South West Milton Keynes

Updated Transport Assessment (ES Appendix 10.1)

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South West Milton Keynes Consortium

SOUTH WEST MILTON KEYNES

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EXECUTIVE SUMMARY

1. WSP has been appointed by South West Milton Keynes Consortium (The Applicant) to provide transport advice for a residential led mixed-use development (the 'Proposed Development') on land referred to as South West Milton Keynes (the 'Site').

2. Planning permission for the Proposed Development was originally sought in 2015 from both Aylesbury Vale District Council (AVDC) (15/00314/AOP) and Milton Keynes Council (MKC) (15/00619/FUL). Since then discussions with both authorities continued and in July 2017 AVDC resolved to grant planning consent subject to the signing of the S106 Agreement. Negotiations have progressed between all parties to finalise the S106 agreement, and although the document has not yet been completed, it is in an advanced position. The duplicate planning application made to MKC was subsequently refused planning permission in November 2019, the reason for refusal relating to the impact of the Proposed Development on the highway network.

3. This updated Transport Assessment (TA) has been prepared to update the transport evidence base associated with the planning applications prepared in January 2015 and subsequently updated in August 2016.

4. The development proposals (the subject of this TA) have not changed from the original 2015 planning applications with the exception of some minor reconfigurations in layout and the introduction of 60 extra care units (within Use Class C3) as part of the total quantum of housing. Those minor revisions all relate to the development within the administrative area of Buckinghamshire Council (formerly AVDC) and do not have any impact on the development proposed within MKC, the traffic generation from the Proposed Development or impacts on the road network.

5. Scoping discussions were held with Buckinghamshire Council (BC) and MKC in December 2019 and January to April 2020 and the scope of this TA accords with the methodology agreed with both parties.

6. A review of planning policy at a national, regional and local level relevant to this TA has been undertaken. This identifies that the development accords with a range of policies at the various levels of policy available and that this TA has been prepared in accordance with best practice guidance.

7. The Site is located adjacent to the A421 providing strategic connections towards Milton Keynes and the M1 in the east and Buckingham and M40 in the west. There is an existing network of footways, public rights of way and cycle routes that pass adjacent to and through the Site. Milton Keynes includes a range of facilities and amenities that are within reasonable walking and cycling distance of the Site. Overall the Site is considered to be well located to make best use of existing infrastructure provision.

8. A review of highway safety in the vicinity of the Site indicates that whilst a number of collisions have occurred across the study area, there are no particular patterns/trends that the Proposed Development will materially impact.

9. The development proposals within BCs jurisdiction include the provision of up to 1,855 dwellings (including up to 60 extra care units), an employment area, neighbourhood centre, a primary school and a secondary school. Accompanying the development proposals are comprehensive public transport, walking and cycling strategies to create a sustainable development that encourages travel by non-car modes. A separately prepared Framework Travel Plan (FTP) includes further measures to influence travel behaviour and encourage travel by non-car modes.

10. The proposed access strategy caters for all road users and has been designed to accommodate all road users and a distribution across a variety of routes.-

11. A multi-modal trip generation has been prepared for the Proposed Development based upon information from the industry standard TRICS database and a series of assumptions that have been agreed with BC and MKC.

12. A comprehensive data collection exercise was undertaken in February 2020 to inform this updated TA. The data collection exercise was completed prior to any travel restrictions being introduced by the UK government associated with the Covid-19 Pandemic. The dataset collected therefore represents a robust picture of traffic conditions at that time and forms the base from which the highway network assessment contained within this TA has been undertaken.

13. A transport network assessment has been undertaken that considers the impacts of the development on all modes of transport during both the construction and operational phases of the development. Consideration has also been given to impacts on surrounding villages, highway safety and the strategic road network.

14. The results of the highway network assessment of the 18 off-Site junctions and two Site access points identified that the development would potentially have an impact at a number of junctions across the study area. The assessment is based on a distribution analysis using census data and a number of static junction models developed using industry standard software tools and presents an analysis that is robust and reliable. The static model makes no provision for the dynamic reassignment of traffic that would be likely to occur during peak travel periods. The transport modelling underlying Plan:MK and the emerging Vale of Aylesbury Local Plan (VALP) both use strategic models which do account for traffic reassignment and reference is made in this TA to their outputs where appropriate in order to draw correlation with future year congestion and delays.

15. Impacts on public transport, walking and cycling have been considered and in the context of the comprehensive strategies proposed in respect of these travel modes, no residual cumulative adverse impacts are anticipated. Indeed, wider benefits to the local community are anticipated.

16. A package of ‘off-Site’ highway mitigation measures has been developed to accommodate the development proposals on the highway network. At some locations, there is significant background traffic growth even without taking account of the Proposed Development and these impacts of wider growth in the area must also be considered.

17. A review of highway safety identified that the development could have an impact on a small number of links surrounding the Site. However, once consideration had been given to the proposed mitigation measures the impact would not present an unacceptable impact on the safety of the highway network. Overall, subject to the implementation of the appropriate mitigation, the residual cumulative impacts of the Proposed Development are not considered to be severe and it will not have any unacceptable impacts on safety.

1

INTRODUCTION

1 INTRODUCTION

1.1 BACKGROUND

1.1.1. WSP has been appointed by South West Milton Keynes Consortium (The Applicant) to provide transport advice for a residential led mixed-use development (the 'Proposed Development') on land referred to as South West Milton Keynes (the 'Site').

1.1.2. Planning permission for the Proposed Development was originally sought in 2015 from both Aylesbury Vale District Council[1] (AVDC) (15/00314/AOP) and Milton Keynes Council (MKC) (15/00619/FUL).Since then, discussions with both authorities have continued and in July 2017 AVDC resolved to grant planning consent subject to the signing of a s106 Agreement. Negotiations have progressed well between all parties to finalise the agreement and, although the document has not yet been completed, it is in an advanced position.

1.1.3. The duplicate planning application made to MKC was subsequently refused planning permission in November 2019 in relation to the impact on the highway network as follows:

> *'…there is insufficient evidence to mitigate the harm of this development in terms of increased traffic flow and impact on the highway and Grid Road network, with specific reference to Standing Way and Buckingham Road, thus this will be in contravention of Policies CT1 and CT2 (A1) of Plan: :MK.'*

1.1.4. This decision was contrary to the advice of MKC Planning and Highway Officers, who have repeatedly recommended the grant of permission. The Officer's Report prepared for the 7th November 2019 Planning Committee specifically concluded:

> *'…subject to adequately worded conditions…the proposed development therefore accords with Policies CT1, CT2 and CT3 of Plan:MK.'*

1.2 PREVIOUS ASSESSMENTS

1.2.1. The original planning application was accompanied by a Transport Assessment (TA) and Framework Travel Plan (FTP) dated January 2015. That TA and FTP were superseded by an updated TA and updated FTP that accompanied the revision submission in August 2016. Agreement was subsequently reached with Buckinghamshire County Council (BCC), MKC and Highways England that the impact of the Proposed Development was not severe in the context of paragraph 32 of the NPPF 2012[2].

1.2.2. The traffic assessments within the 2015 and 2016 TAs were based on the Milton Keynes Traffic Model (MKTM) which had a base year of 2009 and supported the Milton Keynes Local Plan to 2026.

[1] AVDC and Buckinghamshire County Council (BCC) ceased to exist on 1st April 2020, when Buckinghamshire Council (BC) became the new unitary authority with control over the whole of the Buckinghamshire area, including Aylesbury Vale.

[2] Now superseded by NPPF 2019, para 109.

1.2.3. Subsequent to the above agreement with BCC and MKC regarding the impact of the Proposed Development in 2017 MKC and their consultants AECOM, created an updated strategic traffic model with a base year of 2016 and a future year of 2031 to support the Local Plan (Plan:MK). BCC and their consultants Jacobs also updated the Buckinghamshire Countywide Model to a base year of 2013 and a future year of 2033 to support the Aylesbury Vale District Council (AVDC) Local Plan (draft VALP).

1.2.4. As the planning application for the Proposed Development was still to be determined by MKC, an update was provided to MKC in June 2019 to clarify and confirm that the traffic modelling and mitigation package contained within the TA of August 2016 remained appropriate and suitable in light of the new strategic traffic models that have been developed by MKC and BCC to support Plan:MK and the draft VALP respectively.

1.2.5. A Technical Note (TN)[3] was provided to offer a 'high level' review of both the MKC and BCC strategic traffic models and a comparison of the outputs and impacts of the Proposed Development with the calculated impact contained within the revised TA of August 2016. The TN was accepted by MKC planning and highway officers and informed the Officer's Report for Committee in November 2019 and is provided in **Appendix A**.

1.3 PURPOSE OF THIS TA

1.3.1. This TA has been prepared for submission with the Appeal against MKC's refusal of planning permission and to support the submission to Buckinghamshire Council (BC) of a package of revised documentation to reflect the minor amendments proposed to the Site layout, including a revised Development Framework Parameter Plan. This TA updates the transport evidence base associated with the planning applications as submitted in 2015 and subsequently updated in 2016, in accordance with good practice guidance.

1.3.2. The development proposal for the Appeal against the decision by MKC has not changed from the original 2015 planning application, however the revised documentation submitted to BC includes the provision of 60 extra care units within the total of 1,855 residential units. The trip generation associated with the 60 extra care units would be lower than 60 general residential units, as explained further in Section 5, and therefore the assessment within this TA remains appropriate for both purposes.

1.3.3. The Proposed Development assessed therefore includes:

- 1,855 mixed tenure residential dwellings (including 60 extra care units);
- 2.07 hectare employment area (B1 land use);
- 0.67 hectare neighbourhood centre accommodating retail (A1/A2/A3/A4/A5) and community land uses (D1/D2);
- A Primary School with 630 pupil places; and
- A Secondary School with 600 pupil places.

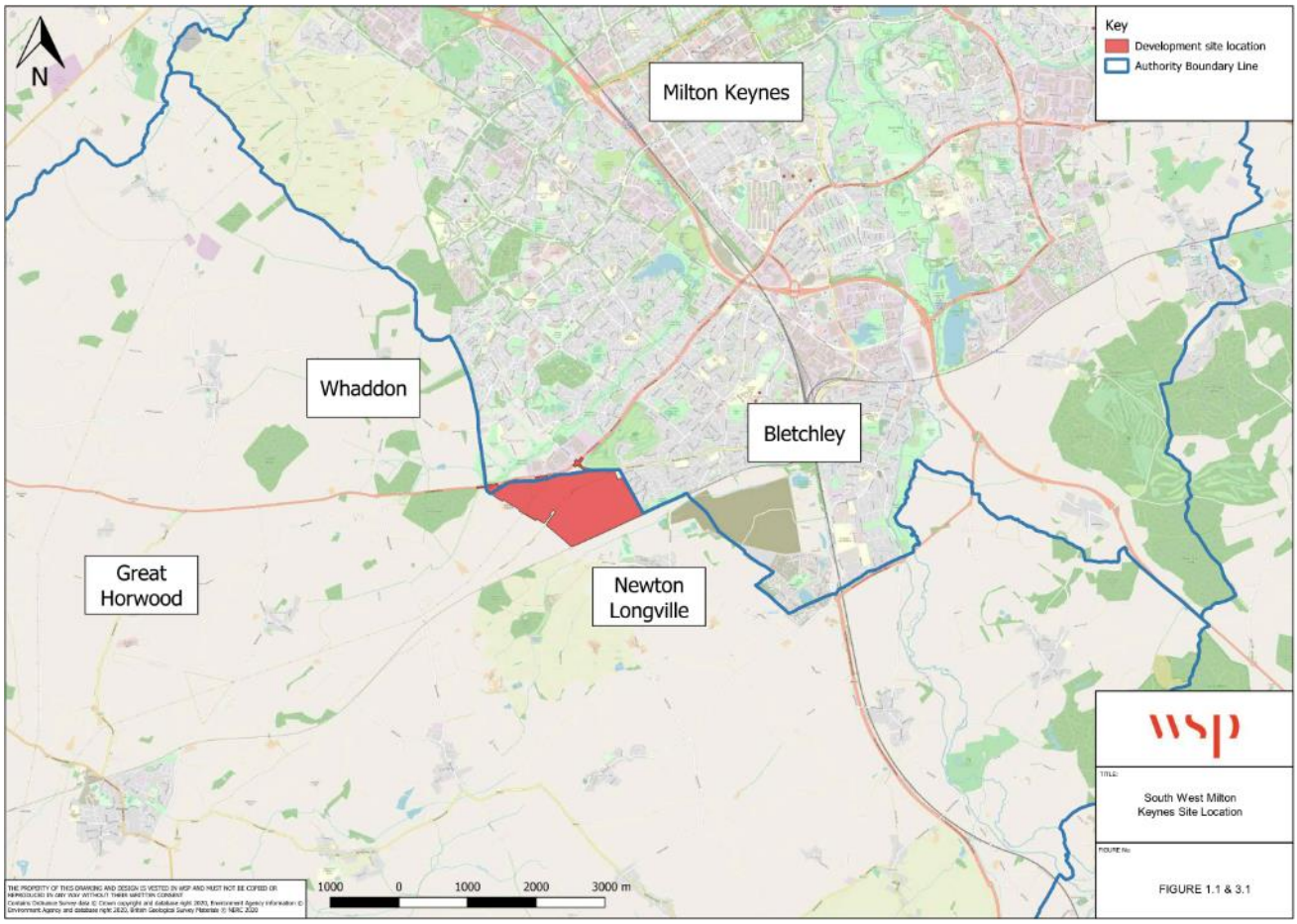
[3] TN18 – Review of Traffic Modelling, WSP, June 2019

1.3.4. In addition to this TA, an updated Framework Travel Plan (FTP) has also been prepared to encourage sustainable travel to and from the Site. The findings of this updated TA and the updated FTP have been included within an updated Environmental Statement (ES) that also accompanies the revised planning submission to BC. These reports are interrelated and should be read in conjunction with each other.

1.4 SITE LOCATION

1.4.1. The Site is located on the south-western boundary of the Milton Keynes authority area on land bound by the A421 Standing Way to the north, B4034 Buckingham Road to the north east, the disused rail line to the south and Whaddon Road to the west (**Figure 1.1** (reproduced at a larger scale in **Appendix B**)). The entirety of the Site is located within the Aylesbury Vale area of Buckinghamshire with the exception of the connections to the public highway on the A421 Standing Way and Buckingham Road which are located in Milton Keynes.

Figure 1.1 - Site Location Plan



1.5 SCOPING DISCUSSIONS WITH HIGHWAY AUTHORITIES

1.5.1. Prior to the preparation of this TA, a comprehensive scoping exercise was undertaken with representatives from BCC (now BC) Highways Development Management and Stirling Maynard Transportation (SMT) on behalf of MKC highway department. All references to agreements reached

with MKC in this TA refer to agreements which have been reached with their transport consultants, SMT.

1.5.2. A Transport Assessment Scoping Note (TASN) was issued to BC and MKC in mid-January 2020. A meeting was held with representatives from both authorities shortly afterwards where the TASN was discussed. The starting point for assessment of the development proposals on the highway network was to use one of the strategic models held by BC and MKC. During this meeting it was agreed that as neither the Buckinghamshire Countywide Model nor the Milton Keynes Multi Modal Model (MKMMM) covered the study area for the TA in sufficient detail, that a manual spreadsheet-based approach to the assessment would be required to provide a consistent approach across the study area, albeit recognising that this 'static' junction model approach would make no allowance for the dynamic reassignment of traffic across the wider highway network.

1.5.3. An updated TASN was then issued and the following key parameters were agreed with BC and MKC as part of this. The full TASN is included within **Appendix C**:

- The principle of adopting a person trip generation disaggregated by journey purpose;
- The mode shares to be used for residential and employment trips to convert the person trip generation into the various modes of travel;
- Use of the secondary school vehicular trip generation from the 2016 TA within this TA;
- Internalisation of all trips associated with the neighbourhood centre with the exception of servicing and any isolated employment (which would be considered as part of the employment trips);
- The use of a Census Journey to Work based trip distribution to distribution trips associated with the residential, employment and education land uses;
- Assessment of the development proposals within a 2033 future year to accord with the end of the local plan period and anticipated year of completion of the development;
- Inclusion of Tattenhoe Park as a committed development;
- Provision of a sensitivity test to test the impacts of the Proposed Development in combination with Shenley Park;
- TA study area including the need to consider 18 off-Site junctions along with the three Site access points on B4034 Buckingham Road, the 'left in only' junction on A421 Standing Way and Whaddon Road;
- The approach to developing, validating and calibrating the junction capacity assessments; and
- The scope and specification of the data collection exercise that would be used to inform the highway network assessment.

1.5.4. Following agreement of the TASN, separate Technical Notes (TN) were issued to BC and MKC regarding trip generation and trip distribution (**Appendix C**). The key parameters for assessment agreed with BC and MKC as part of the TNs were as follows:

Trip Generation TN (dated March 2020)

- Trip rates for the residential and employment land uses;
- Use of National Travel Survey journey purpose information (Table 0502 2018);

- Internalisation assumptions for residential trips;
- Secondary School education person trip generation; and
- Servicing trip rates.

Trip Distribution TN (dated March 2020)

- Methodology for calculating the residential and employment trip distributions;
- Assignment of development trips to the Site access points; and
- The trip generation and distribution associated with the committed development at Tattenhoe Park.

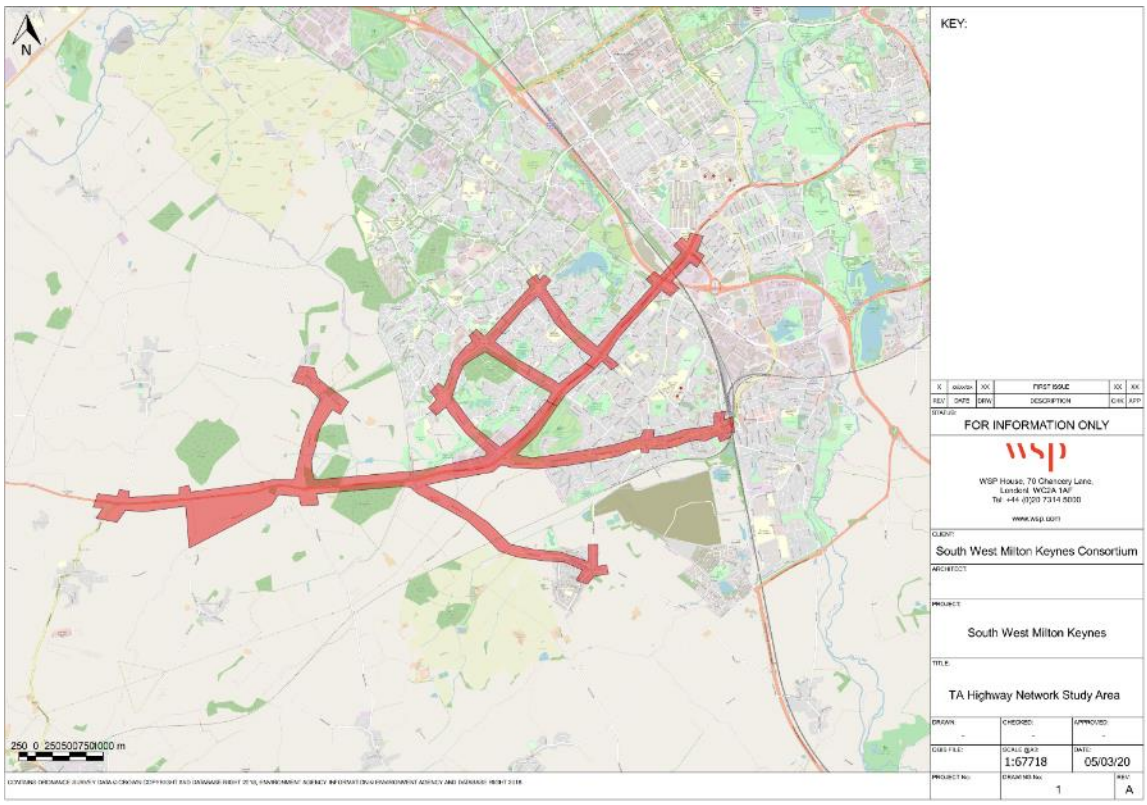
1.5.5. Separate to the TASN and TN, the following key parameters were agreed with BC and MKC in March and April 2020:

- The methodology for calculating the trip generation, distribution and reassignment of existing traffic associated with the Shenley Park sensitivity test; and
- Growth factors to be used in the highway network assessment.

1.6 STUDY AREA

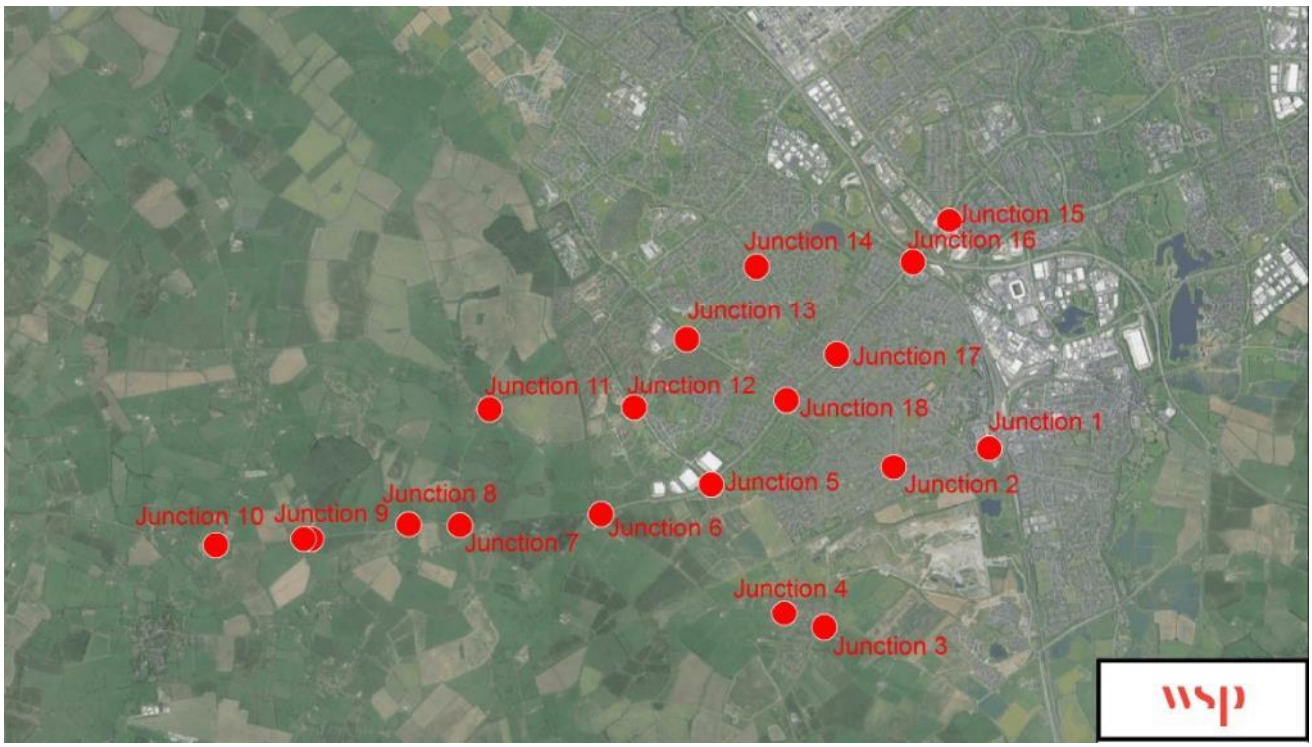
1.6.1. The study area stretches from the A421 junction with Winslow Road in the west within Buckinghamshire to the A421 Bleak Hall Roundabout within Milton Keynes in the east and includes the corridors of A421 Standing Way, B4034 Buckingham Road, V1 Snelshall Street, V2 Tattenhoe Street and Chaffron Way. This study area was agreed with BCC and MKC as part of the TA Scoping process and includes the roads most likely to be affected by the Proposed Development. The study area is shown in **Figure 1.2** and is contained in **Appendix C.**

Figure 1.2 – TA Study Area



1.6.2. To assist with identifying locations throughout this TA, all junctions considered within the study area have been numbered. **Figure 1.3** provides the junction numbering that has been adopted throughout this report.

Figure 1.3 – Junction Locations Within TA Study Area



1.6.3. As part of the preparation of this TA, the original strategies relating to public transport, walking and cycling have been refreshed to reflect current transport conditions.

DATA COLLECTION

1.6.4. A comprehensive data collection exercise was undertaken in February 2020 across the study area agreed with BC and MKC as part of the scoping process. The data collection exercise was completed prior to any travel restrictions being introduced by the UK government associated with the Covid-19 Pandemic. The dataset collected therefore represents a robust picture of traffic conditions at that time and forms the base from which the highway network assessment contained within this TA has been undertaken.

1.7 REPORT STRUCTURE

1.7.1. Following this introduction, the remainder of this TA is structured as follows:

- Section Two provides the national, regional and local planning policy context from a transport perspective;
- Section Three describes the existing transport conditions at the Site; including a review of access by all models and an assessment of existing highway safety;
- Sections Four provides details of the Proposed Development;
- Section Five outlines the anticipated all-mode trip generation for the Proposed Development;
- Section Six details the transport network assessment methodology;
- Section Seven provides the assessment results and impacts of the development;
- Section Eight provides details of the proposed mitigation package;

- Section Nine provides details of the residual impacts of the Proposed Development, taking account of the proposed mitigation package; and
- Section Ten provides a summary and conclusions.

2

POLICY CONTEXT

2 POLICY CONTEXT

2.1 INTRODUCTION

2.1.1. Transport policy and guidance of relevance to the Proposed Development is held on several levels. National policy deals with wider strategic aims and objectives. It does not provide specific detail but gives general guiding principles for the implementation of new developments. Regional policy considers planning and development within Buckinghamshire, whilst local policy defines the detailed requirements for new developments within Aylesbury Vale and Milton Keynes. This section provides a review of those policies that are adopted and those that are emerging along with other guidance and documents considered relevant to the development proposals.

