand in the weekday AM peak, travelling to the Theme Park. The Theme Park would only have a slight impact on conditions on the line in the evening peak, an issue which is already present currently and exacerbated further by local growth.
- 12.13 In the southbound direction (away from Wixams), the GTR service would be able to accommodate the considered rail demand in the weekday evening peak, seated between 17:00 and 19:00 and then with some visitors standing for the rest of the evening. This lack of seated capacity could be addressed by extending the 4tph services later into the evening to match the Proposed Development's demand.

Future Year Assessment at Wixams Station

- 12.14 The study then considers how the early predicted rail demand to/from the Theme Park in the Future Year could be accommodated on the MMRL. Given the increase in demand in the Future Year, the study considers a combination of EMR and GTR services to match against the considered rail demand. The assessment does not consider the added rail demand generated by development in the Lake Zone and the West Gateway Zone as this was not available when AtkinsRéalis carried out their study. However, as demonstrated in this Transport Assessment, the rail demand from the Lake Zone and the West Gateway Zone is minimal and would not affect the conclusion of the AtkinsRéalis study.

- 12.15 In the northbound direction (to Wixams), the study indicates that seated capacity would be exceeded in the weekday AM peak but not the total capacity, indicating a large number of visitors having to stand. This is predicted to occur between 09:00 and 11:00. The possibility for different rolling stock to be used would deliver additional seats and partially address this issue.
- 12.16 In the southbound direction (away from the Site), the current capacity on the line would be able to accommodate predicted demand seated between 16:00 and 19:00, seated and standing between 19:00 and 21:00 with demand between 21:00 and 22:00 exceeding total capacity. There is the identified opportunity to extend GTR services in the evening as well as delivering one additional EMR train late in the day, which would all combine to suggest that seated capacity can be improved on the line to match demand.
- 12.17 On Sundays, a reduced train service means a reduced level of capacity, but also a reduced level of background demand. The reduced service is more pronounced in the AM peak. As a result, the study predicts that total capacity could be exceeded between 09:00 and 10:00. However, this could be addressed by using different rolling stock, and for most of the year it is expected that the services will be able to accommodate the Proposed Development. In the southbound direction, in the Sunday evening peak, seated capacity is likely to be exceeded across the evening, but demand would remain within the total capacity. Again, this can be addressed through using different rolling stock and the situation is likely to be that visitors will have a seat for most of the year.

Summary of Wixams Station Analysis

- 12.18 In summary, the AtkinsRéalis study suggests that the existing service pattern on the MMRL forms a suitable starting point for future services accommodating the Proposed Development with the following changes suggested as potentially required:
- a. Extension of GTR services later in the evening on a weekday; and
 - b. Use of different rolling stock to increase seated and/or total capacity.
- 12.19 The study also highlights a potential issue with platform use at St Pancras if EMR services were to be increased in order to serve the Proposed Development. However, this issue is for NR to address as part of potential changes at St Pancras and not related to, or a consequence of, the Proposed Development.

Update Based on Latest Forecast Rail Demand

- 12.20 Since the AtkinsRéalis study was carried out the predicted rail demand at the Full Wixams Station generated by the Proposed Development has been updated, through collaborative working with stakeholders. This Transport Assessment is based on the following levels of predicted rail demand at the Full Wixams Station on a weekday and on a Saturday. Here the Saturday demand is taken to be representative of the situation at the weekend and therefore is considered relevant for a test against the Sunday rail capacity identified in the AtkinsRéalis study.
- 12.21 **Tables 12-3 to 12-6** provide the updated rail demand forecast at the Full Wixams Station for Primary Opening Year and Future Year on a 'Average' Weekday and on a 'Busy' Saturday, as assessed in the report.

Table 12-3: Wixams Station – Rail Passenger Forecast – Weekday – Primary Opening Year

	Wixams arrivals south	Wixams arrivals north	Wixams departures south	Wixams departures north
Daily Total	5,729	1,447	5,717	1,405
06:00 - 07:00	18	57	6	20
07:00 - 08:00	363	104	14	35
08:00 - 09:00	993	183	21	41
09:00 - 10:00	1,963	349	45	90
10:00 - 11:00	1,178	241	32	69
11:00 - 12:00	512	97	14	44
12:00 - 13:00	290	85	47	51
13:00 - 14:00	78	51	54	53
14:00 - 15:00	139	48	106	55
15:00 - 16:00	73	53	186	60
16:00 - 17:00	36	31	323	75
17:00 - 18:00	33	21	537	103
18:00 - 19:00	33	21	836	161
19:00 - 20:00	8	42	1,074	165
20:00 - 21:00	8	43	1,164	153
21:00 - 22:00	7	21	1,236	154
22:00 - 23:00	0	0	19	60
23:00 - 24:00	0	0	5	15