2.2 ADOPTED POLICY

AYLESBURY VALE DISTRICT LOCAL PLAN 2001-2011 (2004)

2.2.1. The Aylesbury Vale District Local Plan (AVDLP) was adopted in January 2004 and covered the period to 2011. The AVDLP proposed land for development and provided a framework of policies within which other proposals will be considered. After 27 September 2007, legislation meant that policies in the AVDLP ceased to have effect unless 'saved' by a Direction from the Secretary of State. Following an application from AVDC, the Secretary of State issued a direction on 24 September to save specified policies.

2.2.2. Section 4 of the AVDLP included general transport policies that applied across the District. However, the majority of those policies were not saved due to similar guidance being found within the national policy prevalent at the time. There are no saved transport policies relevant to the Proposed Development.

PLAN:MK 2016 -2031 (MILTON KEYNES LOCAL PLAN) (2019)

2.2.3. Plan:MK 2016 - 2031 (Plan:MK) was adopted in March 2019 and sets out the Council's approach and policies for the Borough of Milton Keynes for the period up to 2031.

2.2.4. The vision for the Borough is:

> *'By 2031 Milton Keynes will be known internationally as a great city within a thriving rural hinterland. Its thriving knowledge-based economy, its first class lifelong education and training, its diverse population with their excellent, lively and varied culture, its sport and leisure opportunities, and its range of different, high quality places to live, together with the green, open and spacious layout and a transport system that makes its facilities easily accessible to all, will have enhanced its reputation as a pleasurable and exciting place to live, work, play and visit.'*

2.2.5. Objective 12 of the strategic objectives relates to transport as follows:

> *'To manage increased travel demands through: Smart, shared, sustainable mobility. Promoting improvements to public transport and supporting the development of the East – West rail link between Oxford and Cambridge, including the Aylesbury Spur. Encouraging an increased number of people to walk and cycle by developing an expanded and improved redway network. Extending the grid road pattern into any major new development areas. Utilising demand management measures to reduce*

the growth of road congestion, whilst upgrading key traffic routes such as the A421, A422 and the A509.'

2.2.6. Policy CT1 Sustainable Transport Network sets out requirements for how the Council will promote sustainable development:

- *'i. Promote a safe, efficient and convenient transport system*
- *ii. Promote transport choice, through improvements to public transport services and supporting infrastructure, and providing coherent and direct cycling and walking networks to provide a genuine alternative to the car*
- *iii. Promote improved access to key locations and services by all modes of transport and ensure good integration between transport modes*
- *iv. Manage congestion and provide for consistent journey times*
- *v. Promote and improve safety, security and healthy lifestyles*
- *vi. Continue to engage with relevant stakeholders along the East-West Rail line and Expressway to identify operational benefits, which provide additional support for a more sustainable transport strategy and/or economic growth of the city*
- *vii. Engage with the National Infrastructure Commission to set in place connections from Central Milton Keynes to surrounding communities, including a fifth track constructed between Bletchley and Milton Keynes Central*
- *viii. Promote the usage of shared transport schemes in the borough.'*

2.2.7. Policy CT2 Movement and Access requires development proposals to:

'minimise the need to travel, promote opportunities for sustainable transport modes, improve accessibility to services and support the transition to a low carbon future.'

2.2.8. In relation to planning applications Policy CT2 states that development proposals will be permitted that:

- *'(A)1. Integrate into our existing sustainable transport networks and do not have an inappropriate impact on the operation, safety or accessibility of the local or strategic highway networks;*
- *2. Mitigate impacts on the local or strategic highway networks, arising from the development itself or the cumulative effects of development, through the provision of, or contributions towards necessary and relevant transport improvements including those secured by legal agreement;*
- *[…]*
- *6. Do not result in inappropriate traffic generation or compromise highway safety;*
- *(B). Development proposals that generate significant amounts of movement or impact on level crossings must be supported by a Transport Statement or Transport Assessment and will normally be required to provide a Travel Plan, with mitigation implemented as required.'*

2.2.9. Policy CT3 Walking and Cycling states:

'The Council will support developments which enable people to access employment, essential services and community facilities by walking and cycling.'

2.2.10. Policy CT5 Public Transport states:

'Development proposals must be designed to meet the needs of public transport operators and users. In particular:

- *i. Road layouts must include direct, convenient and safe public transport routes and be free of obstructive parking;*
- *ii. Public Transport priority measures must be implemented, where appropriate;*
- *iii. Where appropriate and necessary, all houses and most other developments must be no more than 400m from a bus stop;*
- *iv. Bus stops must have good pedestrian access, be open to public supervision and be sheltered where appropriate; and*
- *v. Specific consideration must be given to the provision of public transport services in planning new development.'*

2.2.11. Policy CT6 Low Emission Vehicles requires new facilities for low emission vehicles to be integrated into major new developments. All new developments will be required to provide electric vehicle charging infrastructure in accordance with the Council's parking standards.

2.2.12. Policy CT8 Grid Road Network requires the following in respect of the Grid Road Network:

'Opportunities for extending the grid road system design and redway super network route into any major new development areas will be required to ensure that the grid continues to function effectively and sufficient land/corridors are safeguarded for future highway/transit links around the district to accommodate and manage increased travel demands changing and future travel demands.

The Council will also seek to extend grid roads and redway super network route to link with new cross-boundary developments. New grid roads should also include green infrastructure buffers to improve air quality, reduce noise and vibration and enhance the landscape and result in a net gain in biodiversity. New grid roads will be designed with the following characteristics:

- *i. Grid roads will run in generous multi-functional green infrastructure reservations (which are designed to allow for future upgrading to dual carriageways if and when required);*
- *ii. Grid roads will also accommodate main services, and landscaping of appropriate road surfaces to protect adjacent development from the noise and visual intrusion of traffic and give a green character to the road. Where possible, gird roads will incorporate a bund providing additional protection;*
- *iii. Grid roads will also be designed for use by public transport and for alternative forms of transport if required [eg electric cars/driverless cars], with bus laybys at intersections with pedestrian bridges and underpasses and controlled crossings where appropriate;*

- *iv. Grid Road Reserves will be identified in order to safeguard further potential extension of the grid and enable future development to access the grid;*
- *v. Grid road reservations should be 80m in width where residential is on each side and 60m where other land uses occur;*
- *vi. Junction spacings will be set out as in MK Planning Manual. Redways should be setback 3m from the carriageway;*
- *vii. In order to improve pedestrian safety, in line with the Planning Manual, development incursions would be considered permissible within the grid road reserves at "points of connection", for example where redways pass underneath the grid road and at bus stops. This might include local centres and housing which should be designed to provide surveillance over the underpass or bus stop. This development should not however constrain the overall 60m width such that it prejudices future transport systems from being implemented. The overall green character and multi-functional green infrastructure of the grid road reserves should also still be maintained. The effect should be a green corridor punctuated at "points of connection" by development. This development could also have the important benefit of assisting with wayfinding around the grid road system, especially for visitors;*
- *viii. There are cross-border locations where MK Council considers that the extension of the grid road network, as part of new or future development allocations, will provide benefits to both local communities in MK and those in the adjacent district, as well as provide much needed connections to the strategic road network. Milton Keynes Council will seek the safeguarding of grid road connections and extensions or reserves through joint working and consultation responses to neighbouring authorities' local plan policy, or its response to planning applications in adjacent districts"; and*
- *ix. As MK's Mobility Plan develops, it is possible that some areas will be designated for higher densities, with a different relationship to grid roads and public transport corridors. An appropriate specification for that relationship will be produced at that time. The specification will only apply to those designated areas.'*

2.2.13. Policy CT10 Parking establishes that all developments should meet the requirements of the Council's vehicle parking standards.

2.2.14. Policy SD1 sets out place-making principles for strategic development, including urban extensions, within the boundaries of Milton Keynes. In relation to transport, policy SD1 requires, inter alia, that:

- *'2. Development integrates well with the surrounding built and natural environments to enable a high degree of connectivity with them, particularly for pedestrians and cyclists and for access to connected green infrastructure for people and wildlife;*
- *13. The layout and design of development enables easy, safe and pleasant access for pedestrians and cyclists of all abilities from residential neighbourhoods to the facilities including the redway network, open spaces and play areas, linear*

parks and the wider network of green infrastructure, public transport nodes, employment areas, schools, shops and other public facilities in order to promote recreation, walking and cycling within the development area and wider area;

- *15. Impacts on the road network have been thoroughly identified through appropriate technical assessments and appropriate mitigation measures and improvements to the road network and public transport have been identified and incorporated into the development or the wider area as required.*
- *16. Transport solutions maximise the opportunities provided by smart, shared and sustainable mobility solutions to deliver real alternatives to the private car (e.g. connectivity with existing and forthcoming rail services; rapid transit; driverless vehicles; shared vehicle schemes; coaches and buses).*
- *17. The provision of strategic grid road or highway infrastructure should build in measures for rapid public transport solutions as set out in the Council's Mobility Strategy 2018-36 (or any successor document).'*

2.2.15. Policy SD15 provides guidance on the place-making principles for sustainable urban extensions in adjacent local authorities bordering Milton Keynes. The principles include:

- *'6. Technical work should be undertaken to fully assess the traffic impacts of the development on the road network within the city and nearby town and district centres and adjoining rural areas, and to identify necessary improvements to public transport and to the road network, including parking.*
- *7. A route for the future construction of a strategic link road(s) and/or rail link should be protected where necessary.'*

2.2.16. The Proposed Development provides sustainable transport links and improved permeability and connectivity within and outside the development thus integrating with the surrounding built and natural environment and providing transport choice and improved access to key destinations including the railway stations. Further detail is provided in Section 4 of this TA.

2.2.17. This TA reviews the impact of the Proposed Development on the local highway network in Section 7 and identifies appropriate, proportionate and cost effective mitigation in Section 8 to ensure that the residual cumulative impact is acceptable and that it does not compromise highway safety.

2.2.18. A grid road reserve corridor of 80m width is provided within the Proposed Development (as shown on the Development Framework Parameters Plan), to allow for the implementation of the Bletchley Southern Bypass at a point in the future if MKC (and BC) determine that it would be beneficial, and funding is available.

2.2.19. The Proposed Development therefore complies with the policies set out in Plan:MK, as demonstrated within the 2016 TA and within this TA.

2.2.20. The Case Officer's Report to the MKC Planning Committee in November 2019 specifically states that, subject to suitably worded conditions, the development accords with Policies CT1, CT2 and CT3 of Plan: MK.

BUCKINGHAMSHIRE LOCAL TRANSPORT PLAN 4 (LTP4) (2018)

2.2.21. The Local Transport Plan 4 (BLTP4) is designed to help realise the transport element of BC's Strategic Plan and identifies four objectives:

- *'Objective 1: Connected Buckinghamshire - Provide a well-connected, efficient and reliable transport network which links to key national and international destinations helping Buckinghamshire's residents and economy to flourish while capitalising on external investment opportunities;*
- *Objective 2: Growing Buckinghamshire - To secure good road, public transport, cycle and walking infrastructure and service provision, working in partnership with local businesses, the community and district councils through a range of initiatives and taking advantage of new and emerging technologies to meet the (current and future) needs of our residents as Buckinghamshire grows;*
- *Objective 3: Healthy, Safe and Sustainable Buckinghamshire - Allow residents to improve their quality of life and health, by promoting sustainable travel choices and access to opportunities that improve health. Ensure transport systems are accessible by all, safe and allow people to make the most of Buckinghamshire whilst protecting its special environments;*
- *Objective 4: Empowered Buckinghamshire - Allow everybody to access the educational, work and social opportunities they need to grow. Increase opportunities for residents to support themselves and their communities by enabling local transport solutions.'*

2.2.22. A total of 19 policies are identified within the document, each focused on mitigating a specific transport issue; four of these policies have been designed to actively promote the use of sustainable transport modes, as follows:

- Policy 12: Encouraging walking for shorter journeys:

  'Walking should be the best option for more of our short journeys. We will look to develop the walking network and encourage walking, to help ensure it becomes one of the most convenient ways to make short journeys.'

- Policy 13: Encouraging cycling:

  'We will look to develop the cycling network through a combination of new infrastructure, maintenance and guidance. This will help cycling to become one of the most convenient and well used forms of transport for short journeys.'

- Policy 14: Car clubs, car sharing and taxis:

  'We will work with partners to explore opportunities for car clubs, car sharing and taxi initiatives. This will provide an alternative to car ownership for some: encouraging people to consider other modes of transport; and helping people to access the opportunities Buckinghamshire has to offer.'

- Policy 16: Total Transport: the bus network Buckinghamshire needs:

  'We will work with partners to ensure public transport services best meet the county's needs – now and in the future.'

2.2.23. There is a key focus on the development of transport throughout Buckinghamshire, particularly the promotion of sustainable modes of transport as an alternative to single use private vehicles. Policy 16 of BLTP4 is particularly relevant to the development of the Site and seeks to:

- Ensure developments are located near to good public transport or provide the right public transport (i.e. public transport services should be located where they address the impact of new developments and are able to flourish and meet Buckingham's needs). In this regard, the provision of a new/extended bus service would enhance the connectivity between the Site, Central Milton Keynes (CMK) and key social infrastructure;
- Help improve public transport information: the site-wide FTP will ensure that information is provided across social media platforms and through the introduction of Real Time Passenger Information (RTPI) systems;
- Introduce 'smart' ticketing and fares: the new/extended bus service would incorporate technology to enable the introduction of 'smart' ticketing;
- Provide bus priority measures: Within the Site, measures will be provided on the identified bus route(s) to ensure that services are given priority at key junctions;
- Improve public transport infrastructure: Safe and secure weatherproof shelters that would facilitate the provision of RTPI provided across the Site;
- Make public transport fully accessible; considering the needs of mobility impaired people and those with other specific needs. In this regard, tactile paving and high bus boarding platforms would be provided to enable greater accessibility.

2.2.24. The development proposals comply with the objectives and policies outlined within BLTP4. Specifically, the Proposed Development complies with objectives 1, 2 and 3 by providing a range of sustainable transport options that aim to connect the development to the surrounding areas and with policies 12 and 13 by providing a widespread network of footpaths and cyclepaths within the Site and connecting to existing infrastructure outside the Site. Through the introduction of a new/extended high frequency bus service, the Proposed Development complies with policy 16 and would make a significant contribution towards delivering BCC's objectives. Further detail on the proposed options for sustainable travel is provided in Section 4 of this TA.

MOBILITY STRATEGY FOR MILTON KEYNES 2018-2036 (LTP4) MOBILITY FOR ALL (2018)

2.2.25. The Milton Keynes LTP4 (MKLTP4) was adopted in March 2018 and sets out the Council's policies and programme for delivering local, sub-regional and national policy objectives between 2018 and 2036. This mobility strategy for Milton Keynes acts as the reference point for how the town wishes to maintain, improve and develop its transport system up to 2036.

2.2.26. It establishes both short term and long term (up to 2050) visions and demonstrates how it will connect to new infrastructure such as East West Rail and the Oxford to Cambridge Expressway as outlined in the National Infrastructure Commission's final report 'Partnering for Prosperity: a new deal for the Cambridge-Milton Keynes-Oxford Arc' and the council's 'First Last Mile' strategy.

2.2.27. The ambition for MKLTP4 is to:

- *'Stabilise average journey times and ensure they remain competitive while promoting the development of smart shared sustainable mobility for all;*

- *Provide a fully integrated and accessible public transport system - "Mobility as a Service" (MaaS)*
- *Develop and promote a 'First Last Mile' culture for future technologies such as autonomous and connected vehicles and sustainable connectivity*
- *Ensure transport infrastructure is configured to enable the city's future development and growth in travel demand to be accommodated based on the council's 'First Last Mile' Strategy'*

2.2.28. Milton Keynes has established mode share targets for 2030 and 2050 as shown in **Table 2.1**.

Table 2.1 – MK Mode Share Targets

Journey	Journey to work by car/other mode (%)		
	2011 (Actual)	2030 (Target)	2050 (Target)
Milton Keynes	65/35	60/40	50/50
Intra-borough	80/20	70/30	55/45
Inter-borough	85/15	80/20	60/40

2.2.29. A series of initiatives are outlined split by theme and timescale (short, medium, long) which have been considered with reference to both strategic infrastructure schemes such as East-West Rail and the Oxford to Cambridge Expressway as well as Plan:MK. These initiatives are summarised in **Table 2.2.**

Table 2.2 – LTP4 Initiatives

Theme	Initiatives	Timescale
Maintaining current transport system	UTMC	Short
	Freight Quality Partnership	Short
	Logistical Planning	Medium
	Collaborate with neighbouring authorities	Short
	Establish Strategic Highway Infrastructure Position	Medium
	Milton Keynes Grid Expansion	Short
	Connectivity to East West Rail	Short

Theme	Initiatives	Timescale
	Future Transit Corridors	Long
	Local Highway Infrastructure	Short
	Redway Network Upgrade and Extension	Short
	Parking Supply	Short
	Review Parking	Medium
	Improve public realm and wayfinding	Short
	Road Safety	Short
	Support safe urban driving courses	Short
Improving Public Transport	Provide new park and ride sites	Short
	Premium Bus Route Network	Short
	Expand existing local bus network and introduce bus priority	Medium
	Shuttle bus service to retail core at weekends	Short
	Ensure schools, higher education, GP & Hospital services and key employment locations are accessible by sustainable transport	Short
	Demand Responsive Transport	Short
	Milton Keynes Micro Metro	Medium
	Quality Transport Partnership	Short
	Optimise public transport/mass transit access in new development areas	Medium
	Expanding capacity for Central, Bletchley and Wolverton stations	Medium-Long
	Rail service policy position	Short
	Devolved Transport Powers	Short

Theme	Initiatives	Timescale
Travelling More Sustainably	Promote Sustainable Travel	Short
	Electric Vehicle Charging Infrastructure	Short
	Access to Cycles	Short
	Improved cycle and powered two wheeler facilities around MK	Short
	Cycle training in businesses, schools and higher education and community	Short
	Partner with local businesses	Short
	Travel Planning in businesses, schools and higher education as well as new and existing developments	Short
	Incentivisation	Short
	Encourage sustainable logistics	Short
Increasing our use of technology	Smart Sensors	Short
	Autonomous 'last mile' deliveries	Short
	Trialling future transport technology	Short
	'MaaS' mobility app for Milton Keynes	Short
	Variety of payment options on public transport	Short
	Bus application for user devices	Short
	Improved superfast broadband service	Short

2.2.30. MKC's Mobility Strategy sets out key transport objectives and outcomes[4] to accommodate the anticipated level of growth through to 2036 and beyond leading towards 2050. In this regard, development of the Site would include a range of measures to comply with these objectives and outcomes, inter alia:

[4] Mobility Strategy, Section 2, page 3

- **Support growth and provide mobility for all**: the Site would facilitate a transport network that would cater for all road users to improve journey time reliability underpinned by a comprehensive Framework Travel Plan (FTP) that would apply to all the proposed uses. The provision of land to accommodate the extension of the grid road network southwards would also facilitate connectivity to the wider highway network;
- **Provide an effective Network**: to prioritise travel by public transport, cyclists and pedestrians. The Site would maximise the opportunity to enable 'fast track' bus services and provide an integrated network of routes for cyclists and pedestrians, linked to existing Public Rights of Way (PRoW) and the Redway system to the north. A new/extended bus service between the Site and Central Milton Keynes (CMK) would provide a high-quality sustainable travel option;
- **Maximise Travel Choice**: to provide integrated seamless ticketing enabling reliable and frequent transport to reduce the need for car ownership. Given the proximity of the Site to CMK and increasing Mobility as a Service (MaaS), presents an opportunity to reduce the need for car ownership;
- **Protecting Transport Users and the Environment**: to improve wellbeing, reduce emissions and ensure the safety of all travellers. The Site will include cycleways/footways that will enable Non-Motorised Users (NMUs) to travel safely throughout the Site and connect with the wider network of PRoWs, Redways and local bus nodes.

2.2.31. The Mobility Strategy also explains the contribution of public transport towards achieving the delivery initiatives[5] and how MKC would seek to improve public transport services and associated infrastructure, comprising, inter alia:

- Park and Ride sites along corridors where there is a high trip demand;
- Premium bus network to provide high frequency services where there is high demand from early in the morning until late evening;
- Expanding the local bus network and introduce bus priority along key access routes to encourage mode shift;
- Shuttle bus services from identified Park and Ride sites on selected corridors;
- Ensure that social infrastructure (i.e. schools, hospitals) are fully accessible by public transport; and
- Optimise public transport/mass transit access in development areas, to include priority routes, signage and high-quality facilities.

2.2.32. In this regard, the provision of a new/extended bus service between the Site and CMK together with high quality safe/secure infrastructure, would make a significant contribution towards MKC's plans to deliver these initiatives. This is explained further in Section 4 of this TA.

MILTON KEYNES COUNCIL STRATEGY FOR FIRST LAST MILE TRAVEL (2017)

2.2.33. The MK Strategy for First Last Mile Travel forms part of MKLTP4. It aims to establish the approach to providing fast, affordable and efficient connectivity for the city of Milton Keynes and the wider area

[5] Mobility Strategy; Section 3, page 6

and to provide connections to both the East-West Railway and Oxford-Cambridge Expressway as they are implemented in future years.

2.2.34. The objectives of the first/last mile strategy are to:

- Ensure the maximum advantage is taken from the new nationally significant east west infrastructure, putting in place transport solutions which remove the risk of congestion, promote sustainable transformational growth and ensure the region's economic capability, in line with NIC objectives;
- Working with the cities and town of Cambridge, Oxford and Northampton ensure development of transport systems which will be the example for others worldwide;
- Ensure that first/last mile infrastructure schemes provide a basis for the future potential directions of growth for the city out to 2050, in line with the NIC's objectives.

2.2.35. The Strategy recognises that significant growth in Milton Keynes is likely to result in increased congestion, and this is evidenced by the Council's strategic transport model, even though increasing congestion is likely to impact productivity, which could in turn make the City less attractive in the absence of significant investment in transport infrastructure.

2.2.36. The Strategy states that:

> *'the Vision for 2050 sets the scene for the transformation of the city into a highly skilled, highly proactive workforce with one of the best transport systems in the world, to be an exemplar transit city providing benefits for business and an exemplar for future mobility solutions across the world. It envisages a future city for which its ambitions for growth are realised through greater strategic planning with key partners and neighbours, based on high density development along transit corridors with people able to access a transport system that meets their needs based on rapid mass transit and shared use of vehicles such as autonomous pods, electric car share and demand responsive services.'*

2.2.37. The Strategy establishes a series of mode share targets (see **Table 2-1**) which aim to deliver the high growth ambitions of the City.

2.2.38. The Strategy is split into three phases as follows:

- **Phase 1 (2017-2024)** – Managing demand and building capacity to accommodate a future mass transit system, investment in interchanges at key transport nodes and improving cycling connections.
- **Phase 2 (2025-2031)** – Continued demand management and delivery of the mass transit system.
- **Phase 3 (2032-2050)** – Synchronising movement within the East West Rail, Oxford to Cambridge Expressway and HS2 corridors.

2.2.39. The public transport and access strategies for the Proposed Development as set out within Section 4 of this TA, comply with the strategies contained within MKC's First Last Mile Strategy by providing an enhanced and extended bus service as well as improving cycling connections from the Site to the existing network. The FTP which accompanies this TA aims to encourage change of mode to more sustainable travel, supported through a range of measures, incentives and demand management.

2.3 NATIONAL POLICY

NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

2.3.1. The Government's NPPF emphasises the importance of rebalancing the transport system in favour of sustainable transport modes, whilst encouraging local authorities to plan proactively for the transport infrastructure necessary to support the growth of major generators of travel demand.

Section 2 – Achieving Sustainable Development

2.3.2. Paragraph 7 of the NPPF states:

> *"At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs."*

2.3.3. At the heart of the NPPF is the presumption in favour of sustainable development, set out in Paragraph 11 of the NPPF. This is seen by the industry as "the golden thread" running through both plan making and decision taking.

Section 9 – Promoting Sustainable Transport

2.3.4. Section 9 of the NPPF entitled 'Promoting Sustainable Transport' outlines the transport considerations for plan making and development proposals.

2.3.5. Paragraph 102 outlines that:

> *'transport issues should be considered from the earliest of stages of plan making and development proposals' in order to ensure that:*
>
> - *'The potential impacts of the development on transport networks can be addressed;*
> - *The opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated.*
> - *Opportunities to promote walking, cycling and public transport use are identified and pursued;*
> - *The environmental impacts of traffic and transport infrastructure can be identified, assessed and considered – including appropriate opportunities for mitigation and for net gains in environmental quality; and*
> - *Patters of movement, streets, parking and other transport considerations are integral to the design of schemes and contribute to making high quality places.'*

2.3.6. Paragraph 103 states that:

> *"Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes."*

2.3.7. Paragraph 108 outlines the key considerations when assessing sites to be allocated for development in plans or specific development applications. There are:

- *'Appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development applications and its locations;*
- *Safe and sustainable access to the site can be achieved for all users; and*
- *Any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree.*

2.3.8. Paragraph 109 explains that development should only be prevented or refused on highway grounds if:

> *'there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.'*

2.3.9. Paragraph 110 explains that applications for development should:

- *'Give priority first to pedestrian and cycle movements, both within the scheme and with neighbouring areas; and second – so far as possible - to facilitating access to high quality public transport, with layouts that maximise the catchment area for bus or other public transport services, and appropriate facilities that encourage pubic transport use;*
- *Address the needs of people with disabilities and reduced mobility in relation to all modes of transport;*
- *Create places that are safe, secure and attractive – which minimise the scope for conflicts between pedestrians, cyclists and vehicles, avoid unnecessary street clutter, and respond to local character and design standards.*
- *Allow for the efficient delivery of goods, and access by service and emergency vehicles; and*
- *Be designed to enable charging of plug-in and other ultra-low emission vehicles in safe, accessible and convenient locations.'*

2.3.10. As outlined in Paragraph 111:

> *'all developments that generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impact of the proposal can be assessed.'*

2.3.11. The Site is in an accessible location within a range of good public transport services, either existing or to be provided by the Proposed Development, with sustainable connections to Milton Keynes and Bletchley. The Proposed Development provides a permeable and connected network of footpaths and cycleways, and a range of amenities within the proposed Neighbourhood Centre and across the wider development, including both a primary school and a secondary school as shown on the Development Framework Parameters Plan and set out in Section 4 of this TA.

2.3.12. A Framework Travel Plan (FTP), now updated, accompanies the planning application. The FTP identifies trip characteristics and measures to effect a realistic modal shift away from private car use, and to promote the use of sustainable transport where possible.

2.3.13. As evidenced within this TA, in transport terms, the Proposed Development is in accordance with the NPPF. The Site is in an accessible location to maximise the use of existing public transport services and will encourage sustainable travel wherever possible through the implementation of the FTP. The assessment within this TA shows that the residual cumulative impacts of the Proposed Development are likely to be negligible and that the development will not have an unacceptable impact on highway safety. Therefore, in the context of paragraph 109 of NPPF, the development should not be prevented or refused.

2.4 EMERGING POLICY

DRAFT VALE OF AYLESBURY LOCAL PLAN (VALP) 2013-2033

2.4.1. The Draft VALP is currently undergoing Examination by the Inspectorate. A statutory six-week consultation on the Main Modifications following the Inspector's recommendations was completed between November and December 2019. It is anticipated that the Draft VALP will be adopted in 2020.

2.4.2. The Plan will help to accommodate national housing growth demand and bring more investment, employment and opportunity, thus helping the district to thrive. It meets the need for 28,600 new homes in the District by 2033, half of which are either already built or have planning permission.

2.4.3. The Proposed Development is identified as an allocation site within the Draft VALP (Policy D-NLV001) for the delivery of:

- up to 1855 new homes;
- an employment area;
- neighbourhood centre;
- secondary school;
- primary school;
- grid road reserve.

2.4.4. Three points of access are required into the Site in accordance with the planning application and AVDC's resolution to grant planning permission. The following highway improvements are identified as part of the draft policy:

- Highway Improvements by Condition(s):
  - Buckingham Road Access
  - Whaddon Road Access.
- Highway Improvements by s106 agreement(s):
  - A421 Standing Way left in only junction and further detailed design;
  - Signalisation of the priority junctions of the A421/ Warren Road and A421/Shucklow Hill/Little Horwood Road.
  - In order to mitigate the potential impact in Whaddon a financial contribution is required towards road safety improvements on Coddimoor Lane and Stock Lane;

- Newton Longville Traffic Calming Proposals. Currently this is an indicative scheme which may include enhanced gateway features on all roads leading into the village and raised junction tables and signing/lining.

- Internal Road Network:
  - A new network of primary streets will form the principal circulation route for all vehicular traffic including a bus route. The route will connect with the existing highway network at the three access points. Plans should show that the primary street is to be at least 7.3m wide, with a footway/cycleway of 3m wide and will need to consider drop off provision, widened footways, crossing points, road signage and lining in relation to the proposed school site;
- Grid Road:
  - Whilst the Site only requires a single carriageway road for access, a dual carriageway could be provided in the future. The land for the grid road is to be secured in the S106 Agreement for the future extension of Snelshall Street (V1) so that BC/MKC can develop and implement a scheme in the future;
- Public Transport Provision:
  - The enhancement of the existing bus service or provision of a new service to operate between the Site and CMK via the existing rail station will be required and included within the Framework Travel Plan;
- Public rights of way:
  - A number of improvements to the surfacing of the local footpaths will be required within the Site and be completed as part of the development and a financial contribution is to be secured as part of the S106 Agreement for those routes outside of the Site. The improvements within the Site include:
    - upgrade of footpath and resurface between Weasel Lane and the railway underpass; route to be dedicated as a public bridleway;
    - resurface Weasel Lane between B4034 Buckingham Road and Whaddon Road;

2.4.5. Chapter 7 of the emerging VALP sets out the Transport related strategies for the region, outlining the importance of a sustainable transport vision. It states that creating development that is accessible by different modes of transport, particularly active modes, is essential to promoting sustainable development as it reduces car dependency.

2.4.6. Policy T4 Delivering Transport in New Development states:

> *'Transport and new development will also only be permitted if the necessary mitigation is provided against any unacceptable transport impacts which arise directly from that development. This will be achieved, as appropriate, through:*
>
> - *The submission of a transport statement or assessment and the implementation of measures arising from it*
> - *Ensuring that the scale of traffic generated by the proposal is appropriate for the function and standard of the roads serving the area*
> - *The implementation of necessary works to the highway*

- *Contributions towards local public transport services and support for community transport initiatives*
- *The provision of new, and the improvement of existing, pedestrian and cycle routes*
- *The provision of a travel plan to promote sustainable travel patterns for work and education related trips.'*

2.4.7. Policy T6 Footpaths and Cycle Routes sets out how strategic routes through proposed development sites should be treated.

2.4.8. The Proposed Development includes the transport and highway improvements as set out in policy NLV001 to ensure that the scale of traffic generated is appropriate for the function and standard of the roads serving the area, and that unacceptable impacts on the transport network do not arise, in accordance with draft Policy T4. Further detail on the impact of the development and the transport and highway improvements is set out in Sections 7 and 8 of this TA.

2.4.9. The transport evidence that supports the Draft VALP indicates that there would be general increases in congestion on routes including the corridor of A421. Notwithstanding, the Inspector presiding over the Draft VALP Examination in Public (EiP) reported that Aylesbury Vale District Council (now Buckinghamshire Council) was required to increase allocations for housing in close proximity to Milton Keynes[6]. As a result, AVDC included a Main Modification to the VALP to allocate further development along the corridor of A421 at Shenley Park, given the Inspector's suggestion that the location was appropriate for further development.

2.5 GUIDANCE

PLANNING PRACTICE GUIDANCE (PPG) (2014)

2.5.1. On 6th March 2014 the Department for Communities and Local Government launched its planning practice guidance web-based resource. The Planning Practice Guidance (PPG) has updated and replaced a wide range of Government planning policy and Circular guidance. It addresses transportation and highway matters under the headings of 'Travel plans, Transport Assessments and Statements in decision-taking' and 'Design'.

Travel Plans, Transport Assessments and Statements in Decision-Taking

2.5.2. The PPG (Reference ID: 42-004-20140306) explains that Transport Assessments (TAs) and Travel Plans (TPs) are ways of assessing and mitigating the negative transport impacts of development in order to promote sustainable development and that they are required for developments which generate significant amounts of traffic movements. A TA may propose mitigation measures which may be required to avoid unacceptable or severe residual impacts. TPs are identified as playing an effective role in taking forward approved mitigation measures which relate to on-going occupation and operation of the development.

2.5.3. The PPG states that TAs can positively contribute to:

- encouraging sustainable travel;

[6] Paragraph 37, VALP 2013-2022 Examination – Interim Findings 29 August 2018, Inspector PW Clark

- lessening traffic generation and its detrimental impacts;
- reducing carbon emissions and climate impacts;
- creating accessible, connected, inclusive communities;
- improving health outcomes and quality of life;
- improving road safety; and
- reducing the need for new development to increase existing road capacity or provide new roads.

2.5.4. For a TP, the guidance advises that it should identify the specific required outcomes, targets and measures, and set out clear proportionate future monitoring and management arrangements. A TP should also consider what additional measures may be required to offset unacceptable impacts if the targets are not met.

2.5.5. It is necessary for a TP to set out explicit outcomes rather than just identify processes to be followed. A TP should also address all journeys resulting from a Proposed Development by anyone who may need to visit or stay, and it should seek to fit in with wider strategies for transport in the area.

2.5.6. An important part of the overall strategy for the Proposed Development is the implementation, maintenance and monitoring of the Framework Travel Plan (FTP) that encompasses individual more detailed Travel Plans for the principal land use elements of the Proposed Development. The FTP in conjunction with the TA are focused towards influencing future travel behaviour and encouraging sustainable travel.

2.5.7. The PPG also requires the appropriate consideration of the cumulative impacts of any adopted Local Plan allocations or committed developments where there is a reasonable degree of certainty of proceeding within the next three years. Through discussions with BCC and MKC, the appropriate level of committed/allocated development has been included within the assessments through the use of TEMPro[7] growth factors and inclusion of specific developments.

DESIGN

2.5.8. The PPG notes that:

> *'Successful streets are those where traffic and other activities have been integrated successfully, and where buildings and spaces, and the needs of people, not just of their vehicles, shape the area.'*

2.5.9. It goes on to state that:

> *'Every element of the street scene contributes to the identity of the place…' and that, 'Public transport, and in particular interchanges, should be designed as an integral part of the street layout.'*

2.5.10. It also notes that:

> *'The likelihood of people choosing to walk somewhere is influenced not only by distance but also by the quality of the walking experience. When considering pedestrians plan for wheelchair users and people with sensory or cognitive*

[7] Trip End Model Presentation Programme, DfT

impairments. Legible design, which makes it easier for people to work out where they are and where they are going, is especially helpful for disabled people.'

2.5.11. The design of the Proposed Development responds to this part of the PPG in that it aims to address the needs of people and to encourage all users of the development to use sustainable modes for travel both within and to and from the development.

BUCKINGHAMSHIRE COUNTYWIDE PARKING GUIDANCE (2015)

2.5.12. The Buckinghamshire Countywide Parking Guidance document sets out BCC's approach to parking throughout the County. The vehicle parking standards of relevance to the Proposed Development are summarised in **Table 2.3** and **Table 2.4**, and cycle parking standards in **Table 2.5**.

Table 2.3 – Residential Vehicle Parking Standards (Above 10 Dwellings)

Land use	Zone	1-bed	2-bed	3-bed	4-bed	5+-bed
Residential	A	1 space	1.5 spaces	2 spaces	2 spaces	2.5 spaces
Residential	B	1.5 spaces	2 spaces	2 spaces	2.5 spaces	3 spaces
Residential	C	1.5 spaces	2 spaces	2.5 spaces	3 spaces	3.5 spaces

Source: Buckinghamshire Countywide Parking Guidance, Table 5 (2015)

Table 2.4 – Other Land Use Vehicle Parking Standards

Land use	Quantum	Zone 1	Zone 2
Retail (A1)	Less than 1000sqm	1 space per 23sqm	1 space per 22sqm
	More than 1000sqm (non-food)	1 space per 38sqm	1 space per 26sqm
	More than 1000sqm (food)	1 space per 17sqm	1 space per 14sqm
Retail (A3)	-	1 space per 17sqm	1 space per 12sqm
Office (B1)	-	1 space per 25sqm	1 space per 21sqm
Industry (B2)	-	1 space per 64sqm	1 space per 39sqm
Industrial Estate (B2)	-	1 space per 87sqm	1 space per 41sqm
Industry (B8)	-	1 space per 130sqm	1 space per 120sqm
Surgery (D1)	-	1 space per 20sqm	1 space per 14sqm
Primary and Secondary Schools	-	1 per 1fte staff	1 per 1fte staff

Source: Buckinghamshire Countywide Parking Guidance, Table 7 (2015)

Table 2.5 - Cycle Parking Standards

Land use	Quantum	Minimum Requirement
Residential (C3)	Flats/apartments/1 bedroom dwellings	1 space
	2 bedroom dwellings	2 spaces
	3 bedroom dwellings	2 spaces
	4 bedroom dwellings	3 spaces
	5+ bedroom dwellings	4 spaces
Retail (A1)	Less than 1000sqm	1 space per 150sqm
	More than 1000sqm	1 space per 250sqm
Retail (A3)	-	1 space per 100sqm
Offices (B1)	-	1 space per 250sqm
Industry (B2/B8)	-	1 space per 500 sqm
Surgeries/Health Centres (D1)	-	1 space per 5 staff
Education (D1)	Primary	1 space per 10 staff and students
	Secondary	1 space per 7 staff and students

Source: Buckinghamshire Countywide Parking Guidance, Table 3 (2015)

2.5.13. The document also outlines that an appropriate level of electric vehicle charging points should be provided evidenced through the TA.

2.5.14. The Proposed Development is to be determined in Outline with all matters reserved with the exception of access. The level of parking to be provided on-Site will be determined through Reserved Matters and will be considered against the prevailing parking standards at that time.

BUCKINGHAMSHIRE COUNTY COUNCIL HIGHWAYS DEVELOPMENT MANAGEMENT GUIDANCE: MANAGING THE TRANSPORT AND TRAVEL IMPACT OF NEW DEVELOPMENTS (2018)

2.5.15. The BCC Highways Development Management Guidance document establishes a set of guiding principles for the delivery of development within Buckinghamshire. It helps to establish the objectives that are set out within the County's Local Transport Plan and provides:

- The information the Council requires for different types and size of development proposals;
- Principles for designing new developments that meet transport and highway requirements;

- How BCC considers development proposals' transport impacts;
- How cumulative impacts are considered where multiple developments affect an area.

2.5.16. This guidance document has been used throughout this TA to assess the suitability and sustainability of the proposals and to ensure that the impacts of development are adequately assessed.

BUCKINGHAMSHIRE'S SUSTAINABLE TRAVEL PLANS: GUIDELINES FOR DEVELOPERS (2020)

2.5.17. The BC Sustainable Travel Plans: Guidelines for Developers document guides developers through the process and policies surrounding Sustainable Travel Planning.

2.5.18. The guidance sets out the potential benefits of a TP and provides a template for developers who may be required to submit TPs as part of the planning process in Buckinghamshire.

2.5.19. The guidance is intended to assist the developer in the production of consistent and high-quality TPs that will achieve and sustain long term modal shift away from car use. The FTP has been prepared in accordance with this guidance.

2.6 OTHER CONSIDERATIONS

MILTON KEYNES STRATEGY FOR 2050: DRAFT FOR ENGAGEMENT (JANUARY 2020)

2.6.1. MKC published the Milton Keynes Strategy for 2050 (MK2050) for consultation in January 2020. AVDC jointly commissioned the evidence that informed MK2050. In due course MK2050 will be used to inform a review of Plan:MK. The evidence base for MK2050 will be used by Buckinghamshire Council (Aylesbury Vale area) to inform a future review of their development plan document, although it is not a formal planning policy document.

2.6.2. MK2050 identifies potential strategies for housing, employment, transport and quality principles for new communities. MK2050 also references the opportunities associated with the Oxford to Cambridge Arc. MK2050 identifies potential strategic options for the growth of Milton Keynes and identifies direction of growth options into the neighbouring areas of Buckinghamshire, South Northamptonshire and Central Bedfordshire. The decision to identify directions of growth into neighbouring areas was based on delivering sustainable patterns of growth unrestricted by administrative boundaries; although it is acknowledged in MK2050 that decisions about growth in neighbouring areas will be for those authorities.

2.6.3. MK2050 identifies and assesses a number of strategic directions of growth. The Site falls within Spatial Option 7: South West Milton Keynes. In summary, the assessment acknowledges the relationship between development and transport projects is a key opportunity for this area e.g.it is adjacent to East West Rail, it could connect with and provide an extension to the existing walking and cycling network, and it could connect with and accommodate a mass rapid transport system.

2.6.4. The assessment in MK2050 of the growth option to the south west of Milton Keynes has reached the same conclusions as other studies and development plan documents since the early 1990s, including the South East Plan 2009, namely that this area is a suitable and sustainable location for an urban extension.

MILTON KEYNES LOCAL INVESTMENT PLAN (MARCH 2015)

2.6.5. The Local Investment Plan (LIP) sets out the vision and aspirations for the Milton Keynes area as it continues to grow with the aim of delivering a further 28,000 new homes and over 40,000 new jobs by 2026. The plan outlines the investment requirements and funding mechanisms to support the delivery of growth.

2.6.6. The LIP identifies that the commitment to future growth and the policies and strategies in place for Milton Keynes creates both 'challenges' and 'opportunities' in terms of the infrastructure and investment required.

2.6.7. The *'Capacity of Transport Grid and Transport Links'* is identified as an opportunity as the LIP recognises that Milton Keynes has good transport links and was planned to deliver high speed access across the whole town. A specific opportunity that is noted is the reinstatement of the disused railway line through Bletchley and on to Bedford and Cambridge as part of East West Rail.

SOUTH EAST MIDLANDS & BUCKINGHAMSHIRE LOCAL ENTERPRISE PARTNERSHIPS

2.6.8. The South East Midlands Local Enterprise Partnership (SEMLEP) and Buckinghamshire Local Enterprise Partnership (BTVLEP) are part of a network of 39 Local Enterprise Partnerships (LEPs) formed by Central Government in 2011 to drive economic growth at a regional level.

2.6.9. The SEMLEP covers an area that includes the wider authority areas of Bedford, Central Bedfordshire, Luton, Milton Keynes and Northamptonshire. Aylesbury Vale belongs to the BTVLEP but was formerly part of SEMLEP (prior to the change in administrative boundaries on 1st April 2020). BTVLEP and SEMLEP work closely with on projects to support growth in the area, including to develop proposals for the Oxford-Cambridge Arc. Between Central Government and the partner LEPs, the Oxford-Cambridge Arc has been identified as an area with significant growth potential.

2.6.10. The Arc covers an area stretching from Oxfordshire in the west through Bedfordshire, Buckinghamshire and Northamptonshire to Cambridgeshire in the east and the Site falls within this area.

THE OXFORD-CAMBRIDGE ARC GOVERNMENT AMBITION AND JOINT DECLARATION BETWEEN GOVERNMENT AND LOCAL PARTNERS (2019)

2.6.11. This document establishes the Government's ambition, together with its regional partners, for the Oxford-Cambridge Arc and states:

> *'The Oxford-Cambridge Arc (the Arc) is a globally significant place and has the potential to become even greater. It is already home to 3.7 million people and currently supports over 2 million jobs, contributing £111 billion of annual Gross Value Added (GVA) to the UK economy per year.'*

2.6.12. The geography of the Arc is defined as:

> *'The area between Oxford and Cambridge, incorporating the ceremonial county areas of Oxfordshire, Buckinghamshire, Bedfordshire, Northamptonshire and Cambridgeshire forms a core spine that the government recognises as the Oxford Cambridge Arc. There are also vital links beyond the Arc. For example, there are*

important connections with the Midlands, with the M4 corridor and Heathrow Airport, with London and the Greater South East, and with the rest of East Anglia.'

2.6.13. The main aims for the Arc are;

- *'Productivity – ensuring we support businesses to maximise the Arc's economic prosperity, including through the skills needed to enable communities to benefit from the jobs created;*
- *Place-making – creating places valued by local communities, including through the delivery of sufficient, affordable and high-quality homes, to increase affordability and support growth in the Arc, as well as wider services including health and education;*
- *Connectivity – delivering the infrastructure communities need, including transport and digital connectivity, as well as utilities;*
- *Environment – ensuring we meet our ambitions for growth while leaving the environment in a better state for future generations'.*

2.6.14. Underpinning delivery of the Arc are two key transport projects that are being developed by the Department for Transport and its operators Network Rail and Highways England. These two projects are:

- East-West Rail; and
- Oxford-Cambridge Expressway.

EAST WEST RAIL

2.6.15. The aspiration to establish a strategic railway connecting East Anglia with Central, Southern and Western England has been promoted and developed since 1995 by the East West Rail (EWR) Consortium, made up of an alliance of local authorities led by Cambridgeshire County Council.

2.6.16. EWR is proposed in two phases:

- Phase One will connect Oxford with Bicester; and
- Phase Two will connect Bicester with Bletchley and Bedford with a branch line connection to Aylesbury.

2.6.17. Phase One of the project was completed in 2016 and now forms part of the Chilterns railway network.

2.6.18. Phase Two will re-open the former Oxford to Bedford railway line and connect it with the existing line between Aylesbury and Calvert. In 2018 the DfT submitted a Transport and Works Act Order (TWAO) for the project which was approved by the Secretary of State in February 2020. Work can now commence on construction and it is anticipated that the line will re-open in 2023 providing:

- Two trains per hour each way between Oxford and Milton Keynes;
- One train per hour each way between Oxford and Bedford; and
- One train per hour each way between Milton Keynes and Aylesbury.

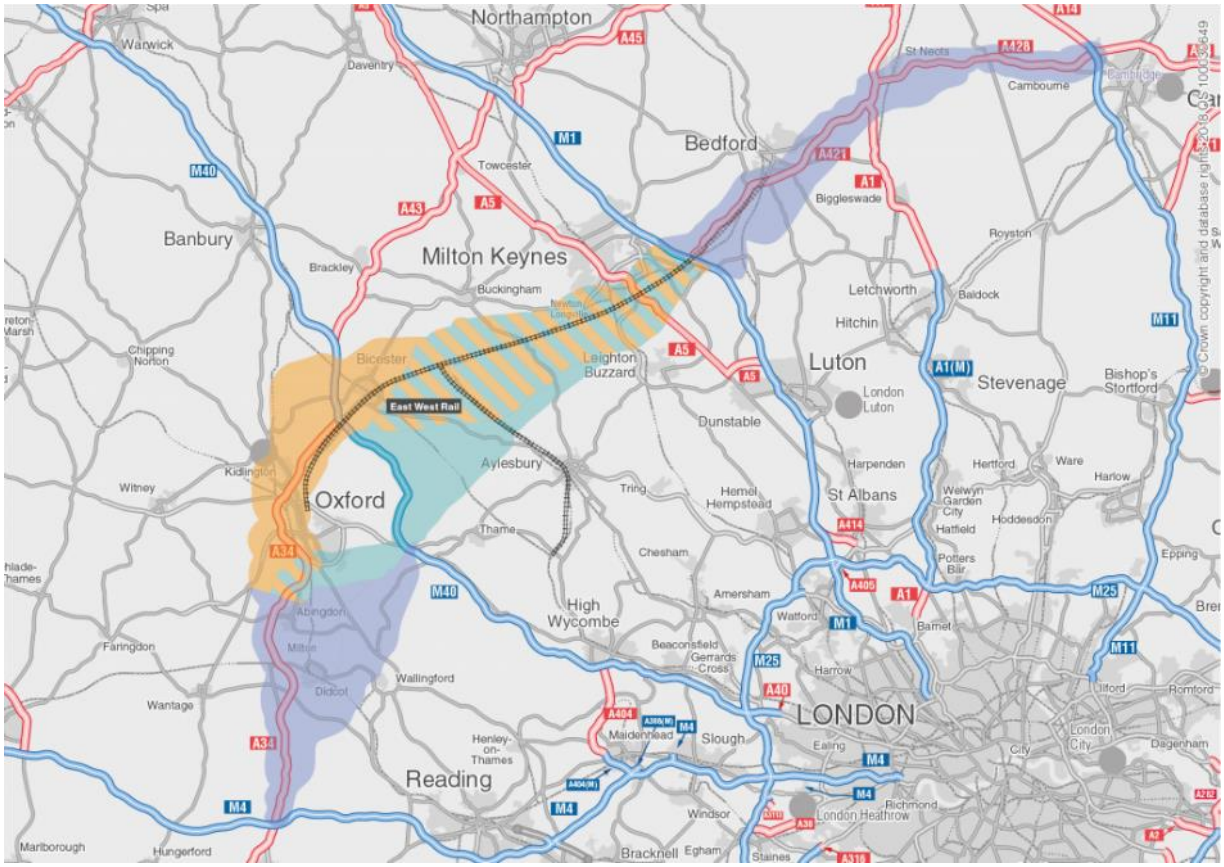
2.6.19. EWR will run immediately adjacent to the Site along its southern boundary. A section of the southern part of the Site has been safeguarded to facilitate construction and operation of East-West Rail.

OXFORD TO CAMBRIDGE EXPRESSWAY (EXPRESSWAY CORRIDOR ASSESSMENT REPORT, 2018)

2.6.20. The Government has identified the Oxford - Milton Keynes - Cambridge corridor as one of the most significant growth areas in the country. However, it also notes that existing east-west road and rail connections between these areas are poor, which is seen as a significant infrastructure barrier that risks constraining growth. In response, the Oxford to Cambridge Expressway was proposed to provide a high-quality road link between Oxford and Cambridge, via Milton Keynes.

2.6.21. In September 2018, Highways England announced that corridor B (central option) had been selected as the preferred corridor for the Oxford-Cambridge Expressway. Corridor B encompasses the Site and land both to the north and south, as shown in **Figure 2.1**.

Figure 2.1 - Preferred Corridor For The Oxford Cambridge Expressway



Source: https://highwaysengland.co.uk/oxford-to-cambridge-expressway-home/

2.6.22. Highways England issued a statement on 12th March 2020 as follows:

> *'We are now pausing further development of the scheme while we undertake further work on other potential road projects that could support the Government's ambition for the Oxford-Cambridge Arc, and benefit people who live and work there, including*

exploring opportunities to alleviate congestion around the Arc's major economic centres such as Milton Keynes'.

2.7 SUMMARY

2.7.1. Taken together, national, regional and local policy require new residential development to be well located to a range of facilities and services by a variety of modes of transport including walking, cycling and public transport to minimise the number and length of car journeys. Safe and suitable access to the Site should facilitate inclusive mobility and be achievable by all people.

2.7.2. In relation to the impact of development generated traffic on the operation of the local highway network, planning decisions should take account of whether improvements can be undertaken within the transport network that cost effectively and acceptably mitigate the significant impacts of the development.

2.7.3. Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.

2.7.4. The Proposed Development will provide a high-quality residential scheme, with connectivity for pedestrians and cyclists; access to public transport services; a range of amenities within the Site to reduce the need to travel, and a package of proposed mitigation to ensure the residual cumulative impacts on safety and highway capacity are acceptable and not severe. The Proposed Development therefore satisfies the requirements of local and national policies.