Table 12-4: Wixams Station – Rail Passenger Forecast – Saturday – Primary Opening Year

	Wixams arrivals south	Wixams arrivals north	Wixams departures south	Wixams departures north
Daily Total	9,503	1,900	9,490	1,856
06:00 - 07:00	19	61	7	22
07:00 - 08:00	594	138	18	45
08:00 - 09:00	1,646	272	32	65
09:00 - 10:00	3,268	550	73	146
10:00 - 11:00	1,967	364	49	105
11:00 - 12:00	852	133	15	47
12:00 - 13:00	495	118	71	54
13:00 - 14:00	125	55	83	57
14:00 - 15:00	232	51	170	61
15:00 - 16:00	119	42	302	71
16:00 - 17:00	57	18	531	94
17:00 - 18:00	54	8	881	134
18:00 - 19:00	54	8	1,372	217
19:00 - 20:00	7	30	1,784	231
20:00 - 21:00	7	31	1,965	205
21:00 - 22:00	7	23	2,112	222
22:00 - 23:00	0	0	20	65
23:00 - 24:00	0	0	5	16

Table 12-5: Wixams Station – Rail Passenger Forecast – Weekday – Future Year

	Wixams arrivals south	Wixams arrivals north	Wixams departures south	Wixams departures north
Daily Total	9,490	1,371	9,469	1,321
06:00 - 07:00	28	69	10	25
07:00 - 08:00	592	102	13	28
08:00 - 09:00	1,623	156	8	7
09:00 - 10:00	3,178	281	17	15
10:00 - 11:00	1,921	207	18	28
11:00 - 12:00	857	106	22	54
12:00 - 13:00	439	94	93	61
13:00 - 14:00	160	62	100	63
14:00 - 15:00	294	58	189	65
15:00 - 16:00	152	57	305	67
16:00 - 17:00	74	29	517	80
17:00 - 18:00	69	18	805	101
18:00 - 19:00	69	18	1,220	156
19:00 - 20:00	12	44	1,677	156
20:00 - 21:00	12	45	2,095	157
21:00 - 22:00	11	26	2,344	165
22:00 - 23:00	0	0	30	74
23:00 - 24:00	0	0	7	18

Table 12-6: Wixams Station – Rail Passenger Forecast – Saturday – Future Year

	Wixams arrivals south	Wixams arrivals north	Wixams departures south	Wixams departures north
Daily Total	17,690	1,817	17,668	1,763
06:00 - 07:00	30	74	11	26
07:00 - 08:00	1,092	136	16	31
08:00 - 09:00	3,034	240	14	12
09:00 - 10:00	5,961	470	31	27
10:00 - 11:00	3,602	322	27	37
11:00 - 12:00	1,601	149	23	58
12:00 - 13:00	826	132	157	66
13:00 - 14:00	288	66	171	69
14:00 - 15:00	547	62	339	73
15:00 - 16:00	278	46	557	82
16:00 - 17:00	136	17	956	105
17:00 - 18:00	131	5	1,490	146
18:00 - 19:00	131	5	2,257	233
19:00 - 20:00	11	32	3,139	247
20:00 - 21:00	12	33	3,969	224
21:00 - 22:00	11	28	4,471	229
22:00 - 23:00	0	0	32	79
23:00 - 24:00	0	0	8	20

- 12.22 Comparing the Primary Opening Year forecasts in **Table 12-3** (Weekday) to the earlier forecast considered in the AtkinsRéalis study (**Table 12-1**), it can be seen that in the peak directions (Wixams arrivals south and Wixams departure south), on a Weekday, the final forecasts return a lower number of predicted passengers on the railway than considered by AtkinsRéalis. As such the conclusions reached by AtkinsRéalis demonstrate that the railway network has the ability to accommodate the Proposed Development on a Weekday.
- 12.23 In the direction to/from the north, on a weekday, the final forecasts suggest a higher level of passenger demand, potentially exacerbating the overcrowding in that direction indicated in the AtkinsRéalis report. However, the change in passenger forecast in the worst hourly period (07.00-08.00) where the AtkinsRéalis report indicates a baseline demand of in excess of 10,000, would suggest an additional 104 passengers so an increase in demand of 1% which would not be noticeable.