3

EXISTING CONDITIONS

3 EXISTING CONDITIONS

3.1 INTRODUCTION

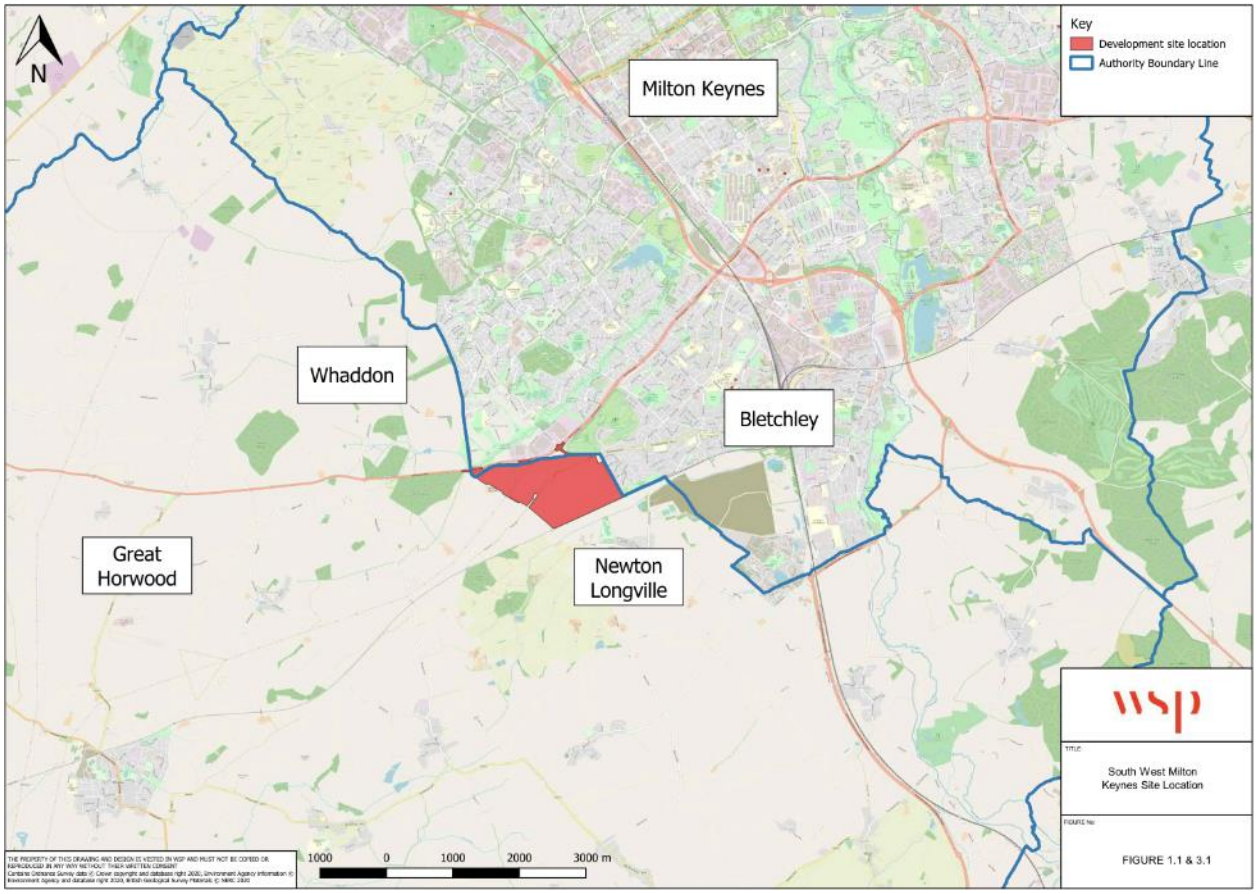
3.1.1. This section reviews the existing transport conditions in the vicinity of the Site. More specifically, this section provides a description of the existing Site operations, a review of existing walking, cycling and public transport facilities as well as a description of the existing highway network and a review of the existing highway safety records.

3.2 SITE DESCRIPTION

3.2.1. The area of land that will accommodate the Proposed Development comprises a 'green field' site, north-west of Newton Longville and immediately west of Far Bletchley and south west of the centre of Milton Keynes. The Site, which covers an area of approximately 144 hectares, is bounded to the north by A421 Standing Way, to the east by the existing built up area of Far Bletchley, to the south by the disused railway line and to the west by Whaddon Road. The entirety of the Site is located within the area of Aylesbury Vale in Buckinghamshire, with the exception of the proposed Site access points on the A421 Standing Way and B4034 Buckingham Road which are located within the Milton Keynes borough.

3.2.2. A plan showing the location of the Site in relation to the surrounding area is provided in **Figure 3.1**. This plan is reproduced at a larger scale in **Appendix B.**

Figure 3.1 - Site Location Plan



3.2.3. There is currently no formal means of vehicular access into the Site that could be used to serve the Proposed Development. Weasel Lane crosses the Site in a north easterly direction from Whaddon Road to B4034 Buckingham Road. Weasel Lane is a restricted byway, a highway over which the public has a right of way on foot, bicycle, horseback, and with non-mechanically propelled vehicles. Weasel Lane is accessible from both Whaddon Road and Buckingham Road by means of 'simple' priority junctions at both ends.

3.3 LOCAL ROAD NETWORK

3.3.1. The Site is well connected on a local, sub-regional and regional scale. A421/H8 Standing Way runs in a north easterly direction towards the A5, providing connections to the Bletchley, Emerson Valley and Furzton areas. A roundabout at the junction of H8 Standing Way and V6 Grafton Street (Bleak Hall Roundabout) provides access to Redmoor Roundabout which interchanges with A5. To the east of A5, A421 Standing Way provides access through the Beanhill, Netherfield, Monkston, Kents Hill and Brinklow areas to Junction 13 on the M1 Motorway and northeast into Bedford.

3.3.2. To the west, A421 provides links to Buckingham and A43. A421 extends west from Bottle Dump Roundabout in the north-west corner of the Site and has a number of junctions along its length providing links to minor roads that serve the surrounding villages. A421 continues west and meets A413 at a roundabout to the east of Buckingham, some 12.5km west of the Site, before continuing west bypassing Tingewick to the south before joining the A43 approximately 4km south of the centre of Brackley.

3.3.3. Whaddon Road runs in a south easterly direction along the western edge of the Site, over the disused railway, and into the village of Newton Longville. Within the village, Whaddon Road gives way to Bletchley Road/Drayton Road at a four-arm priority junction before continuing as Stoke Road. Stoke Road connects via a priority junction with Drayton Road which provides access to A4146 Stoke Hammond bypass to the south, of which A4146 provides a southern bypass to Leighton Buzzard before joining A505. A505 joins A5 Watling Street at a roundabout junction to the north west of Houghton Regis with A5 continuing eastwards to the recently opened Junction 11A on M1.

3.3.4. The location of the Site in relation to the local and strategic highway network is shown on **Figures 3.2** and **3.3** respectively. These plans are reproduced at a larger scale in **Appendix D.**

Figure 3.2 - Local Highway Context

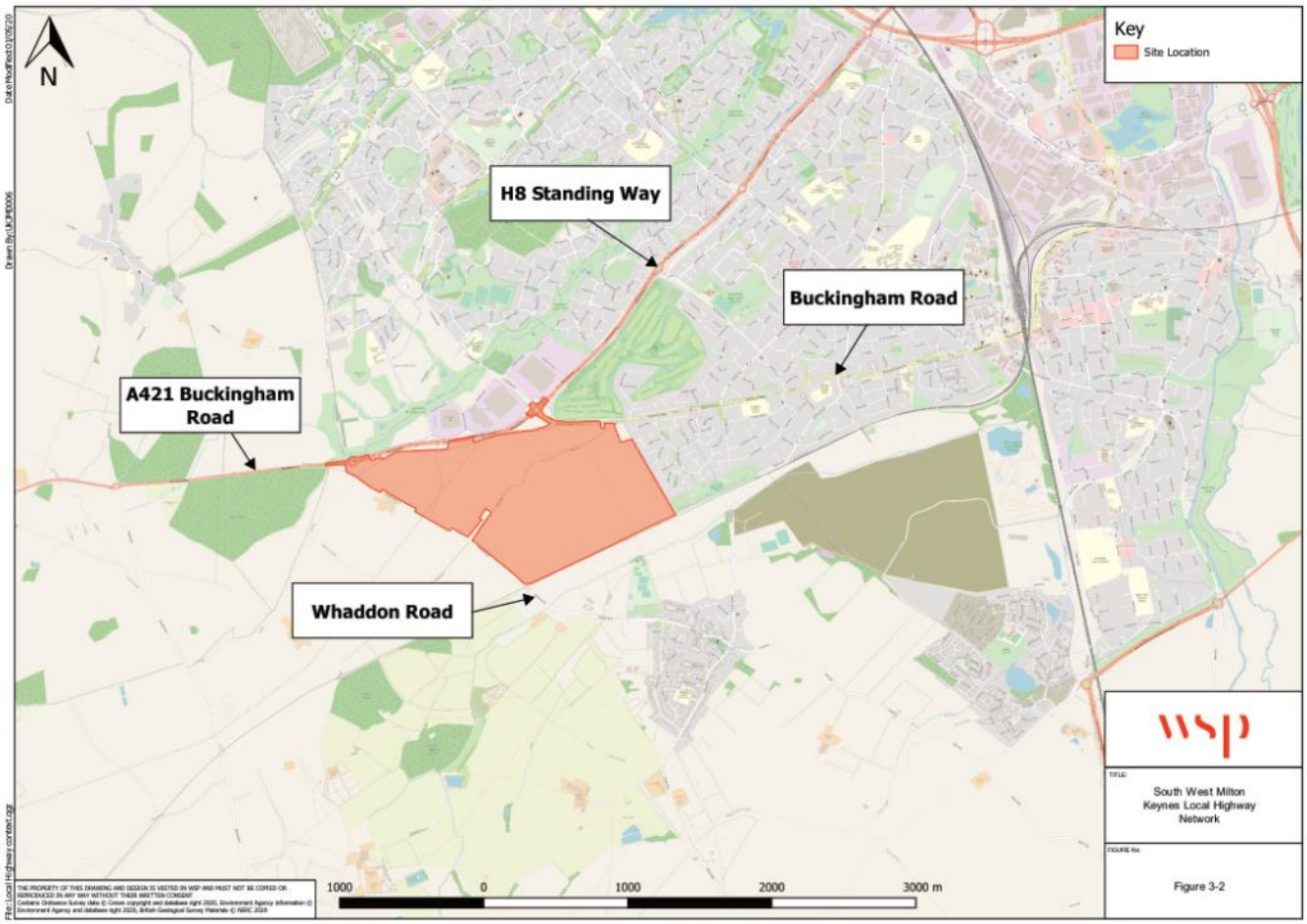
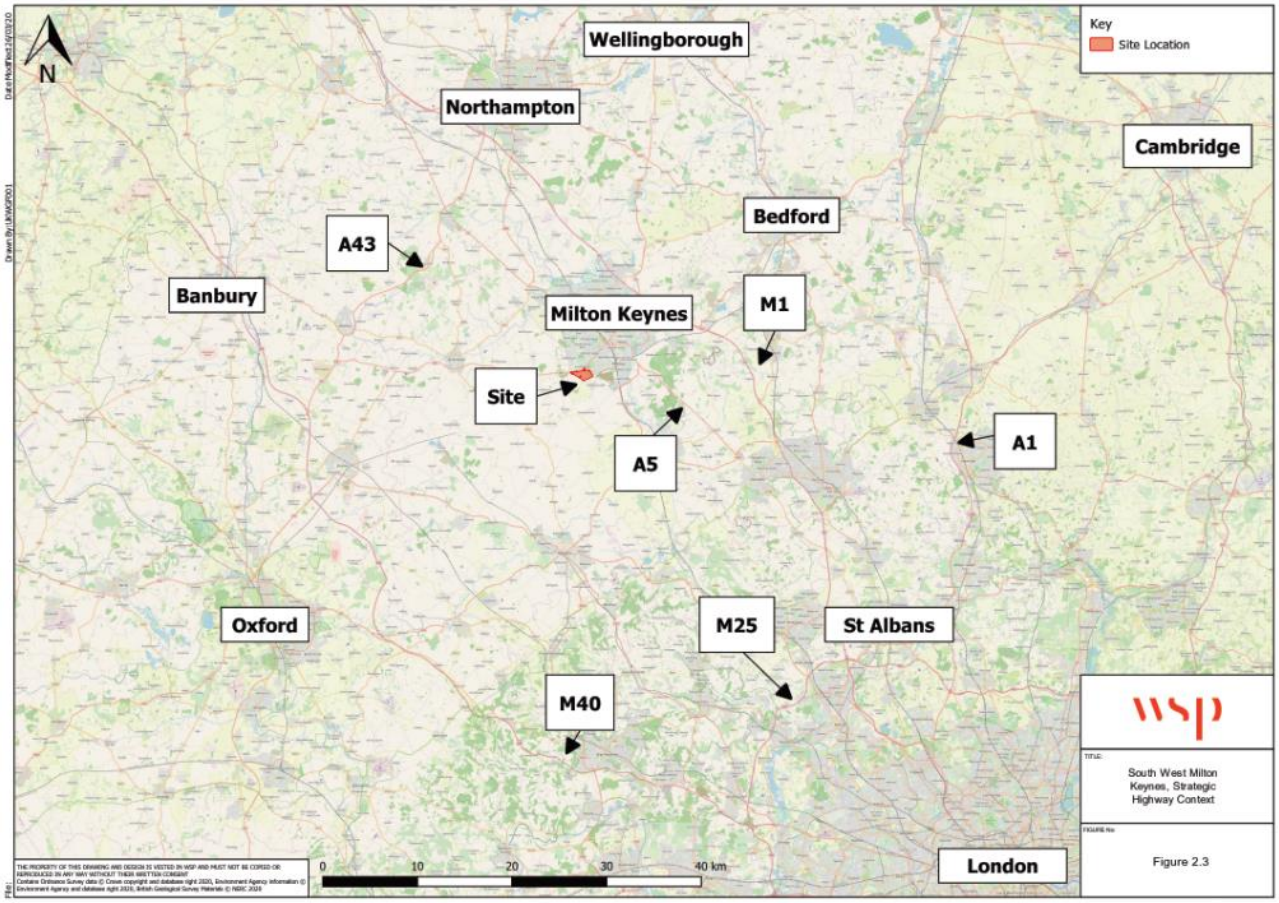


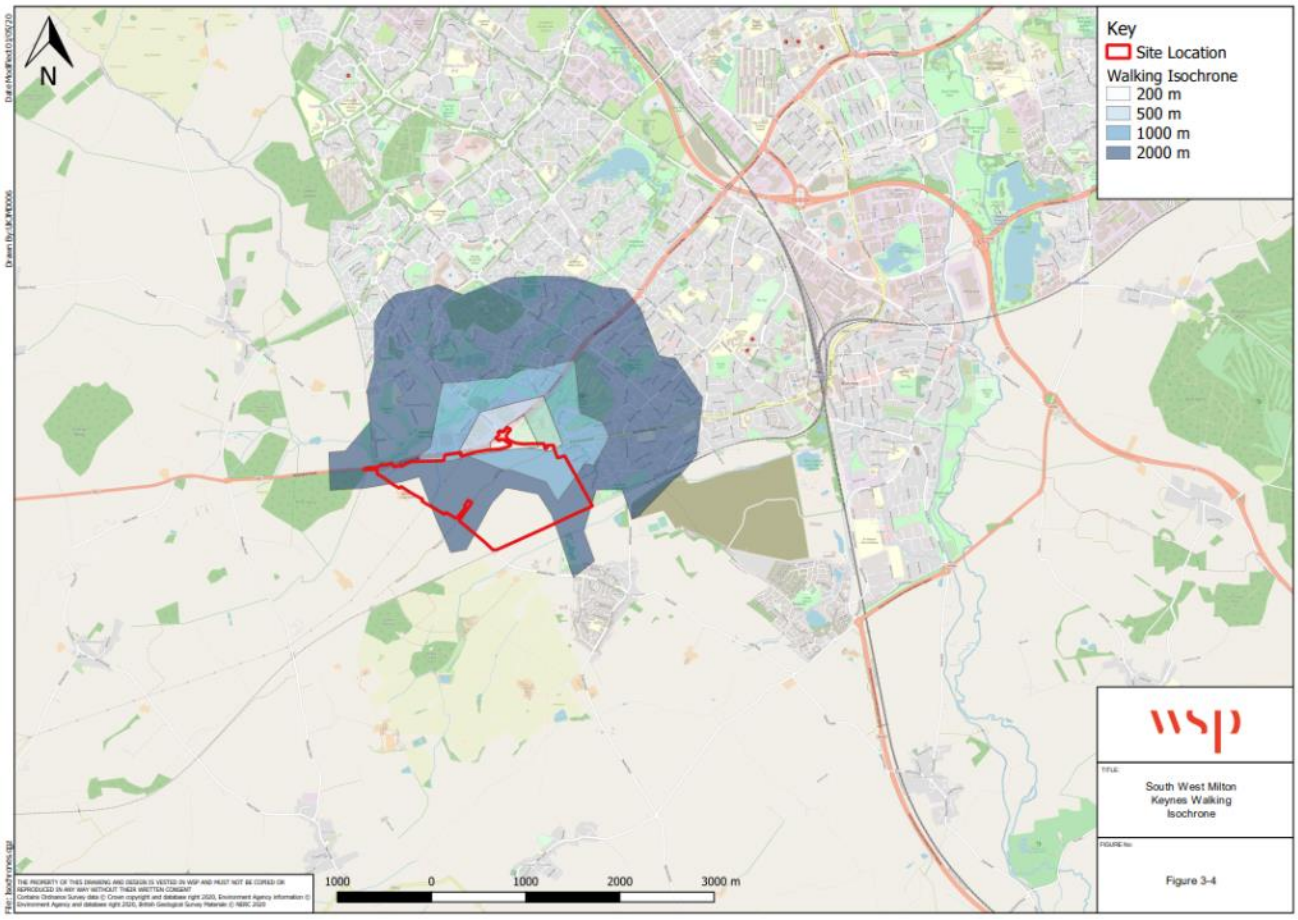
Figure 3.3 - Strategic Highway Context



3.4 WALKING NETWORKS

3.4.1. The Site is currently served by a network of existing pedestrian footways and public rights of way predominantly to the north and east of the Site. The existing opportunities for walking to the south and of the Site are limited given the more rural nature of those locations. Walking isochrones using the existing network of footpaths from a centroid on the Buckingham Road edge of the Site highlight the areas accessible within 500m, 1km and 2km distances as shown in **Figure 3.4**. This plan is reproduced at a larger scale in **Appendix E**. Using a centre point within the Site itself for the isochrone map would show inaccurate walk times due to the lack of an existing footway network within the Site.

Figure 3.4 - Walking Isochrone



3.4.2. **Figure 3.4** demonstrates that the areas of Snelshall West, Tattenhoe Park and West Bletchley are all within reasonable walking distance of the Site.

3.4.3. Whaddon Road to the west of the Site forms part of the Milton Keynes Boundary Walk, despite not featuring any formal pedestrian infrastructure, whereas, both A421 Standing Way and B4034 Buckingham Road do provide pedestrian and cycle facilities. A421 Standing Way features a shared cycle/footway to the north of the carriageway segregated by a wide grass verge. That forms part of Milton Keynes' 'Redway' Network, a network of pedestrian and cycle across the City. A subway is provided adjacent to Steinbeck Crescent which provides access to the southern side of the carriageway where a lay-by is provided. The subway also provides a connection to the disused carriageway of the old Buckingham Road that runs parallel and to the south of A421 Standing Way comprising the northern boundary of the Site.

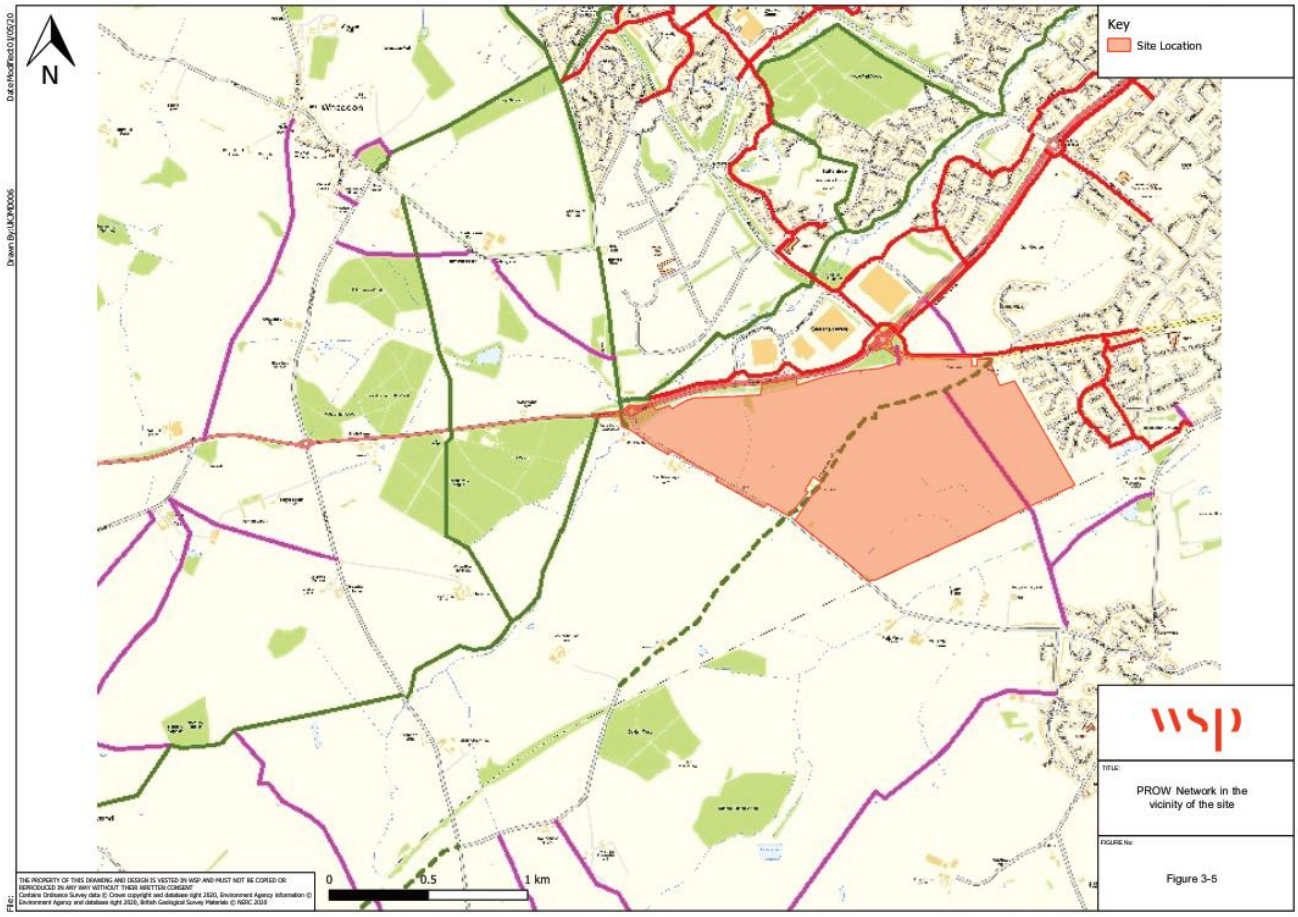
3.4.4. The Redway on A421 Standing Way runs between the Bottle Dump roundabout and the urban centre of Milton Keynes. Grade separated provision at the Tattenhoe Roundabout provides a safe connection to a further Redway route that runs along B4034 Buckingham Road to Caernarvon Crescent where Chestnuts Primary School is located. The Redway on A421 Standing Way continues into Milton Keynes along the southern side of the carriageway with subway connections to Tattenhoe Park and other residential areas to the north.

3.4.5. Buckingham Road features a shared cycle/ footway on the northern side of the carriageway segregated from the carriageway by a grass verge.

3.4.6. The following Public Rights of Way (PROW) (also shown in **Figure 3.5** and **Appendix F**) run through or adjacent to the Site:

- Bridleway WHA/16 extends south from A421 (approximately 150m west of Bottle Dump Roundabout) to Whaddon Road (Mursley) and beyond Whaddon Road to the west as LHO/19.
- Weasel lane, a restricted byway runs through the Site on a south west to north east axis between Whaddon Road and Buckingham Road where it terminates. In the west it continues across Whaddon Road and connects with Salden Lane.
- Footpath NLO/19 extends from Weasel Lane (250m west of Buckingham Road) south to Whaddon Road, Newton Longville, opposite Westbrook End. The footpath passes under the currently disused route of the East West rail line via an existing underpass.
- There are two recreational footpath routes in the vicinity of the Site:
  - The Midshires Way is a long-distance footpath and bridleway that runs from Bledlow in Buckinghamshire, to Stockport in Greater Manchester. Near the Site, it runs along Bridleway WHA/16 from Whaddon Road (Mursley) under the subway at Bottle Dump Roundabout, and north along the western boundary of Tattenhoe Park; and.
  - The Milton Keynes Boundary Walk is a circular route around Milton Keynes. It runs through Newton Longville, north along footpath NLO/19 to Weasel Lane, along Weasel Lane, north along Whaddon Road to Bottle Dump Roundabout and north along the western boundary of Tattenhoe Park. The route is a ‘walk’ and is not designated as a Public Right of Way (PROW).

Figure 3.5 - PROW Network In The Vicinity Of The Site



3.5 CYCLING NETWORK

3.5.1. National Cycle Route (NCR) 51 runs south-west through the Site, along Weasel Lane from Buckingham Road, crossing Whaddon Road before re-joining the road network on a small farm track, east of Lower Salden Farm. Weasel Lane is a restricted byway, with the following public right of way (PROW) classifications:

- NLO/25 at the north eastern end (between Buckingham Road and footpath NLO/19 – around 250metres) with a metalled surface around 4m in width and with verges both sides;
- NLO/20 between footpath NLO/19 and the parish boundary – around 1150m in length generally metalled and with a similar width of around 4m and verges to both sides; and
- MUR/15 between the parish boundary and the track to Lower Salden Farm – around 550m, with width and surface generally as for NLO/20.

3.5.2. The route is sign-posted throughout as NCR51, providing connections to Bicester and Oxford to the south-west, and Bedford and Huntingdon to the north-east.

3.5.3. The Milton Keynes cycle network (i.e. the Redway system) commences west of Bottle Dump roundabout before continuing eastbound, north of A421 Standing Way, reaching Tattenhoe Roundabout where it passes under the Snelshall Street and A421 Standing Way arms of the roundabout via subways. At this point, the Redway splits in three. A route can either be followed

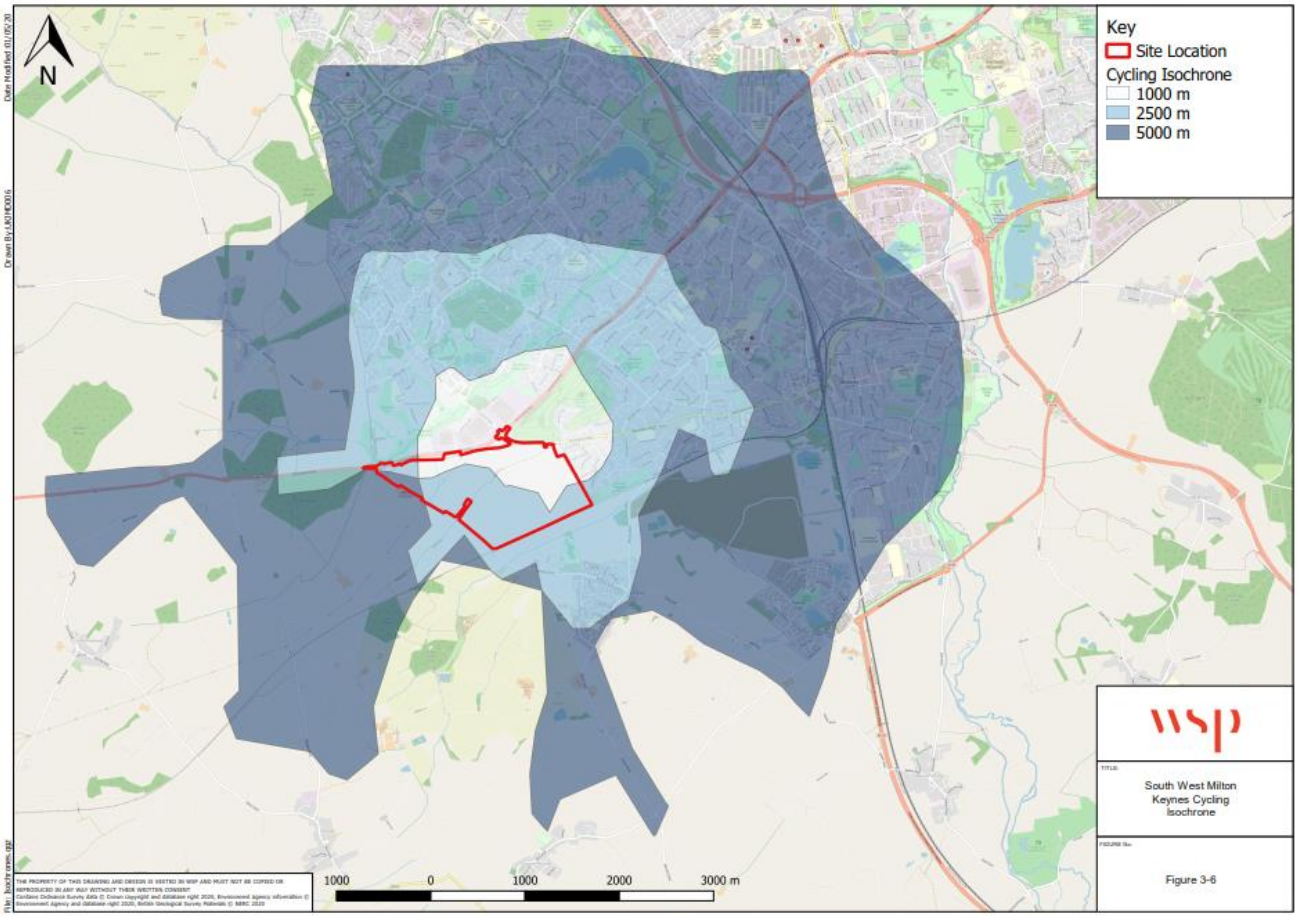
north-east alongside A421 Standing Way towards the City Centre and Central Milton Keynes Railway Station, or to the south east alongside Buckingham Road, and to the north alongside Snelshall Street.

3.5.4. The Redway network can be accessed from the Site via:

- Whaddon Road, immediately south of Bottle Dump roundabout;
- The subway under A421 Standing Way, east of Steinbeck Crescent; and
- Buckingham Road, south east of Tattenhoe Roundabout.

3.5.5. Isochrones showing the areas accessible within a 5km cycling distance of the Buckingham Road boundary of the Site are provided in **Figure 3.6**. This plan is reproduced at a larger scale in **Appendix G**. Within a 5km cycling distance the areas of Bletchley including Bletchley Railway Station, Water Eaton, Tattenhoe, Oxley park, Emerson Valley, Furzton and Shenley Lodge are accessible. Using a centre point within the Site itself for the isochrone map would show inaccurate cycle times due to the lack of an existing cycleway network within the Site.

Figure 3.6 - Cycle Isochrone



3.6 LOCAL BUS SERVICES

3.6.1. Access to public transport is measured with reference to the number of services accessible within a reasonable walking distance. For bus based public transport a reasonable level walking distance

between a home/place of employment and a bus stop is generally regarded to be around 300-500m, depending on the frequency of services from the stop[8]..

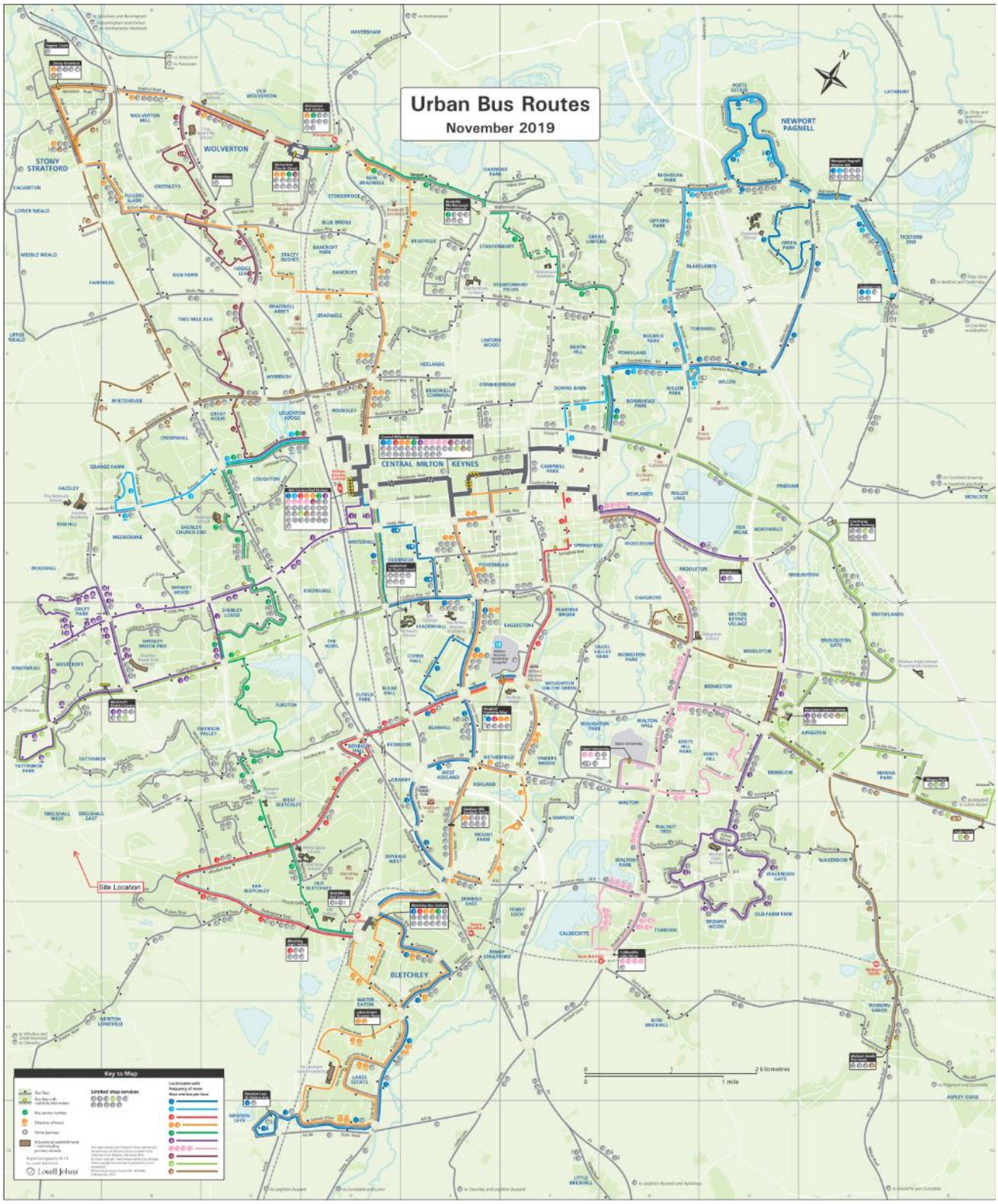
3.6.2. The nearest bus stops that are served by a regular bus service are on Chepstow Drive in Far Bletchley to the east of the Site. The existing bus stops on Chepstow Drive are currently served by Route 28 operated by Red Rose Travel. Between Monday and Saturday, an hourly service operates between Central Milton Keynes and Bletchley Bus Station.

3.6.3. The nearest bus stops to the Site that provide a more frequent level of service are around 950 metres walking distance from the Site boundary on Whaddon Way, and 2km from the centre of the Site. These stops are currently on Route 4, operated by Arriva which provides a 30-minute frequency service from 6:47 am to 10:27pm between Milton Keynes City Centre and Bletchley from Monday to Friday. Routes 30 and 604 also service at this stop but only for school travel Monday to Friday during term time.

3.6.4. An extract from the Milton Keynes Urban Bus Map showing the existing bus routes in the vicinity of the Site is provided in **Figure 3.7**, also contained at **Appendix H**.

[8] Table 4 page 18, *Buses in Urban Developments*, 2018, CIHT

Figure 3.7 - Bus Map Of Milton Keynes



3.6.5. A summary of the local bus services available is provided in **Table 3.1**.

Table 3.1 - Bus Services In The Vicinity Of The Site

Service No.	Nearest Bus Stop	Route	First Bus (Mon - Fri)	Last Bus (Mon - Fri)	Daytime Frequency		
					Mon - Fri	Sat	Sun
4	Whaddon Way	Central Milton Keynes - Bletchley	06:21	23:49	Every 10 mins	Every 15 mins	Every 15 mins
28	Chepstow Drive	Westcroft Shopping Centre - Bletchley	07:27	19:30	1 per hour	1 per hour	No service
7A	Buckingham Road	Wolverton - Bletchley	05:46	17:41	Twice per day	Twice per day	Twice per day
30	Whaddon Way	Bletchley - Newport Pagnell	07:30	16:42	Twice per day	No service	No service
604	Whaddon Way	Bletchley - St Pauls School	08:20	15:54	Three per day	No service	No service

3.7 RAIL SERVICES

3.7.1. Bletchley Railway Station is located approximately 3.4km to the east of the Site and accessible by bicycle or by Bus Route 4.

3.7.2. Bletchley Railway Station has 628 parking spaces with 29 for use by the mobility impaired. There is also sheltered parking for 58 bicycles at the station.

3.7.3. The station, operated by London Northwestern Railway, is located on the West Coast Main Line, providing connections to Milton Keynes Central and Birmingham New Street to the north, and Watford and Euston to the south. The station also provides links to local stations, including Leighton Buzzard.

3.7.4. Southern Trains operates an hourly service which terminates at East Croydon. **Tables 3.2** and **3.3** below provide details of the services from Bletchley Railway Station for Monday to Friday and Saturday and Sunday respectively.

Table 3.2 - Rail Services From Bletchley Railway Station (Monday To Friday)

Monday to Friday							
Route	Origin	Destination	First train	Last train	Total trains	08:00-09:00	17:00-18:00
Croydon and Clapham Jn. To Watford Jn. And Milton Keynes	Euston /East Croydon / Clapham Junction	Birmingham/ Northampton/ Milton Keynes	06:34	02:29	39	4	3
	Birmingham / Northampton / Milton Keynes	Euston/East Croydon/Clapham Junction	03:35	02:30	40	7	3
Bletchley - Bedford	Bletchley	Bedford	05:16	21:01	16	1	1
	Bedford	Bletchley	06:12	22:00	16	1	1

Table 3.3 - Rail Services from Bletchley Railway Station (Saturday and Sunday)

Saturday and Sunday							
Route	Origin	Destination	Saturday			Sunday	
			First train	Last train	Total trains	First train	Last train
Croydon and Clapham Jn. To Watford Jn. And Milton Keynes	Euston / East Croydon / Clapham Junction	Birmingham / Northampton / Milton Keynes	06:30	00:02	39	09:48	23:55
	Birmingham / Northampton	Euston / East Croydon / Clapham Junction	04:40	22:26	40	08:14	22:16
Bletchley - Bedford	Bletchley	Bedford	05:34	21:01	16	No service	
	Bedford	Bletchley	06:29	22:00	16		

3.7.5. Milton Keynes Central is located approximately 6.4km from the Site via the Redway network on bicycle, or via Snelshall Street, Childs Way and Elder Gate by car. The station provides sheltered storage for 900 bicycles. Car parking is available at the station although this is more costly than the provision at Bletchley and therefore may be a less attractive option for drivers wishing to access rail services.

3.7.6. The train operators serving Milton Keynes Central are London Northwestern, Southern Trains and Virgin Trains. **Table 3.4** below provides details of the services from Milton Keynes Central.

Table 3.4 - Rail Services From Milton Keynes Central Railway Station

Service	Frequency		
	Monday-Friday	Saturday	Sunday
West Midland Trains Bletchley – Milton Keynes	4 per hour	4 per hour	2 per hour
Southern Trains Croydon and Clapham Jn. to Watford Jn. and Milton Keynes (connections to Northampton and Birmingham New Street)	Hourly	Hourly	Hourly
Virgin Trains/West Midlands Trains Milton Keynes - London Euston	8 per hour	8 per hour	6 per hour
Virgin Trains London & West Midlands - North West & Scotland	5 per hour	5 per hour	4 per hour

3.8 ACCESSIBILITY TO LOCAL FACILITIES

3.8.1. In line with national planning policy the Site should be accessible by a variety of transport modes allowing a reduction in the reliance on the private car.

3.8.2. Access to local amenities has been considered by examining the number of services and facilities available within a reasonable walking and cycling distance of the Site. The distances that are typically considered acceptable by these modes of travel are as follows:

- Walking - up to 2km (equivalent to a 25-minute walk); and
- Cycling - up to 5km (equivalent to a 20-minute cycle).

3.8.3. The range of amenities and facilities available are shown in **Figure 3.8** and **Table 3.5.** **Figure 3.8** is also reproduced in **Appendix I**.

Figure 3.8 - Amenities Plan

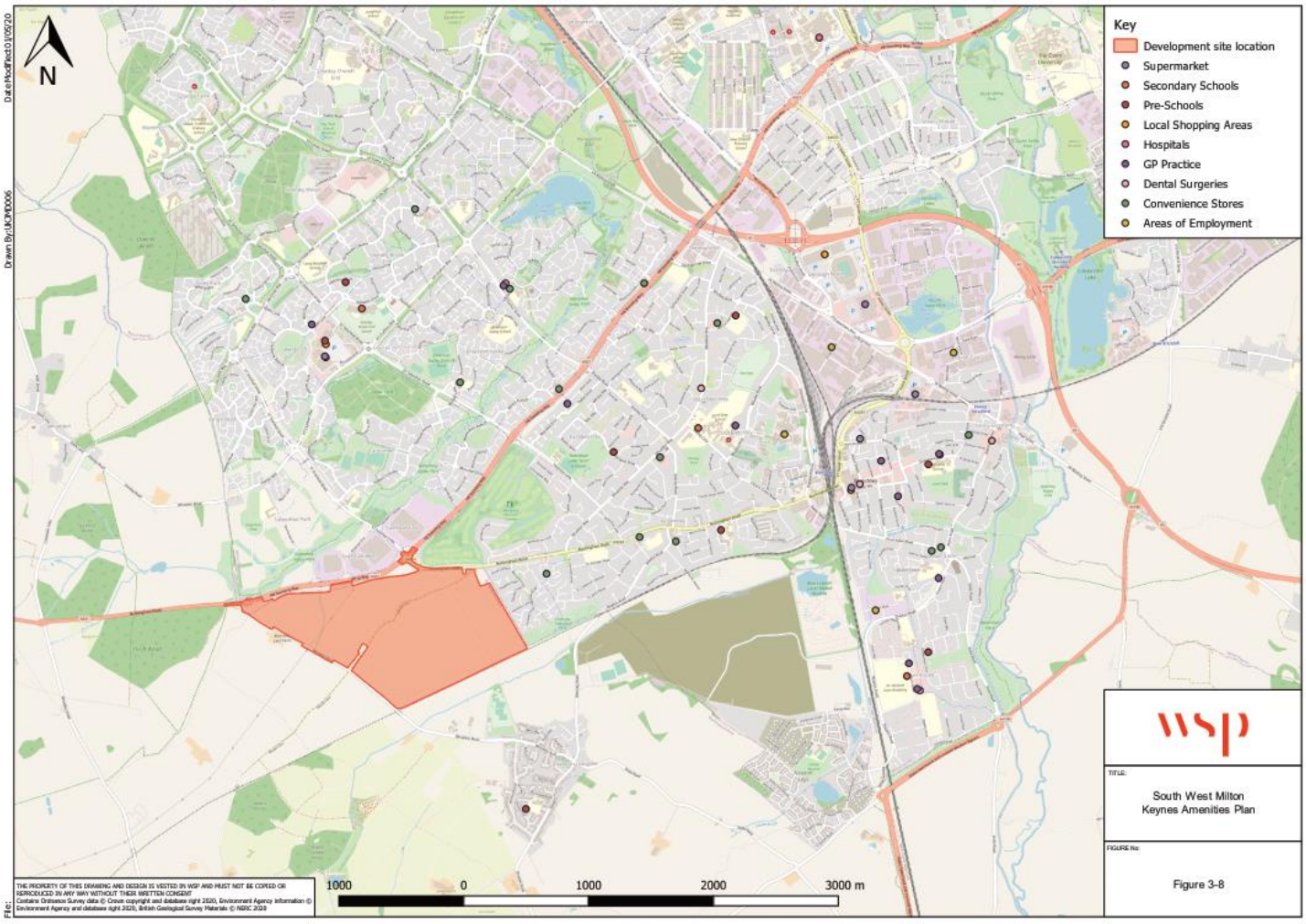


Table 3.5 – Amenities And Facilities In The Vicinity Of The Site

Amenity	Distance from Site Access Point	Walking Time*	Cycling Time**
Premier Store, Chepstow	1km	13 minutes	3 minutes
Chepstow Community Centre	1km	13 minutes	3 minutes
Whaddon House GP Surgery	2.1km	26 minutes	7 minutes
All Smiles Dental Care	2.5km	31 minutes	8 minutes
Bilep Chemist	1.7km	21 minutes	5 minutes
Milton Keynes University Hospital	6.25km	78 minutes	19 minutes
Westcroft District Centre (Local Shopping Centre)	2.7km	34 minutes	8 minutes
Giles Brook Primary School	1.2km	15 minutes	4 minutes
Priory Rise Primary School	1.8km	23 minutes	6 minutes
Lord Grey Academy (Secondary School)	2.6km	33 minutes	8 minutes
Morrisons	2.7km	34 minutes	8 minutes
Bletchley Leisure Centre	4km	50 minutes	12 minutes

**Walking time based on an average walking speed of 80m per minute (3mph[9])*
***Cycle time based on an average cycling speed of 322m per minute (12mph[10])*

3.8.4. It should be noted that the Proposed Development includes provision of a Neighbourhood Centre, a primary school and a secondary school, meaning access to local facilities will be via shorter distances than those shown in **Table 3.5**. Further detail on the composition of the Proposed Development is provided in Section 4 of this TA.

3.9 PERSONAL INJURY COLLISIONS

INTRODUCTION

3.9.1. This section provides a review of Personal Injury Collision (PIC) data across the TA study area.

[9] Page 6, *Planning for Walking*, 2015, CIHT

[10] Para 8.2.2 Page 41, LTN02/08 Cycle Infrastructure Design, 2008, DfT

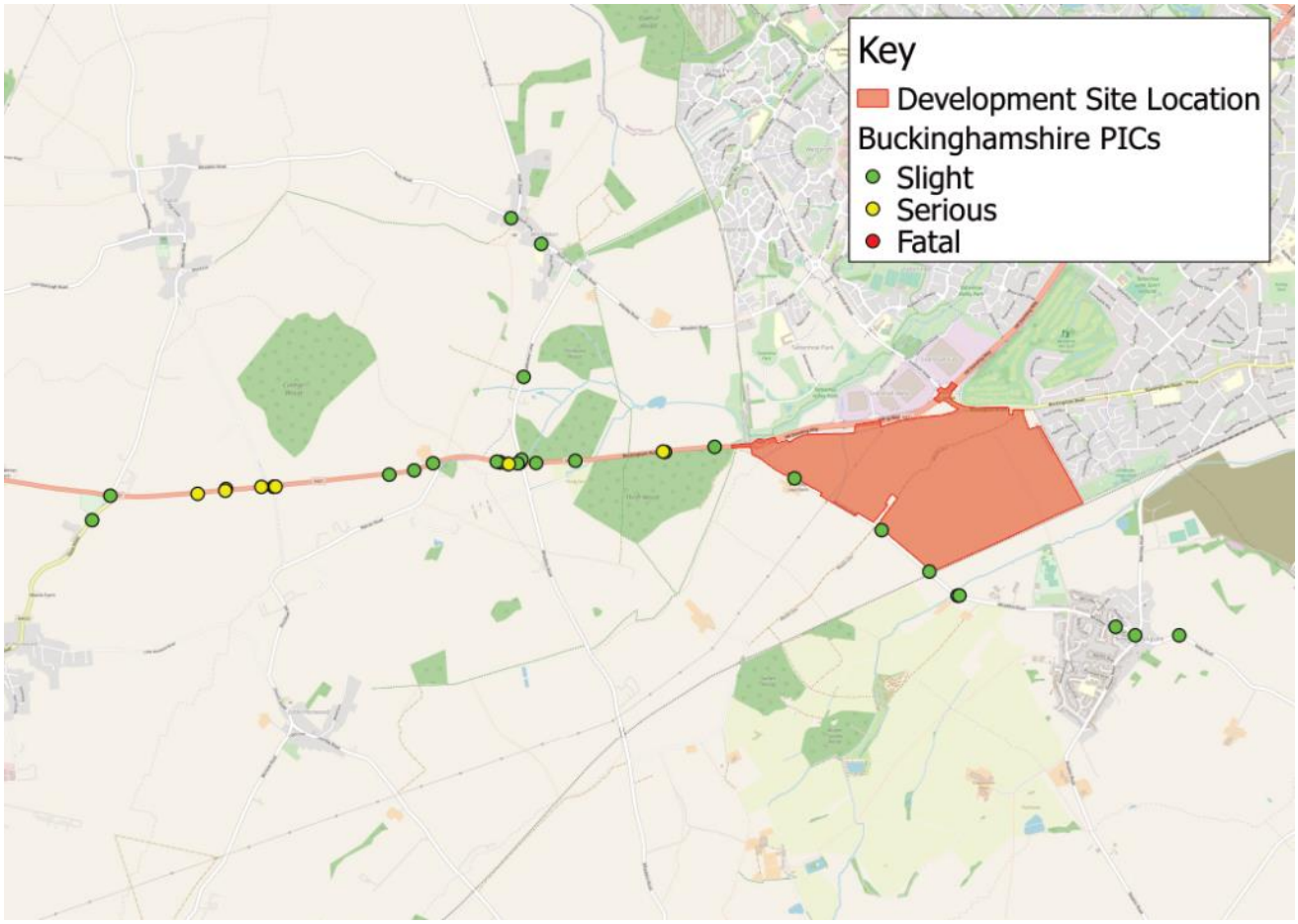
BUCKINGHAMSHIRE.

Summary of Collisions

3.9.2. The most recent five years of Personal Injury Collision (PIC) data has been obtained from BC for the TA study area. The raw data is contained in **Appendix J**.

3.9.3. **Figure 3.9** shows the collisions that occurred within the Buckinghamshire study area between 2014 and 2019.