- 12.24 Looking at the weekend forecast, in the Primary Opening Year (**Table 12-4** compared to **Table 12-1**), it can be seen that the final forecast suggests a higher level of rail trips than considered in the AtkinsRéalis report. However, the AtkinsRéalis report suggests that there is spare capacity within the rail network to accommodate the predicted Park rail demand at the weekend and the revised rail forecast does not change this conclusion.
- 12.25 The Future Year final forecast (**Table 12-5** (Weekday) and **Table 12-6** (Weekend)) can also be compared to the earlier forecast considered by the AtkinsRéalis study (**Table 12-2**). On a Weekday, the final forecast is lower than the Weekday forecast considered in the AtkinsRéalis report for the Future Year. As such the conclusions reached by the AtkinsRéalis report remain valid. At the Weekend, the final forecast exceeds the forecast considered by AtkinsRéalis. However, the exceedance is such that the total final demand forecast for the railway at the weekend in the Future Year remains within the capacity of the rail network with the improvements suggested by AtkinsRéalis. Only in the morning peak arrival period would there be a risk of demand exceeding capacity in the peak hour, although capacity would be available within the peak's 'shoulder' hours. Overall, the final rail forecasts for the Full Wixams Station when compared to the earlier forecast considered by the AtkinsRéalis study do not change the conclusions of the AtkinsRéalis study.

EWR Proposals

- 12.26 The Proposed Development is not reliant on the delivery of the EWR project and can come forward without EWR being progressed. There is no certainty on the delivery of EWR, but the Proposed Development does not prejudice its future delivery and safeguards land for a potential EWR station to serve the Site.
- 12.27 It will be up to EWR to take account of the Proposed Development in its future planning and delivery.

13 Summary and Conclusions

- 13.1 This Transport Assessment Report has been prepared on behalf of Universal Destinations & Experiences (UDX) which is seeking planning permission for the construction and operation of a Universal ERC, and associated development, in Bedford. The proposal is sponsored by the Department for Culture Media and Sport (DCMS). The Department for Transport (DfT) and its associated arm's-length bodies have assisted in the development of the highways and rail related elements of the proposal with Bedford Borough Council (Bedford BC). The proposal intends to provide sufficient information to enable the Secretary of State for Housing, Communities and Local Government (MHCLG) to consult on and consider making a planning decision.
- 13.2 The Site is located south-west of Bedford, Bedfordshire and is broadly to the east of the A421 and west of the Midland Main Line and is on the former Kempston Hardwick brickworks and agricultural land. The Site is divided into four main land areas referred to in the planning proposal as the Core Zone, Lake Zone, West Gateway Zone, and East Gateway Zone. The proposed ERC lying within these zones would allow a theme park and associated uses including retail, dining, entertainment; visitor accommodation; sport, recreation, leisure and spa facilities; venues with conference and convention spaces; associated services and uses for any operational or administrative functions; utilities generation, storage, collection and processing facilities associated with the ERC; vehicle parking, maintenance and servicing; access routes and circulation spaces; landscaping; utility conveyance infrastructure; and use of land necessary to support construction. The planning proposal also includes road and rail-related development including:
 - a. a new slip road to provide access to and from the A421;
 - b. an expanded railway station on the Thameslink/Midland Main Line at Wixams;
 - c. improvements to Manor Road; and
 - d. improvements to certain other local roads.
- 13.3 It also safeguards land for a potential new railway station on the proposed East West Rail (EWR) Bletchley to Bedford line, should this come forward in the future.
- 13.4 Many factors have aligned to make this site UDX's chosen location for its new European ERC.
- 13.5 One of the most significant is its superb transport accessibility. This is accessibility from across the UK, and the excellent connectivity with the rest of Europe.
- 13.6 Major national and local transport infrastructure already exists to the area. The task is to maximise the benefits of the location and the infrastructure by connecting into it strategically and seamlessly, and ensuring that it has the ability to accommodate the demand.
- 13.7 In doing so, this site can be made highly accessible from both the north-south, and east-west UK railway networks. It 'can be' made highly accessible to the UK's high quality strategic road network. It will be within easy reach of many of the UK's major airports, and will have a direct rail connection to London's Eurostar terminal, the UK hub for rail connections throughout Europe.

- 13.8 This UDX's team has worked hand in hand with the Department for Transport (DfT) to develop these infrastructure connection solutions, and to assess the effects and needs of the scheme. In particular, the DfT teams have worked with phenomenal enthusiasm, speed and discretion to deliver ideas and to get to a position where MHCLG can have confidence that the scheme can be delivered. A substantial part of this transport work has been informed by the DfT teams.
- 13.9 The Proposed Development will form an additional nucleus of activity within the Oxford and Cambridge Arc, connected and complementary to existing and future centres of excellence such as the Cambridge Biomedical Campus or the motor racing hub around Milton Keynes. As such it is considered a catalyst for further investment within the Arc, cementing the Arc as a world-wide destination for investment.
- 13.10 The upshot is that MHCLG and UDX can have suitable confidence that this scheme can be delivered in transport terms with the associated substantial benefit, and with little adverse transport consequence.
- 13.11 MHCLG can have confidence that there will be good connections at the local scale, and in particular that 'team members' and visitors are able to get access by a choice of means of transport, whilst at the same time local towns and villages are protected from inappropriate traffic and traffic volumes.