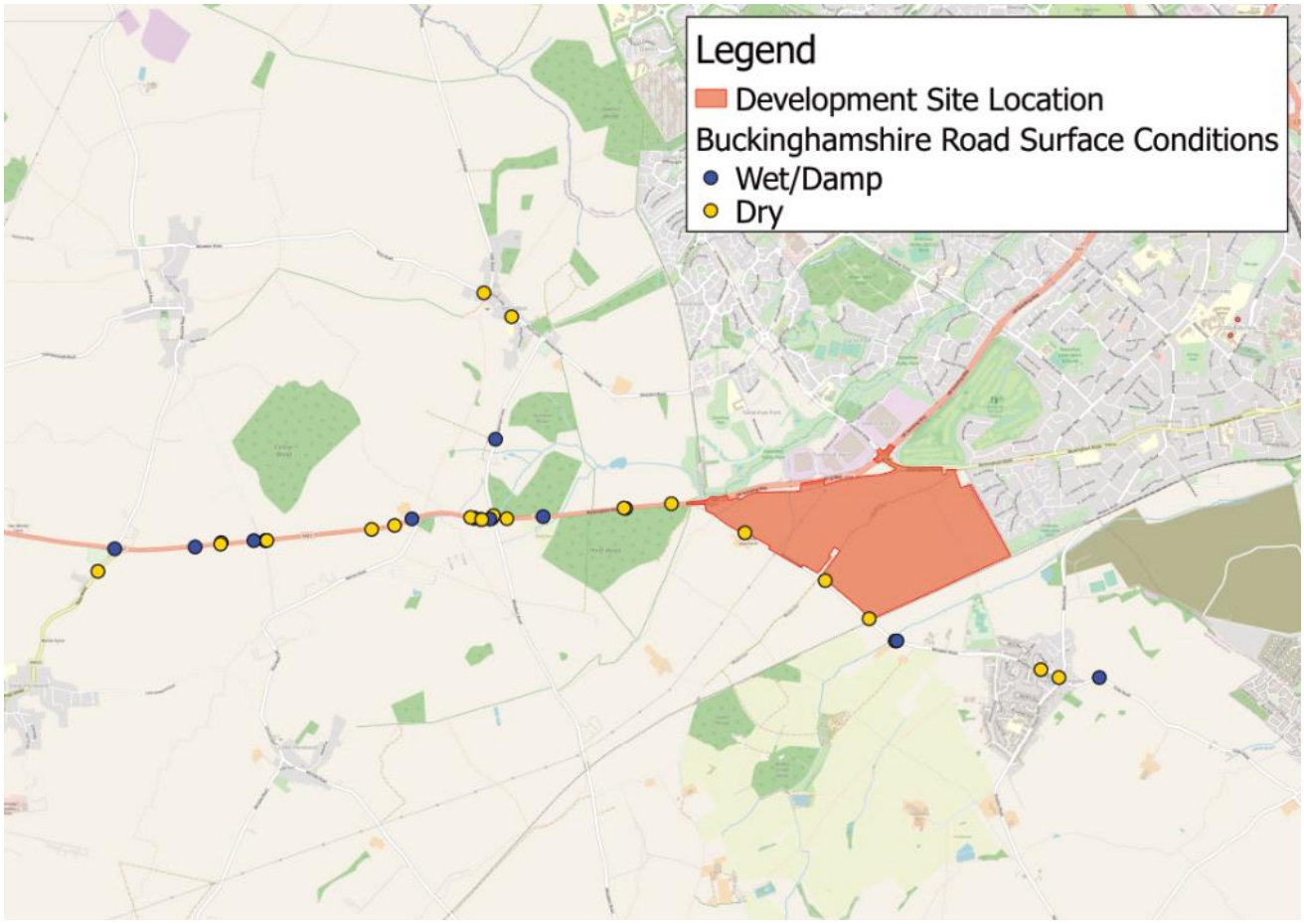
Figure 3.9 – Collisions By Severity Between 2014 And 2019 (BC)



3.9.4. A total of 36 collisions occurred on the road network within the Buckinghamshire study area in the five-year period studied. No fatal collisions occurred. There were six serious collisions and 30 slight collisions. Of all collisions between 2014 and 2019, 11% occurred during both the morning peak period (0700-0900) and the evening peak (1600-1800) period.

3.9.5. **Figure 3.10** shows the collisions classified by road condition. This analysis shows that 69% of all the collisions occurred on a dry carriageway surface. This suggests that road surface condition was not a major causal factor of the recorded collisions.

Figure 3.10 - Collisions By Road Condition From 2014 To 2019 (BC)



3.9.6. Within the 36 collisions that were recorded there were 55 casualties, of which 82% were slightly injured, 18% were seriously injured and 0% suffered fatal injuries. **Table 3.6** summarises the collisions recorded.

Table 3.6 – Summary Of Collisions By Location And Severity Between 2014 And 2019 (BC)

Location	Number of PICs by Severity		
	Slight	Serious	Fatal
A421 / B4033	1	0	0
A421 / Coddimoor Lane / Whaddon Road	8	1	0
A421 / Great Horwood	2	2	0
A421 / Warren Road	2	0	0
Whaddon	2	0	0
Newton Longville	3	0	0

3.9.7. **Table 3.7** provides a summary of the collisions by severity and who was injured.

Table 3.7 - Summary of Casualties Between 2014 and 2019 (BC)

	Fatal	Serious	% of Serious	Slight	% of Slight	Total
Vehicle Driver	0	7	70%	31	68%	38
Passenger	0	1	10%	10	22%	11
Motorcycle rider	0	1	10%	1	2%	2
Cyclists	0	1	10%	2	4%	3
Pedestrian	0	0	0%	1	2%	1
Other	0	0	0%	0	0%	0
Total	0	10	18%	45	82%	55

3.9.8. When reviewing the casualty data for the collisions in Buckinghamshire, there was only one pedestrian casualty and three cyclist casualties, two of whom were slightly injured, and one seriously injured. The proportion of all casualties that are pedestrians or cyclists is just 7%, reflecting the rural nature of the area and the low usage of these roads by pedestrians and cyclists.

Collisions by Location

3.9.9. **Figure 3.11** shows the collisions that occurred at or on the approaches to the A421/Winslow Road (Junction 10) and Whaddon Crossroads (Junction 7)

Figure 3.11 – Collisions - A421/Nash Road/Winslow Road & Whaddon Crossroads

3.9.10. There was one collision at the roundabout of the A421 and B4033 (Junction 10) which occurred when a motorist failed to give-way to another vehicle on the roundabout resulting in a slight injury. There was also one collision south of the roundabout which resulted from a rear end collision adjacent to a private drive and is therefore unrelated to the roundabout.

3.9.11. There were three collisions at the Whaddon Crossroads roundabout junction between the A421 and Coddimoor Lane (Junction 7). Details of the collisions were as follows:

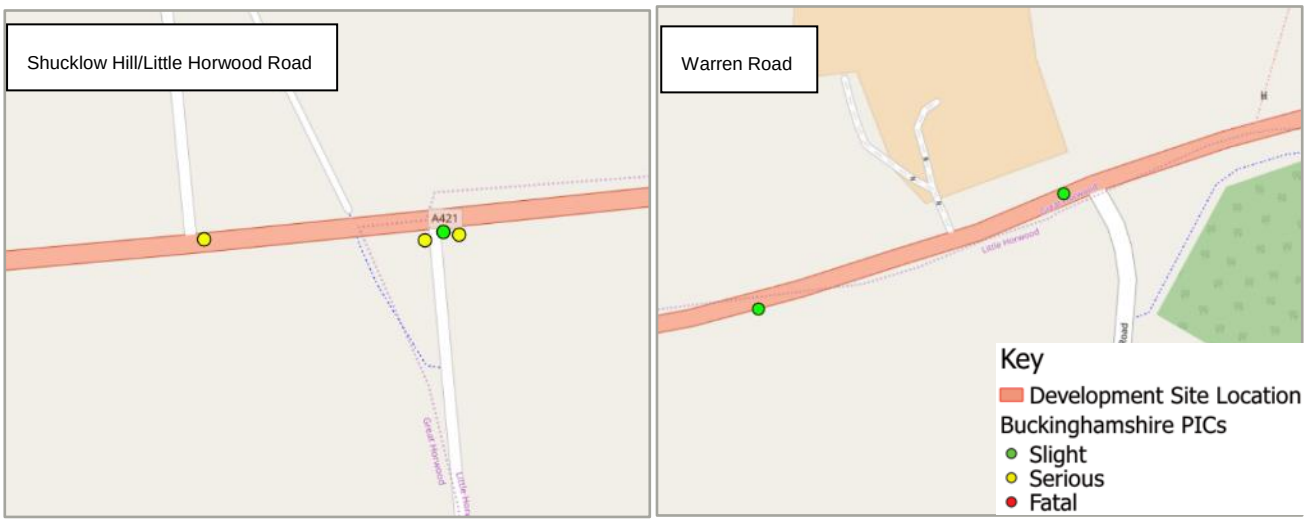
- Two rear end shunt collisions occurred in damp conditions; and
- One loss of control accident on the western arm.

3.9.12. The remaining collisions occurred on the main A421 carriageway and involved:

- A rear end shunt occurred when a following motorist failed to brake;
- A loss of control occurred due to excessive speed; and
- Two head on collisions occurred due to poor lane discipline.

3.9.13. **Figure 3.12** shows the collisions that occurred at the A421/Little Horwood Road junction (Junction 9) and the A421/Warren Road (Junction 8).

Figure 3.12 - Collisions - A421/Shucklow Hill/Little Horwood Road & A421/Warren Road



3.9.14. There were four collisions at the junction between A421 and Little Horwood Road (Junction 9). One of these was serious and three were slight. The details of the collisions were as follows:

- A side on impact due to overtaking when the car in front was making a right turn off A421; and
- Two side on collisions due to failure to look when exiting junction.

3.9.15. There was one collision at the junction of A421 and Warren Road (Junction 8). This was caused by a rear end shunt due do a failure to judge braking ahead and stationary vehicles.

3.9.16. **Figure 3.13** shows the collisions that occurred in Whaddon and Newton Longville**.**

Figure 3.13 - Collisions - Stock Lane & Newton Longville Crossroads

3.9.17. Two collisions occurred in Whaddon, both the result of driver error and resulting in slight injuries. The collision in Whaddon occurred when a vehicle collided with a stationary vehicle and the other occurred when a vehicle accidently crossed into the opposing traffic lane colliding with a vehicle.

3.9.18. There were three slight collisions in Newton Longville. The cause of the collisions was as follows:

- Failure to observe give way and colliding with opposing vehicle;
- Rear end shunt caused by failure to judge a stationary vehicle in front; and
- Loss of concentration causing loss of control and vehicle to come off carriageway.

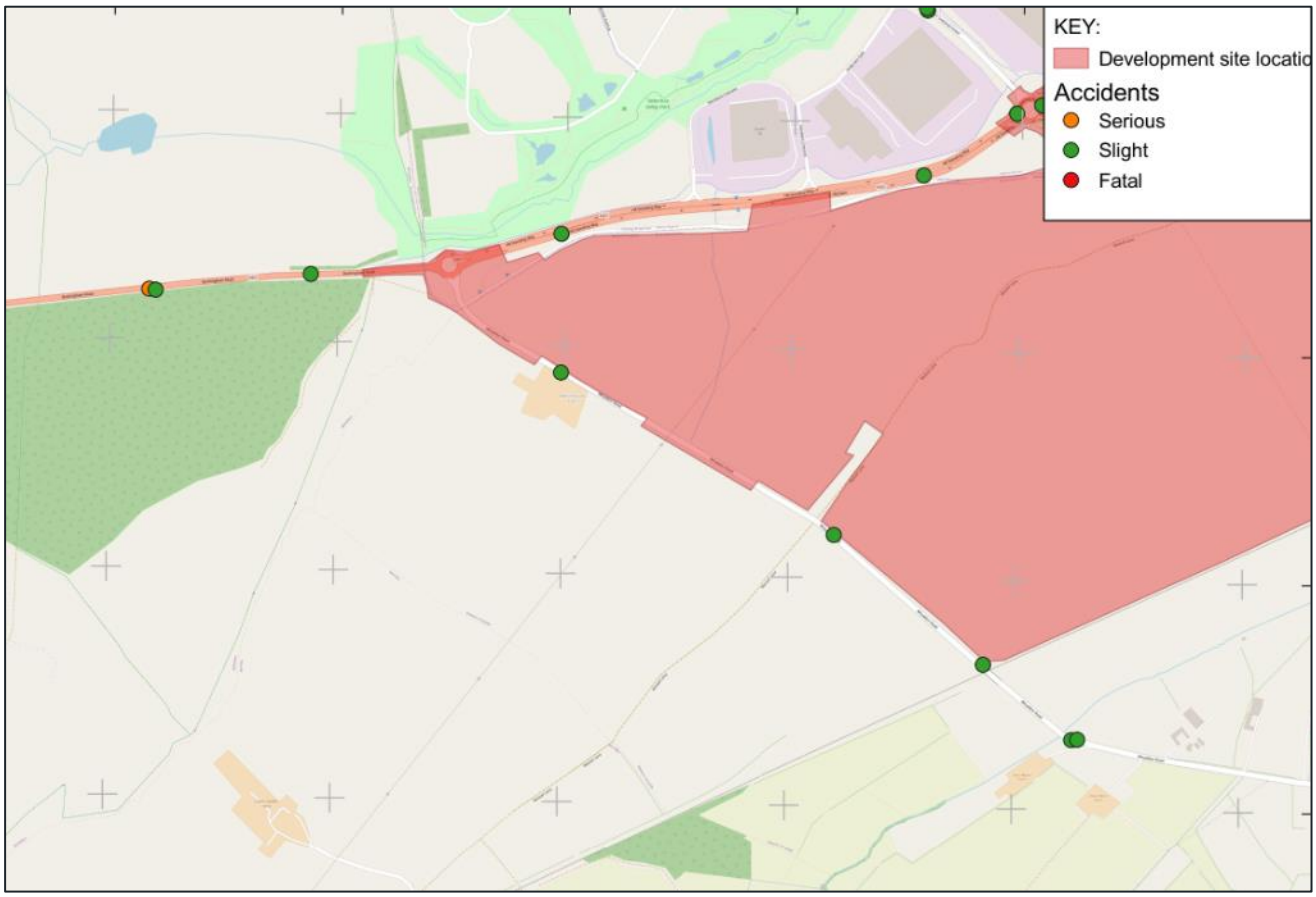
Whaddon Road Collisions

3.9.19. **Figure 3.14** illustrates the collisions along Whaddon Road which borders the Site boundary to the west.

3.9.20. There were five collisions along Whaddon Road, all of which were slight in severity. The cause of the collisions was as follows:

- Three collisions occurred due to a loss of control and colliding with the nearside of the carriageway;
- One occurred when a learner driver swerved to the nearside due to an oncoming HGV and collided with a wall; and
- The final collision occurred when a motorist attempted a right turn manoeuvre across the path of an oncoming vehicle.

Figure 3.14 – Collisions - Whaddon Road



MILTON KEYNES

Summary of Collisions

3.9.21. The most recent five years of Personal Injury Collision (PIC) data has been obtained from MKC for the TA study area. The raw data is contained in **Appendix K**.

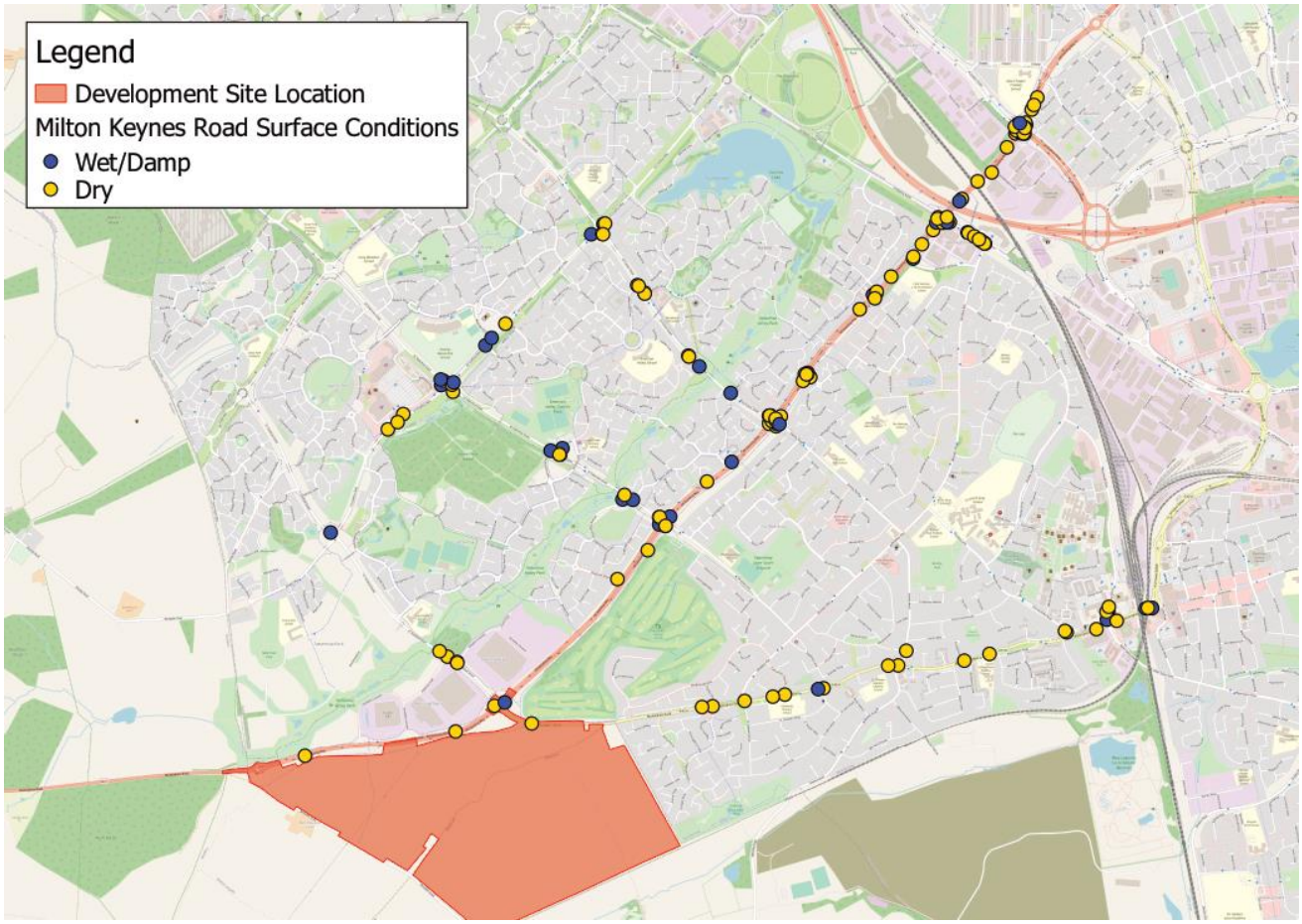
3.9.22. The collisions that occurred within this area of interest in the five-year period, 2014 to 2019, are shown in **Figure 3.15**.

Figure 3.15 - Collisions By Severity Between 2014 And 2019 (MKC)

3.9.23. A total of 157 collisions occurred on the road network within the Milton Keynes study area in the five-year period considered. No fatal collisions occurred with 21 serious collisions and 136 slight collisions. Of all collisions, 8% occurred during the morning peak period (0700-0900) and 27% during the evening peak period (1600-1800). There was therefore a disproportionate number of collisions in the evening peak period.

3.9.24. **Figure 3.16** shows the collisions classified by road surface condition, with 75% of all the collisions occurring on a dry carriageway surface. This suggests that poor road surface condition was not a major causal factor of the collisions.

Figure 3.16 - Collisions By Road Condition From 2014 To 2019 (MKC)



3.9.25. Within the 157 collisions that were recorded there were 213 casualties, 89% of which were slightly injured, 11% were seriously injured and 0% suffered fatal injuries. **Table 3.8** summarises the collisions recorded.

Table 3.8 – Summary Of Collisions By Location And Severity Between 2014 and 2019 (MKC)

Location	Number of PICs by Severity		
	Slight	Serious	Fatal
Tattenhoe Roundabout	2	0	0
H8 Windmill Hill Roundabout	6	0	0
Emerson Roundabout	12	1	0
Elfield Park Roundabout	11	0	0
H8 Standing Way – V6 Grafton Street	17	0	0
Kingsmead Roundabout	0	1	0
V2 Tattenhoe Street	4	2	0
Westcroft Roundabout	4	2	0
V3 Fulmer Street	7	1	0
Furzton Roundabout	5	0	0
V4 Watling Street - Whaddon way	11	1	0

3.9.26. **Table 3.9** provides a summary of the collisions by severity.

Table 3.9 – Summary Of Casualties Between 2014 and 2019 (MKC)

	Fatal	Serious	% of Serious	Slight	% of Slight	Total
Vehicle Driver	0	7	30%	107	56%	114
Passenger	0	2	9%	46	24%	48
Motorcycle rider	0	6	26%	16	8%	22
Cyclists	0	0	0%	8	4%	8
Pedestrian	0	8	35%	13	7%	21
Other	0	0	0%	0	0%	0
Total	0	23	100%	190	100%	213

3.9.27. When reviewing the casualty data for the Milton Keynes sections of the study area (as shown in **Table 3.9**), there were 31 pedestrian casualties and eight cyclist casualties, 21 of whom were

slightly injured and eight seriously injured. The proportion of all casualties that are pedestrians or cyclists is 14%, which is twice as many proportionally than the study area within Buckinghamshire. This highlights the more urban nature of the study area within Milton Keynes.

Collisions by Location

3.9.28. **Figure 3.17** shows the collisions that occurred at or on the approaches to the A421/Snelshall Street (Junction 5) and A421/Tattenhoe Street (Junction 18)

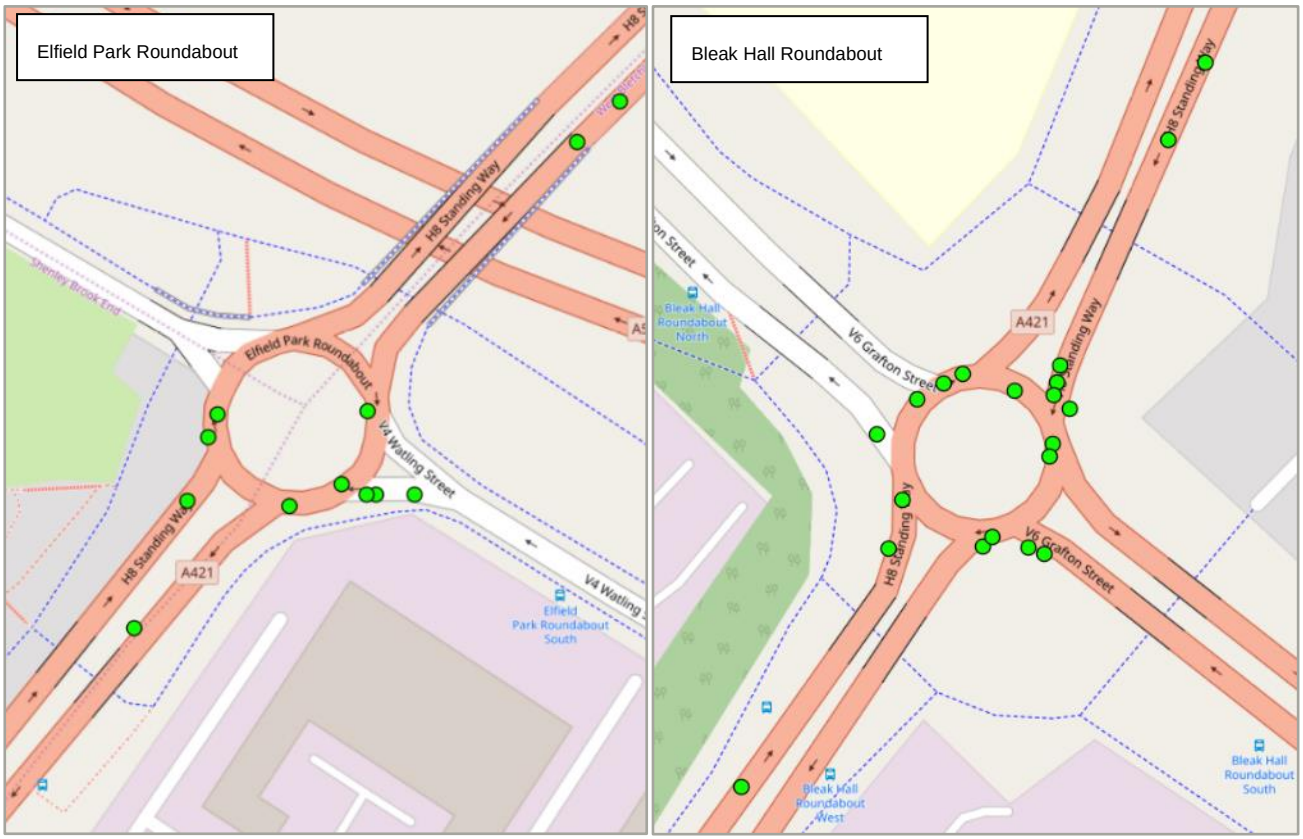
Figure 3.17 - Collisions - Tattenhoe Roundabout & Windmill Hill Roundabout

3.9.29. One of the two collisions that occurred at the Tattenhoe Roundabout one was due to the driver failing to stop upon entering and another due to a medical episode.

3.9.30. There were six collision recorded at Windmill Hill Roundabout. The collision entering the roundabout from the north-east occurred due to driver error where they struck the central reservation and in the opposing direction, entering south-west a driver failed to stop when entering the roundabout. These were therefore both driver error. The two collisions entering the roundabout on V2 Tattenhoe Street occurred due to a rear end collision and the two collisions occurring on the roundabout were due to poor lane discipline.

3.9.31. **Figure 3.18** shows the collisions that occurred at or on the approaches to the A421/Watling Street (Junction 16) and A421/Grafton Street (Junction 15).

Figure 3.18 - Collisions - Elfield Park Roundabout & Bleak Hall Roundabout



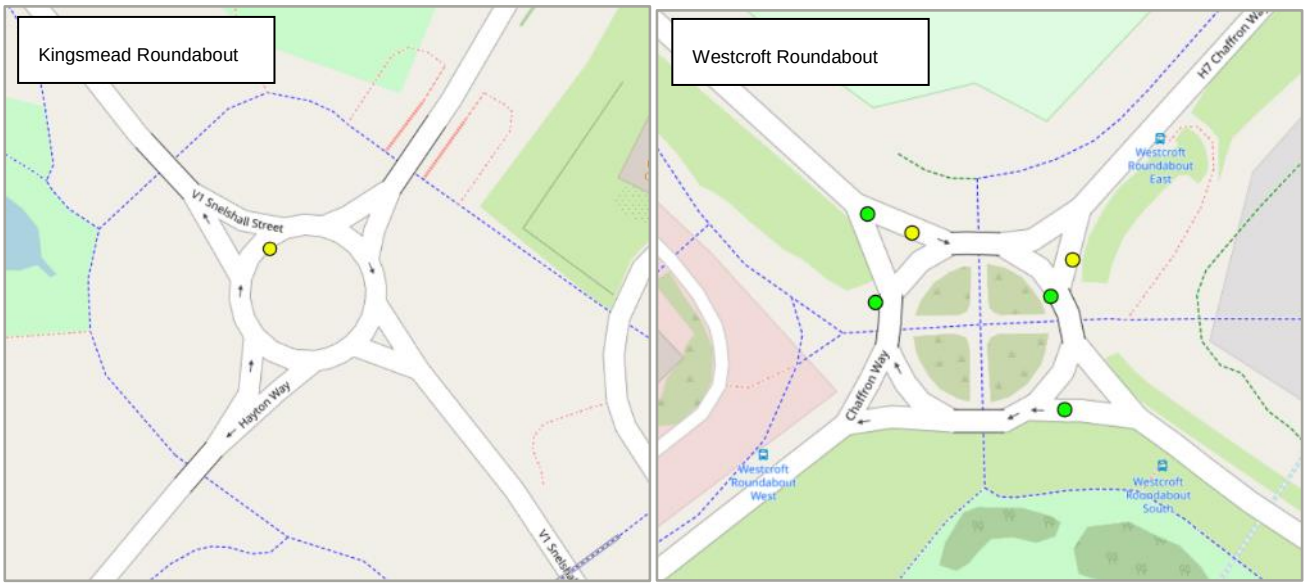
3.9.32. All nine collisions at Elfield Park Roundabout were slight in severity. There were four rear end collisions, three of which occurred on the north-west V4 Watling street entry lane. Two other Give-way collision occurred, and two poor lane discipline collisions occurred.