Location and Accessibility

- 13.12 The Site is in the middle of the UK's economic heartland. It lies at the confluence of the UK's strategic north-south transport network, next to the MMRL. It will connect directly into the UK's strategic road network at the A421, which in turn connects to the M1 and A1. There are 6 international airports within easy reach of the Site.
- 13.13 All of this means that 30 million people in the UK can reach the Site in 2 hours either by car or from their local railway station, and 50 million people are similarly within 3 hours of the Site. London can be reached in just over 30 minutes by train.
- 13.14 The planning proposal includes two major new pieces of transport infrastructure:
- a. A new station at Wixams, that enlarges the currently planned and consented new station at Wixams which itself serves the new Wixams settlement of circa 5,000 homes. The larger station includes additional platforms and a western plaza to serve the Proposed Development, in addition to the currently planned settlement-facing eastern plaza.
 - b. A new road junction on the A421, including a new eastbound off slip into the Site, a new westbound off slip into the Site and a new westbound on slip away from the Site.
- 13.15 Alongside this will be changes to operational train patterns and potentially train size to accommodate the specific demands of the schemes, including weekend travel, holiday period peaks and late night movement.

The Demand

- 13.16 A Vision Led approach has been adopted to forecast demand.

- 13.17 Broad demand profiles of access to the Theme Park gate were provide by UDX as it best knows its business. For UK (Domestic) demand, the country was divided into 62 zones. For each of these zones judgements were made on likely proportions of movement by mode. For International demand judgements were made about airport, onward travel and hotel stay.
- 13.18 This led to the Transport Vision. The Transport Vision is that, for UK travel, it is reasonable to design for a 40:40:20 split of visitor movement between road, rail and 'other' modes, where 'other' modes include dedicated coach travel, local bus and taxi travel.
- 13.19 The Transport Vision formed the basis for a more detailed assessment using a logit model. The model variables and inputs included:
- a. Group size (in ten separate categories from five person families to individuals);
 - b. Distance of travel;
 - c. Road travel time by time of day and day of week;
 - d. Train travel time by time of day and day of week;
 - e. The number of interchanges if travelling by public transport;
 - f. Transfer time from the railway stations to the Proposed Development;
 - g. The generalised cost of travel;
 - h. Rail fares have been assumed to be off peak for the purpose of assessment;
 - i. Coach fares;
 - j. The parking charge at the Site; and
 - k. The likelihood of visitors traveling from further afield to stay in a hotel or visitor accommodation both on-site and within the local area, with consequent onward travel from there.
- 13.20 The detail associated with this model was scrutinised and iterated by the UDX team and the DfT team working together. The result is a model that both parties are satisfied provides good estimates of demand.
- 13.21 The peak periods for demand to the ERC will be outside of the times at which background travel peaks. The demands are largely complementary, meaning an increase in efficiency of the transport infrastructure.
- 13.22 The Proposed Development will typically be busiest at weekends, during holiday periods and outside of the traditional UK commuter peaks. Easter and Christmas are also likely to be periods of peak attendance at the Theme Park.

- 13.23 Looking ahead to demands in our Future Year scenario, and based on the operation of other similar Theme Parks around the world, the transport assessment considers that there will be in the order of 15 ‘peak’ days, the peak of the peak, there will be about 35 days of ‘busy’ period, and the remainder, about 315 days, the ERC will operate at its ‘average’ intensity or lower.

The Effects

- 13.24 A major positive effect is the substantial counter tidal flow in the morning from London. At present, the morning movement by train on the Midlands Mainline Railway Line is commuters heading to London. These trains make the return journey almost empty. In contrast, the peak movement for the Site is out of London at the end of the morning ‘rush hour’ and can go a long way to filling the seating capacity of those trains. This is a very substantial benefit for the efficient operation of the railway infrastructure.
- 13.25 The DfT has considered demands on the Midland Mainline Railway Line network and is satisfied that the scheme demands can be accommodated by this rail network with a larger Wixams Station. The Primary Opening Year scenario for EWR Company (EWR Co) is assumed to be an EWR line from Oxford to Milton Keynes. There is an aspiration for an extension of that line to Bedford and then Cambridge. The timescale for this is uncertain. This report assesses the planning proposal on the basis of an EWR service to Milton Keynes only, with a shuttle bus transfer of passengers from both EWR and the West Coast Mainline Railway between Milton Keynes Central Railway Station and the Site.
- 13.26 A sensitivity test has been conducted for an EWR service running from Oxford to Cambridge, and assuming delivery of the new EWR Station on the Site.
- 13.27 The planning proposal is not reliant on EWR and, should further phases of EWR over and above what is committed not come forward, the Proposed Development can still operate smoothly.
- 13.28 NR has considered the safety of the rail network in the vicinity of the Proposed Development and has not required any further mitigation compared with what is already proposed.
- 13.29 To inform judgement about effect on the highways a microsimulation model was built spanning the A421 corridor between the M1 and the A1, with local roads north and south of the corridor in the vicinity of the Site. The model was assessed by National Highways, and following iteration was agreed by both UDX and the DfT to be fit for purpose.
- 13.30 The conclusion is that, with the inclusion of the associated transport infrastructure, there is no significant difference, in the planning context, in journey times as a result of the Proposed Development.
- 13.31 In planning policy terms, the bar is set high for a traffic impact to be a material matter. The NPPF at paragraph 116 sets a threshold test of ‘severe’ residual cumulative impact on the road network to be met before traffic impact becomes a matter of substantial weight in the planning balance. The definition of ‘severe’ has often been interpreted in Secretary of State planning decisions to be ‘very great’. In addition, the context, also common in Secretary of State planning decisions, is that it is not the purpose of planning policy to protect the convenience of the commuting car driver. Hence, the traffic model spans the day, not just the commuter peak periods. The NPPF reinforces that approach.

- 13.32 Journey time has been adopted in planning policy interpretation as a reasonable metric from which to judge 'impact' and therefore to be used in the judgement of whether an 'impact' is 'severe' or not.
- 13.33 The journey time differences will be either not discernible or not significant. Therefore, the impacts fall well below the threshold for planning 'severe' and hence having any significant weight in the planning context. Additional analysis of vehicle speeds, queue lengths and individual junction operations verify this.
- 13.34 The assessment presented in this report also considers the sensitivity of the analysis in relation to rail fares and capacity constraints at the M1 J13. It confirms that the conclusions reached with the Core scenario assessed are not affected.
- 13.35 The construction related traffic effects will be noticeable, and at times substantial.
- 13.36 Preliminary works will use the local road network of Ampthill Road and Manor Road for construction access. As construction movement becomes more significant, and at an early stage in the process, construction traffic will be routed from the A421 via Woburn Road and Broadmead Road. It is likely that it is at this time that construction effects will be most noticeable. HDVs will not be allowed to pass through local villages.
- 13.37 Construction will then be taken from Broadmead Road until such time as the new road link is provided into the West Gateway Zone from the A421 for West Gateway Zone construction. It will remain from Broadmead Road for the remainder of the Site until such time as Woburn Road is connected to the Core Zone by the new bridge over the Marston Vale Railway Line.
- 13.38 Without intervention, the junction of Broadmead Road with Woburn Road will be more difficult to use, as will that part of Broadmead Road between Woburn Road and the construction access to the Core Zone. Therefore, the scheme includes traffic signal control for this junction for the entirety of this period, and improvements to this section of Broadmead Road.
- 13.39 Following discussion with Stewartby Parish Council and Bedford BC, the planning proposal evolved such that the traffic signals installed for the purpose of construction are retained as permanent traffic signals. This makes this route more attractive for local traffic movement than it is at the moment, the consequence of which as well as improving convenience for local people, attracts more local people to this route in preference to the parallel Green Lane route.
- 13.40 The OCEMP (**Appendix 2.3: OCEMP (Volume 3)**) includes measures, checks and balances which will stringently manage the construction process to minimise the effects, with the flexibility to react to changing conditions.

Conclusion

- 13.41 UDX, having worked closely with the DfT, has demonstrated that the proposed location of the ERC is excellent in terms of its inclusive connectivity to the UK population. It has also demonstrated the excellence of the location in terms of attracting international visitors to the UK.

- 13.42 The transport infrastructure improvements that the planning proposal includes are necessary and proportionate. They strike the appropriate balance between travel modes, which similarly reinforces the inclusive nature of the Proposed Development and maximises its transport sustainability credentials.
- 13.43 There is no transport reason to resist this scheme, and good transport reason to conclude that if this Proposed Development can be attracted into the UK, that this is the place to put it.

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