3.9.33. There were 17 collisions at the Bleak Hall Roundabout, all of which were slight in severity. The cause of the collisions are as follows:

- Eight of these were rear end collisions;
- Seven were due to poor lane discipline; and
- Two were due to vehicles failing to give way when entering the roundabout.

3.9.34. **Figure 3.19** shows the collisions that occurred at or on the approaches to the Kingsmead Roundabout (Junction 12) and Westcroft Roundabout (Junction 13).

Figure 3.19 - Collisions – Kingsmead Roundabout & Westcroft Roundabout



3.9.35. One serious collision occurred at the roundabout of Hayton Way and V1 Snelshall Street due to a driver failing to see the roundabout and colliding with the central island.

3.9.36. At Westcroft Roundabout there were four slight and two serious collisions. The cause of the collisions was as follows:

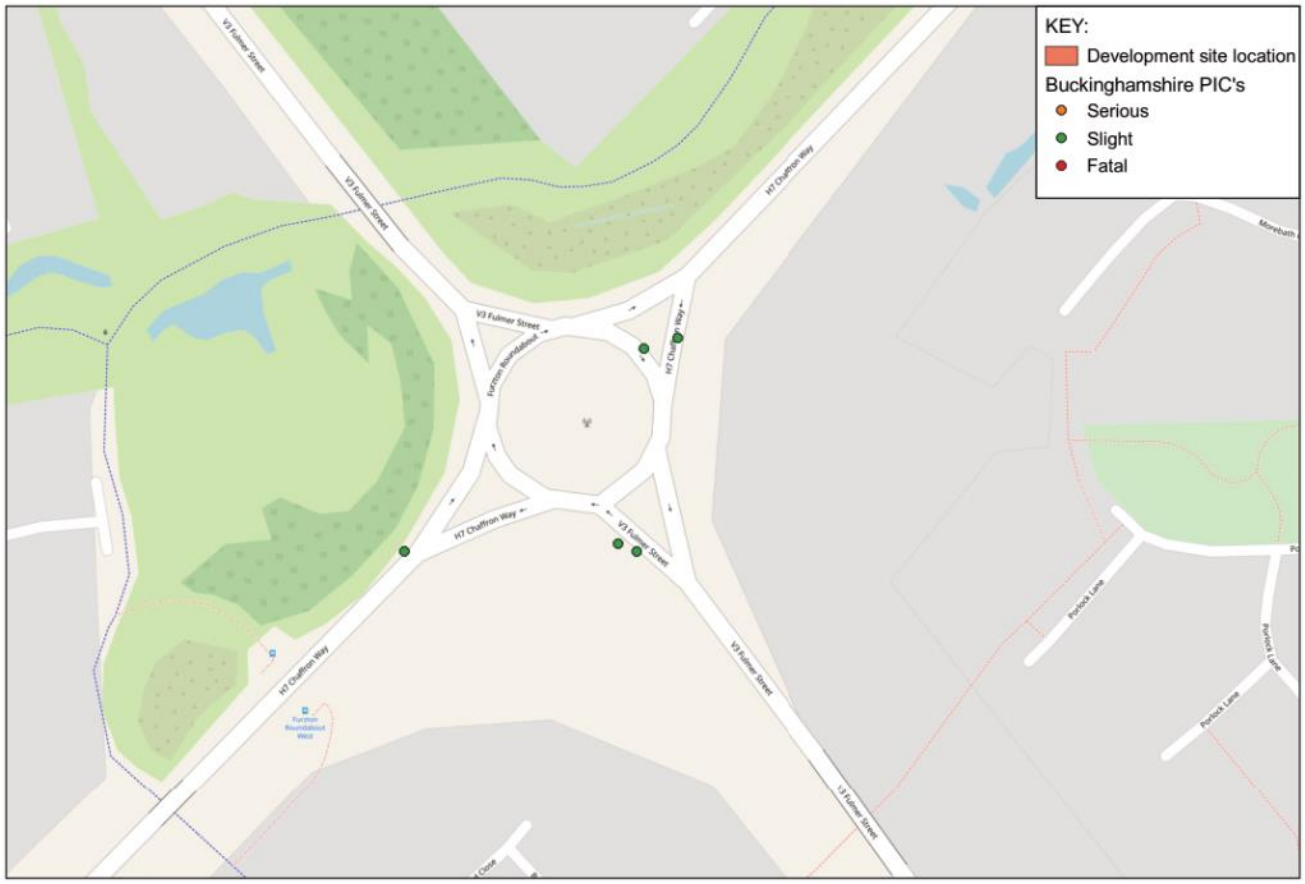
- One of the serious incidents occurred due to alcohol impairment;
- The other serious collision occurred due to sudden braking on a motorcycle;
- One collision was due to a loss of control due to skidding on a wet road;
- Two hit and runs occurred one caused by a pedestrian crossing the road whilst impaired by alcohol and the other caused by a vehicle colliding with a motorcycle on a roundabout; and
- One rear end shunt occurred due to failure to judge speed of the vehicle in front.

3.9.37. There were no recorded collisions within the study period at Bottle Dump Roundabout (Junction 6).

3.9.38. **Figure 3.20** shows that there were five collisions at Furzton Roundabout (Junction 14), all slight in severity, the causes of these collisions was as follows:

- A loss of control due to speeding;
- Three rear end shunts caused by failure to judge speed correctly; and
- A loss of control due to skidding on a wet road surface.

Figure 3.20 - Collisions - Furtzon Roundabout

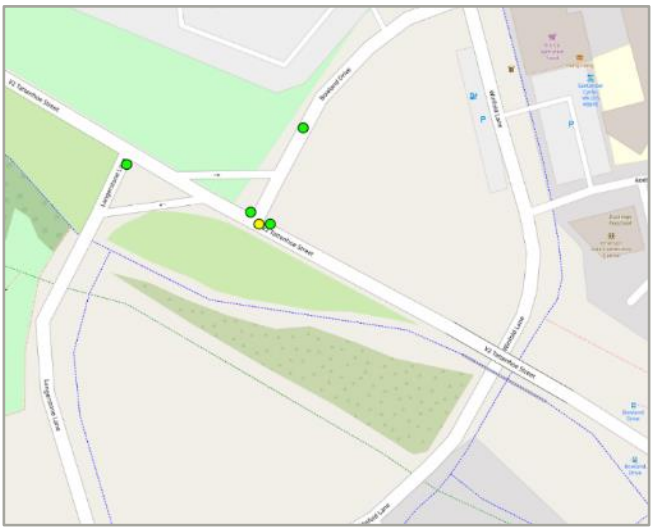


3.9.39. A total of 12 collisions occurred at the Emerson Roundabout (Junction 12), of those only one was serious in severity with 11 being slight in severity. The causes of these collisions were as follows:

- Six collisions were caused by rear end shunts due to failure to stop and failure to judge speed correctly;
- One collision caused by loss of control due to a health episode;
- Two were caused by loss of control entering the roundabout; and
- One collision was caused by failure to look at the opposing traffic correctly.

3.9.40. **Figure 3.21** shows the collisions that occurred on Tattenhoe Street.

Figure 3.21 - Collisions - Bowland Drive / Tattenhoe Street / Langerstone Lane



3.9.41. Five collision occurred at the junction of Bowland Drive, V2 Tattenhoe Street and Langerstone Lane, four were slight in severity and one was serious. Four of the collisions included vehicles entering and exiting the junctions and one occurred when a vehicle struck a stationary vehicle on Bowland Drive.

3.9.42. **Figure 3.22** shows the collisions that occurred on Fulmer Street.

Figure 3.22 - Collisions - V3 Fulmer Street

3.9.43. Eight collisions occurred on V3 Fulmer street, seven of which were slight in severity and one was serious. The four slight collisions in the north-west occurred due to vehicles not giving way to other vehicles. The two incidents at the junction with Chipping Vale occurred due to vehicles entering and exiting Chipping Vale. Another occurred due to a rear end collision in queueing traffic and the final collision occurred due to two vehicles entering Blackmoor Gate from opposing directions.

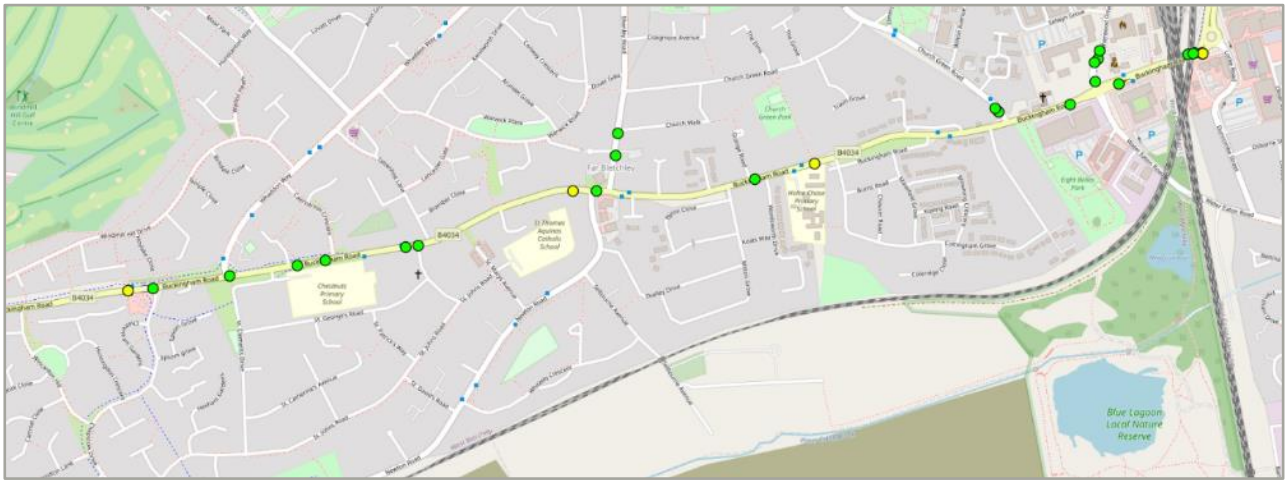
3.9.44. **Figure 3.23** shows the collisions that occurred on Watling Street.

Figure 3.23 - Collisions - Whaddon Way / V4 Watling Street

3.9.45. Twelve collisions occurred close to the junction of Whaddon Way and V4 Watling Street, one of which was serious. They included two collisions related to u-turns, likely due to the banned right turn movement from Whaddon Way. Four collisions occurred due to poor lane discipline and four were related to vehicles failing to give way to other vehicles when exiting Whaddon Way. The final two collisions were rear end shunts, one of which was serious in severity.

3.9.46. **Figure 3.24** shows the collisions that occurred on B4034 Buckingham Road.

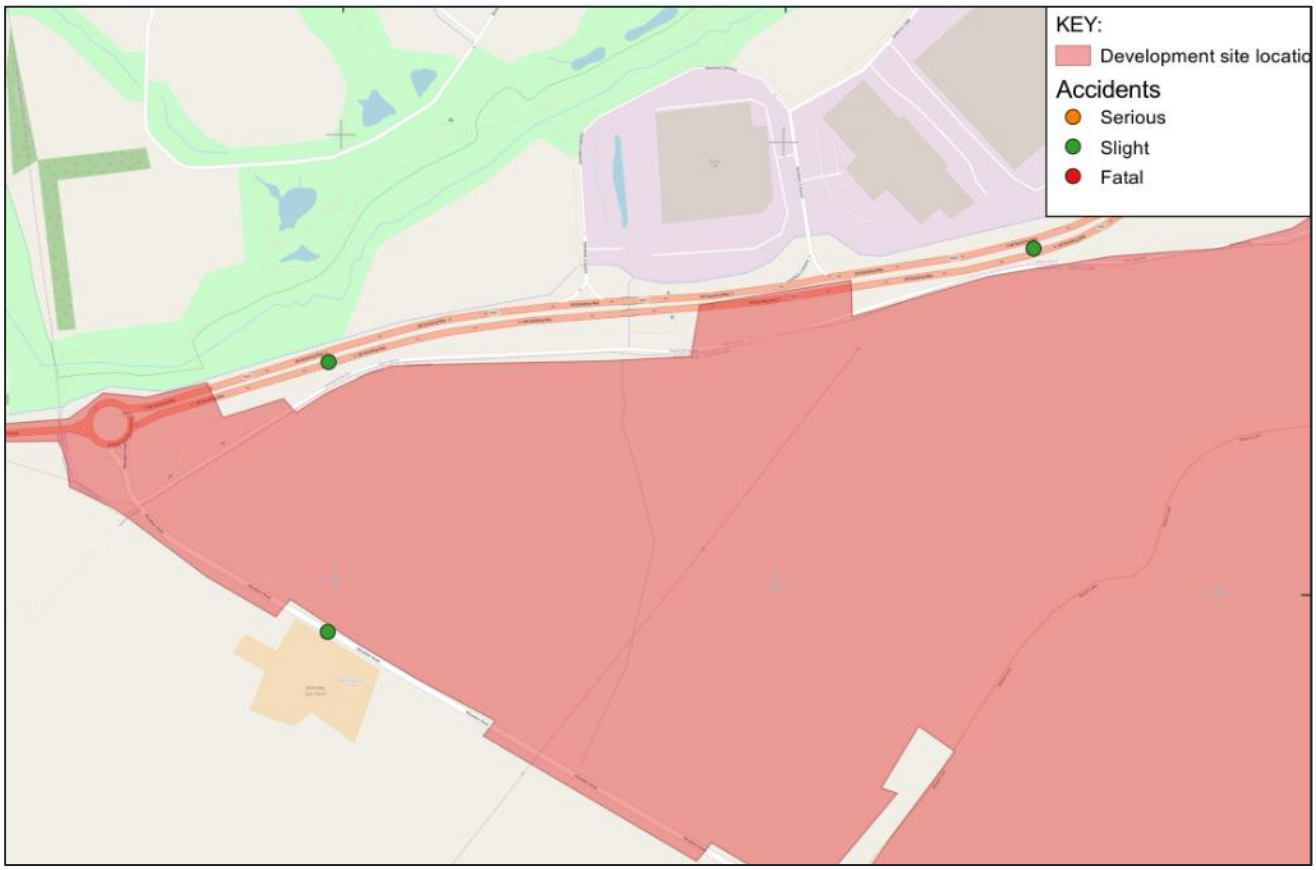
Figure 3.24 – Collisions - B4034 Buckingham Road



3.9.47. A significant number of collisions occurred on B4034 Buckingham Road involving pedestrians, nine of which were slight in severity and six of which were serious.

3.9.48. **Figure 3.25** shows that there were two collisions on the A421 in the vicinity of the Site boundary. Both collisions were slight in severity. One collision was due to a loss of control caused by a medical episode and the other was caused by failure to judge speed and lack of awareness of surrounding vehicles.

Figure 3.25 - Collisions - A421 Adjacent To The Site



3.9.49. **Figure 3.26** Illustrates that there was a total of four collisions on V1 Snelshall Street north of Junction 5 adjacent to Pendeen Crescent and Andersen Gate. All of these five collisions were slight in severity. The causes of the collisions were as follows:

- Three collisions were caused by poor turning manoeuvre across the carriageway into opposing traffic; and
- Two were the result of pedestrians failing to look properly and walking across the road and colliding with vehicles.

Figure 3.26 – Collisions - V1 Snelshall Street

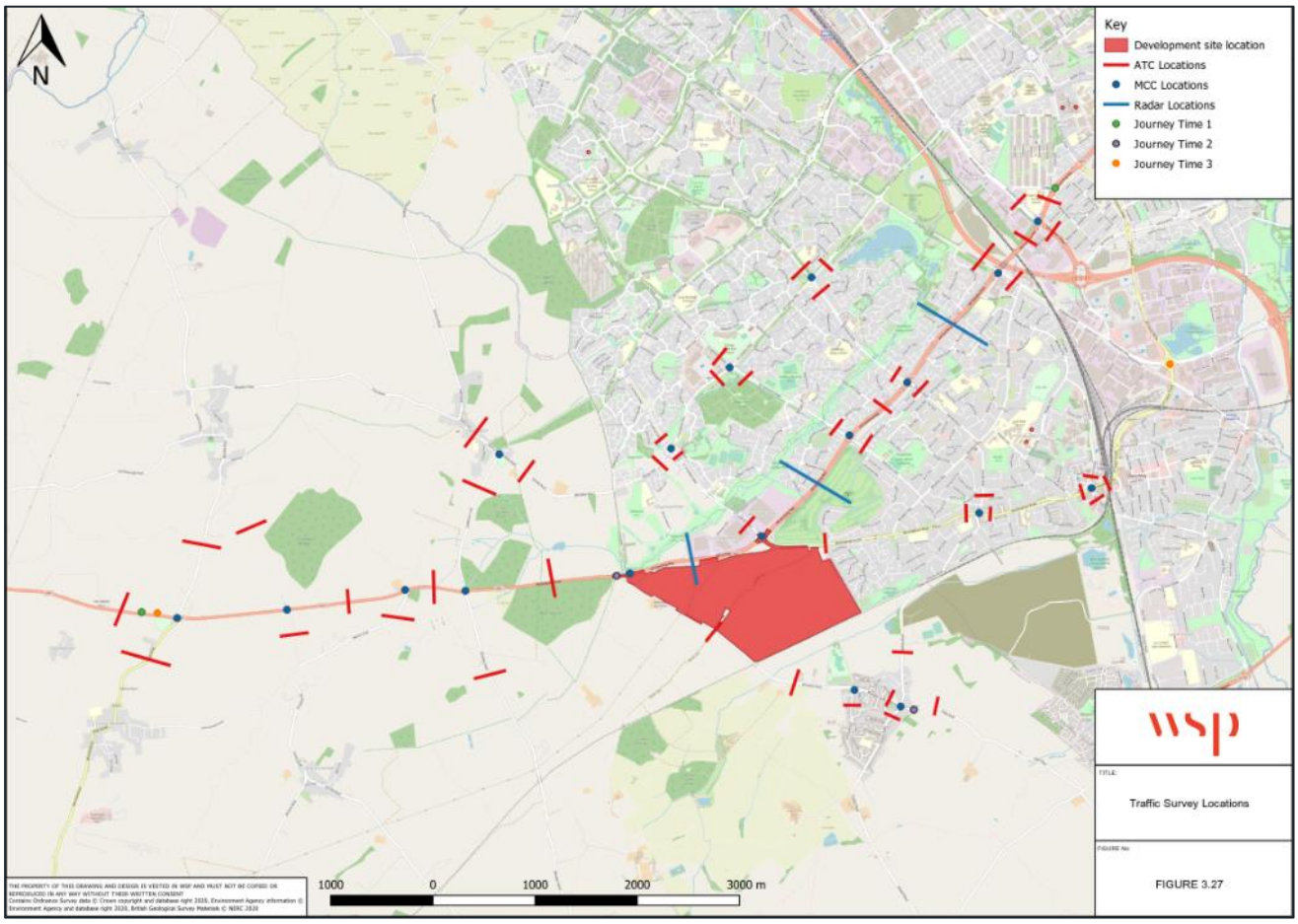
SUMMARY

3.9.50. The collision analysis presented identifies that whilst a number of collisions have occurred across the study area there is no specific causal pattern (e.g. poor junction configuration and highway alignment) on the existing road network immediately surrounding the Site that is likely to be exacerbated by the Proposed Development.

3.10 TRAFFIC SURVEYS

3.10.1. A comprehensive data collection exercise was undertaken in February 2020 to provide an up to date baseline for consideration within this TA. The study area was agreed with BC and MKC as part of the TA Scoping process and includes the roads most likely to be affected by the Proposed Development. **Figure 3.27** provides details of the data collection exercise undertaken with the full scope provided in **Appendix B**.

Figure 3.27 – Traffic Survey Study Area



3.10.2. A total of 18 junction turning counts alongside 55 automatic traffic counts, three journey time surveys and three radar surveys were commissioned. Junction turning counts were undertaken on three separate weekdays to reduce any uncertainty regarding daily fluctuations in traffic flow. The Automatic Traffic Count (ATC) and radar surveys were conducted over 14 days to provide two weeks of data.

3.10.3. From the analysis of the survey data across the 18 junction turning counts it was established that the weekday network peak hours were 07:45-08:45 and 17:00-18:00.

3.10.4. The data collection exercise was completed prior to any travel restrictions being introduced by the UK government associated with the Covid-19 Pandemic. The dataset collected therefore represents a robust picture of traffic conditions at that time and forms the base from which the highway network assessment contained within this TA has been undertaken.

3.11 SUMMARY

3.11.1. There is good access to local footways / footpaths, PROW and the local cycle network. The pedestrian network provides connections to local places of interest and public transport facilities.

3.11.2. The Site is well located to make use of existing highway connections. The number of bus services accessible from the Site is limited and therefore a public transport strategy is required to ensure that sustainable connections are available to all users of the Site. This is explained further in Section 4.

3.11.3. The facilities and amenities surrounding the Site are largely beyond a reasonable walking and cycling distance and therefore the provision of facilities on-Site is an integral part of the Proposed Development as described in Section 4.

3.11.4. A review of the most recent collisions data available for the study area indicates that there are no specific causal patterns that relate to junction/highway alignment that are likely to be exacerbated by the Proposed Development.

3.11.5. Development of the Site therefore offers an excellent opportunity to enhance the existing infrastructure and seek to influence travel behaviour and encourage the use of more sustainable travel options that would offer a far wider community benefit. In this way, the development would contribute positively to both national and local policy objectives for sustainable development.

4

DEVELOPMENT PROPOSALS

4 DEVELOPMENT PROPOSALS

4.1 INTRODUCTION

4.1.1. This section of the TA provides an outline of the Proposed Development including a review of access, parking and servicing arrangements.

4.2 DEVELOPMENT PROPOSALS

4.2.1. Planning applications were submitted to both AVDC and MKC in early 2015. The proposals comprise a mixed-use sustainable urban extension on 144.77Ha of land to the south west of Milton Keynes and seek outline planning permission (all matters reserved except for access) for the following:

> *'Outline planning application with all matters reserved except for access for a mixed-use sustainable urban extension on land to the south west of Milton Keynes to provide up to 1,885 mixed tenure dwellings; an employment area (B1); a neighbourhood centre including retail (A1/A2/A3/A4/A5), community (D1/D2) and residential (C3) uses; a primary and a secondary school; a grid road reserve; multi-functional green space; a sustainable drainage system; and associated access, drainage and public transport infrastructure'*

4.2.2. The development proposals for the Appeal against the decision by MKC to refuse planning permission remain unchanged. A number of minor revisions are proposed to the development within BC's jurisdiction, including the provision of 60 extra care units within the total of 1,855 residential units as follows:

> *'Outline planning application with all matters reserved except for access for a mixed-use sustainable urban extension on land to the south west of Milton Keynes to provide up to 1,855 mixed tenure dwellings, including 60 extra care units (C3); an employment area (B1) including provision for a 6GP surgery (D1); a neighbourhood centre including retail (A1/A2/A3/A4/A5), community (D1/D2) and residential (C3) uses; a primary school; a secondary school; a grid road reserve; multi-functional green space; a sustainable drainage system; and associated access, drainage and public transport infrastructure.'*

4.2.3. The trip generation associated with the 60 extra care units would be lower than 60 general residential units, as explained further in Section 5, and therefore the assessment within this TA remains appropriate for both purposes.

4.2.4. The development proposals assessed within this TA therefore provide for the following:

- 1,855 mixed tenure residential dwellings, including 60 extra care units;
- 2.07-hectare employment area (B1 land use);
- 0.67-hectare neighbourhood centre accommodating retail (A1/A2/A3/A4/A5) and community land uses (D1/D2),
- A Primary School with 630 pupil places; and
- A Secondary School with 600 pupil places.

4.2.5. The residential component of the Proposed Development includes up to 1,855 new dwellings, 60 of which would be extra care units with the precise mix of the remaining 1,795 units to be fixed through subsequent reserved matters planning applications pursuant to any outline planning permission. There will be a range of residential densities from 20-25 dwellings per hectare on the southern edge of the development where it meets the open countryside to up to 50 dwellings per hectare abutting the Neighbourhood Centre.

4.2.6. The Proposed Development makes provision for a range of employment uses. Principally, employment uses will be provided within an Employment Area set around a mixed-use Neighbourhood Centre located close to the north-eastern gateway to the Site, adjacent to the northern edge of the Site.

4.2.7. The Employment Area is likely to accommodate small 'starter' office units that would provide appropriate space for small local businesses but will not preclude larger single buildings / businesses.

4.2.8. The proposed mix of uses, to include both primary and secondary school provision, will encourage internalisation of trips and therefore satisfies key local and national policy requirements to reduce the impact of development on the wider highway network through reducing the need to travel and to encourage greater use of sustainable modes of travel, in particular walking and cycling.

FRAMEWORK MASTERPLAN

4.2.9. The Framework Masterplan for the Proposed Development has been prepared to accompany the revisions to planning application to BC . The masterplan has evolved from that which was submitted with the outline planning applications in 2015, however the principles of access remain unchanged and the internal layout remains broadly consistent. The revised masterplan incorporates the following changes:

- Revised development zones to accommodate updates to the surface water drainage strategy and utilities on Site; and
- Inclusion of the 60 bed extra care facility.

4.2.10. The development and details of the revised masterplan are described in detail in the updated Design and Access Statement prepared to accompany the planning application revision submission. The extent of the proposed highway improvements is discussed and explained in more detail later in this TA but broadly include the following:

- Weasel Lane and National Cycle Route 51 to be retained and enhanced as an important route through the new development, new homes set back from Weasel Lane and existing landscape features orientated to provide overlooking of public routes, and provision of appropriately designed, at-grade, road crossings;
- An extensive linear park running alongside Whaddon Road, incorporating new landscape planting, trees, footpaths and cycleway links to Redway standard to enhance the northwest section of the MK Boundary Walk;
- Highway improvements to Bottle Dump Roundabout, including a new combined equestrian/pedestrian/cycle crossing across Whaddon Road just to the south of the existing roundabout;

- Access improvements along Whaddon Road, A421 and Buckingham Road to facilitate all travel modes, including combined 'at grade' crossing facilities for pedestrians and cyclists with connections to the wider existing network;
- Potential highway improvements across the wider higher network; and
- Improvements to the Public Rights of Way Network (PROW) to create permeability across the Site and strengthen connections with the existing network.

4.2.11. The design of the Proposed Development and its location in close proximity to the Milton Keynes Redway network, will encourage walking and cycling as an alternative sustainable method of travel to the private car. Pedestrian and cycling facilities within the Proposed Development will be designed as high quality, convenient and direct routes to both internal and external destinations.

4.2.12. The provision of the Grid Road reserve is an important element to be accommodated by the proposals in order to satisfy aspirational local planning policies. Whilst the Proposed Development requires only provision of a single carriageway road for access, the Framework Masterplan included as part of the updated planning submission seeks to protect the corridor and would enable a dual carriageway to be implemented by MKC/BC at some point in the future, subject to the prevailing Development Plan policies and securing the necessary funds.

4.3 MOVEMENT STRATEGY

INTRODUCTION

4.3.1. The movement strategy remains unchanged from that proposed within the 2016 TA. The underlying principle of the movement strategy for the Proposed Development is to provide the future community with a sustainable travel network which will influence behaviour to reduce the need to travel and thereby minimise the impact on the external transport network. A key priority is given to pedestrian and cycle movements, and accessibility to high quality public transport facilities.

4.3.2. At the heart of the overall Transport Strategy is the implementation, monitoring and management of Travel Plans (TP)s for the residential, commercial/employment and school uses. TPs under the umbrella of the approved FTP will be the key tool for developing a sustainable Travel Demand Management Strategy for all land uses.

PEDESTRIANS & CYCLISTS

4.3.3. Pedestrian access to the Proposed Development will be achieved as follows with all but the recreational footpaths being available for use by cyclists:

- a connection with the existing Redway on the northern side of A421 Standing Way as well as other recreational routes, and via the existing pedestrian / cycle route running along the line of the old Buckingham Road route south of the current A421 Standing Way:
  - across A421 close to Bottle Dump Roundabout via the existing subway;
  - across A421 to Snelshall West via the existing subway; and
  - via Tattenhoe Roundabout;
- a connection to the existing Redway network via a new pedestrian/cyclist/equestrian route along Whaddon Road, including a new 'Pegasus' combined crossing to the south of Bottle Dump Roundabout and the access to Pearce Recycling (Drawing D015D, **Appendix L**);

- to Buckingham Road, approximately 600m to the south of Tattenhoe Roundabout, via NCR 51 on Weasel Lane, and via a new access to the Site between this point and Tattenhoe Roundabout;
- at four locations to the south and west of the Site, via existing bridleways / footpaths NLO/19, MUR/15, WHA/15 and WHA/16.

PUBLIC TRANSPORT

Overview

4.3.4. The principal objective of the public transport strategy will be to provide a high quality, fast, frequent and reliable bus service between the Proposed Development and Central Milton Keynes via the rail station. As well as serving the social and accessibility needs of those future residents and employees without access to a car, it is also expected that, with the help of effective marketing and initiatives included within the FTP, people who would otherwise use a private car will be encouraged to use the proposed bus service for many of their work, school and leisure based journeys.

4.3.5. Previous discussions with MKC and the operator Arriva indicate that there could be potential to extend either service 8/8A/8X (currently operating between Oxley Park, Westcroft, CMK, Kingston and Walnut Tree) further south into the Site. An alternative would also potentially include extending service 300 (currently operating between Tattenhoe Park, Westcroft, Central Milton Keynes, Coachway, Kingston, Magna Park and Eagle Farm). At this stage, the potential viability for extending either the 8/300 service would be subject to a further review prior to commencing the tendering process for the new service.

4.3.6. It is currently anticipated that the preferred option would be to start a completely new high frequency service between the Site, CMK, the rail station and key social infrastructure. The target would be to provide a journey time between the Site and CMK of circa 20 minutes, although this would be subject to further discussion and agreement with MKC, BC and the preferred operator.

4.3.7. The phasing and anticipated ‘build-out’ of the Proposed Development are shown in **Table 4.1**. The first occupation of dwellings is likely to occur in 2022, although this is dependent on the rate of build and sales. The intention would be to ensure that there is a critical mass of occupied dwellings prior to the commencement of the service, to ensure sufficient potential patronage so that the service would be operationally viable.

4.3.8. The proposed bus service between the Site and Central Milton Keynes would commence no later than the occupation of the 100th dwelling, although the exact timing will be dependent upon the overall phased ‘build out’ period. As dwellings become occupied, the route into the development will be extended further and the service frequency increased.

4.3.9. The initial phase of the development will include the construction of the primary school. It is therefore proposed to ensure that the new/extended bus service should be available prior to the schools opening and becoming fully operational.

4.3.10. It is proposed that the service would be funded initially by way of a financial contribution incorporated within a service level agreement that would be secured as a S106 planning obligation. The level of the initial subsidy required would reduce as patronage and revenue increase once further homes and areas of employment are occupied in subsequent development phases.

Proposed Route

4.3.11. Within the Site the Service will run on the principal development access roads designed to allow a dedicated route for bus services with priority at key junctions. Bus stops within the Proposed Development will be located at appropriate intervals to minimise walk distances and to ensure that where practicable, residential dwellings are no greater than 400 metres from a stop. Each stop would include raised boarding platforms (220mm high), together with safe and secure weather proofed shelters equipped with Real Time Passenger Information (RTPI) displays.

4.3.12. Between the Site and Central Milton Keynes, the proposed bus service will operate using existing grid roads, primary roads and their associated bus stops. The overall description of the agreed route is to be defined and agreed between MKC, BC and the preferred operator and as a minimum, would link the Site with key social infrastructure, Central Milton Keynes and Milton Keynes railway station.

Proposed Timetable

4.3.13. The estimated house completions by year and the required frequency are shown in **Table 4.1**. The required hours of operation of the Service is shown in **Table 4.2**.

Table 4.1 – Estimated Housing Completions And Required Service Frequency

Year	House Completions		Bus Frequency	
	In Year	Running Total	Daytime	Eve/Sun
2022/23	100	100	60	60
2023/24	200	300	30	60
2024/25	250	550	30	60
2025/26	250	800	30	60
2026/27	250	1050	30	60
2027/28	250	1300	20	30
2028/29	250	1550	20	30
2029/30	250	1800	20	30
2030/31	55	1855	20	30

Table 4.2 – Required Hours Of Operation

Criteria	Monday to Friday	Saturday	Sunday
Full daytime frequency to start with first journey arriving in CMK no later than:	0605	0705	0905
Full daytime frequency to end with last journey departing CMK no earlier than:	2005	2005	1905
Evening service to end with last journey departing CMK no earlier than:	2305	2305	2305

Vehicle Specification

4.3.14. The following specification is expected as a minimum:

- Low floor vehicles with 28 seats, new at the commencement of the contract and must be no more than five years old at any time during the life of the contract and comprise:
  - Fitted with racks or holders for bus service publicity which should normally display the timetable for the service being operated;
  - Have exterior LED destination displays with good visibility at the front and on the nearside, and a rear route number display;
  - Engine to comply with a minimum of either Euro 6 emission level or the appropriate standard prevailing nearer to the time of seeking competitive tenders for the new service;
  - Equipped with CCTV cameras for customer and driver security, using a high-quality digital system that records conditions on the pavement as well as at various points on the bus so giving passengers greater confidence in personal security. The operator should have suitable equipment to process the information from the 'on-bus' equipment and is responsible for ensuring compliance with relevant data protection and other legislation;
  - Smart card technology 'on-bus' to eliminate cash retention and exchange;
  - Acceptance of 'through' ticketing to enable longer commuter and leisure journeys to be connected

Interim Vehicles

4.3.15. If new buses are not going to be available at the start of the contract (assumed to be late 2022/early 2023), alternative vehicles may be used and should meet the following specification:

- Be no more than two years old at the commencement of the service and shall comply with the latest requirements under the Disability Discrimination Act;
- Low-emission engines (Euro 6 standard as a minimum);
- Be equipped with internal and external CCTV cameras for customer and driver security, using a high quality digital system that records conditions on the pavement as well as at various points on

the bus so giving passengers greater confidence in personal security. The operator should have suitable equipment to process the information from the 'on-bus' equipment and is responsible for ensuring compliance with relevant data protection and other legislation;

- Have exterior LED destination displays with good visibility at the front and on the nearside, and a rear route number display;
- Be fitted with racks or holders for bus service publicity.

VEHICLE ACCESS

4.3.16. Three vehicular means of access will be provided to the Proposed Development via:

- Whaddon Road – by means of a priority 'T'-junction with a 'ghost island' right turn lane;
- An extension to Buckingham Road into the Proposed Development – by means of a four-arm roundabout junction; and
- A421 Standing Way – by means of 'left in only' junction.

4.3.17. The principle of gaining vehicle access to the Proposed Development from these three roads remains unchanged from the original planning application as submitted in January 2015 and the subsequent update in August 2016. The detail and form of each access has been modified to reflect comments raised by BC, MKC and Road Safety Auditors. The changes made to each access point is explained in greater detail below.

4.3.18. The access onto Whaddon Road joins the public highway under the control of BC, whilst A421 Standing Way access point joins the highway network controlled by MKC. The Buckingham Road access joins the existing public highway controlled by MKC, but the majority of the new highway layout is located within Buckinghamshire.

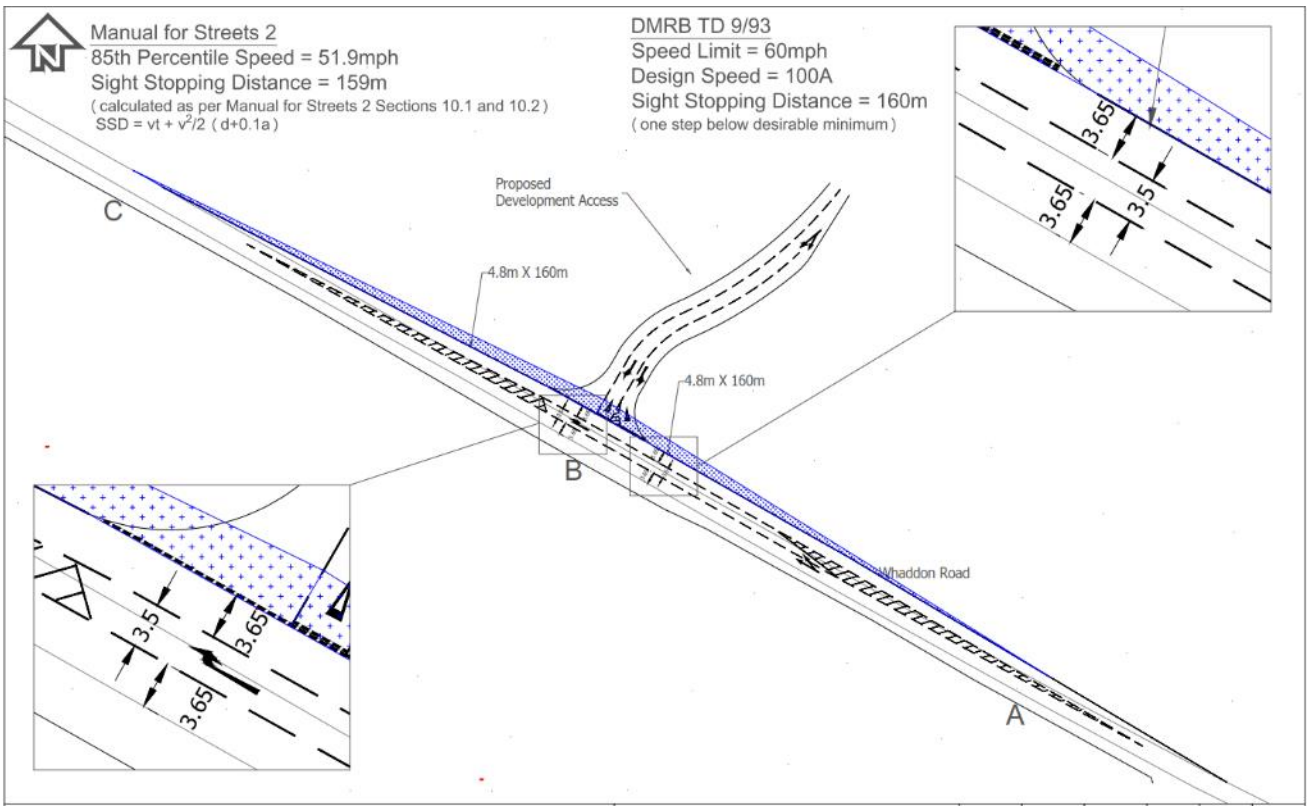
4.3.19. Three access points were selected to ensure the efficient distribution of traffic around the local highway network and to provide route choice options for new residents and Site users. The access points (and internal road layout) are designed to discourage through trips, i.e. rat running through the development. The provision of three access points also provides ease of access for residents onto the highway network and allows for appropriate place-making through design and frontage activity on all three public sides to the Site.

Whaddon Road

4.3.20. The proposed access at Whaddon Road is a Ghosted Right Turn priority junction, with a single lane minor arm approach with a long flare to two lanes, as shown on drawing D014D (**Appendix M**) and in **Figure 4.1**. The access arrangement has been enlarged to accommodate a longer flare length along the development access road (i.e. within the Site) as it approaches the junction with Whaddon Road to accommodate peak hour demand for vehicles leaving the Site. During the planning application determination period, and subsequent to agreement of the layout with BC and MKC, revisions were undertaken to provide amendments to the visibility splays. These revisions were shown on Drawing D014E (also in **Appendix M** for information). Revision E would be taken forwards to detailed design if required by BC.

4.3.21. Following the Stage 1 Road Safety Audit (**Appendix N**), the length of the 'ghost island' along Whaddon Road has been extended to ensure sufficient deceleration length is provided for right turning traffic.

Figure 4.1 - Proposed Whaddon Road Access



4.3.22. BC revert to the highway design guidance as set out by Manual for Streets 2[11](MfS2). MfS2 states in paragraph 10.1.4 that 85th percentile wet weather speeds should be used to determine sight stopping distances, which are in turn used to calculate visibility requirements. Guidance note CA 185[12] specifies that the free flow speed of traffic should be used when reviewing speed data, and that using a time between 1000-1200 and 1400-1600 is appropriate to determine the free flow speed.

4.3.23. ATC surveys were completed along Whaddon Road in June 2015 and again in February 2020, with the 85th percentile wet weather speeds as detailed in **Table 4.3**. The highest 85th percentile speed along Whaddon Road is 51.9mph in the southbound direction.

[11] CIHT, 2010, Manual for Streets 2, CIHT, London

[12] Highways England, 2019, CA 185, Vehicle Speed Measurement on All Purpose Roads (formerly TA 22/81)

Table 4.3 - Whaddon Road Speed Data

Direction	Mean Wet Weather Speed (mph) 2015	85th Percentile Wet Weather Speed (mph) 2015	Mean Wet Weather Speed (mph) 2020	85th Percentile Wet Weather Speed (mph) 2020
Northbound	40.4	46.7	43.4	46.8
Southbound	44.1	51.9	42.0	48.3

4.3.24. Taking the worst case speed recorded in 2015 of 51.9mph an 85th percentile wet weather speed of 51.9mph requires a sight stopping distance of 159m using the parameters as set out in MfS2. On both the northbound and southbound approaches to the proposed junction, a Sight Stopping Distance (SSD) of 159m can be accommodated in the vertical plane. Visibility in the horizontal plane can also be accommodated through vegetation clearance within the Site.

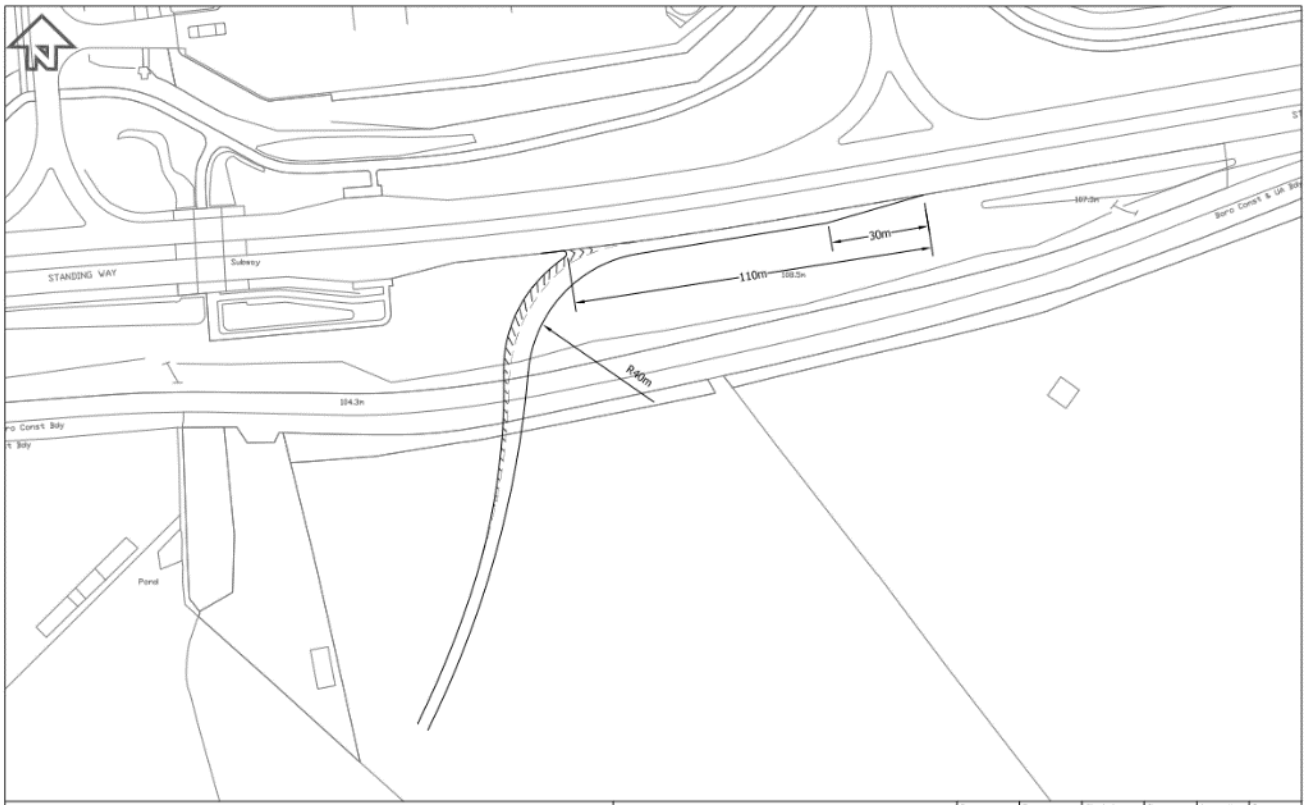
4.3.25. Design Manual for Roads and Bridges (DMRB) CD109 'Highway Link Design' requires visibility of 160m (one-step below desirable minimum) for a road with a speed limit of 60mph. The 'x-distance' on the visibility splays has been increased from 2.4m to 4.8m as suggested within the Stage 1 Road Safety Audit. An 'x-distance' of the full 9m standard can be accommodated if required during detailed design.

A421 Left In Only

4.3.26. The proposed access from A421 Standing Way is in the form of a 'left-in only' junction with a single entry lane. A 'left in left out' option was originally considered and included within the original planning application. Following subsequent discussions with MKC and BC and observations from WSP's (i.e. previously Mouchel) Safety Auditor, it was agreed that access onto A421 in this location would potentially give rise to an increase in weaving movements between passing traffic along A421 and merging traffic from the development. As a consequence, there will be no exit from the Proposed Development onto A421 Standing Way. A deceleration lane to meet the requirements of CD123[13] of the DMRB will be provided to ensure highway safety. Following the Stage 1 Road Safety Audit, Vehicle Restraint Systems (crash barriers) will be included within the design of the access road to minimise the impact of any loss of control collisions around the bend. The design of the proposed access is shown on drawing D013A (**Appendix O**) and in **Figure 4.2**.

[13] Highways England, 2020, CD 123 Geometric Design of At-Grade Priority and Signal-Controlled Junctions (formerly TD 9/93)

Figure 4.2 - Proposed A421 Standing Way Access



4.3.27. The design does not compromise the location of the existing underpass which connects pedestrian and cycle routes with the Redway on the northern side of A421.

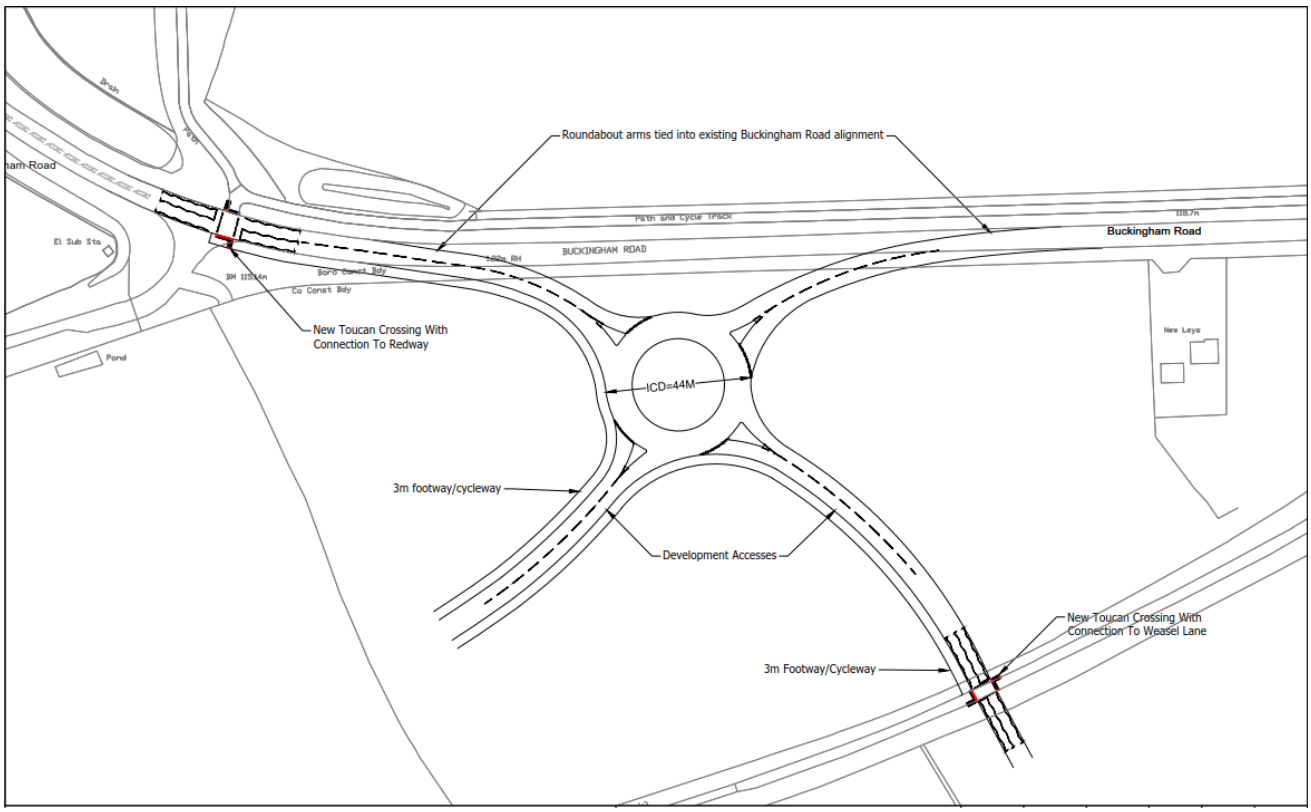
Buckingham Road

4.3.28. The original 2015 TA proposed a signalised crossroads arrangement for a new access into the Site from Buckingham Road. That arrangement introduced a number of points of delay for vehicles travelling through the junction and provided no facilities for pedestrians and cyclists. MKC expressed concerns regarding the introduction of traffic signals in the area, and BC were concerned by the overly complicated arrangement which could potentially be confusing for drivers.

4.3.29. Therefore, a new arrangement for the junction is proposed (as per the 2016 TA) in the form of an at grade roundabout, encompassing two new roads from within the Site, as shown on drawing D017C (**Appendix P**) and in **Figure 4.3**. The existing Redway on the northern side of Buckingham Road will remain, and a shared footway for pedestrians/cyclists[14] will be provided on the southern arms of the junction into the Site. During the planning application determination period, and subsequent to agreement of the layout with BC and MKC, revisions were undertaken at the request of BC to provide minor lane marking improvements. These revisions were shown on Drawing 0017D (also in **Appendix P** for information). Revision D would be taken forwards to detailed design if required by BC.

[14] With an effective width of 3m

Figure 4.3 - Proposed Buckingham Road Access



4.3.30. The roundabout solution ensures amendments to the alignment of Buckingham Road are minimised. The provision of a 'Toucan' Crossing facility for pedestrians and cyclists is included on the north-western arm between the new roundabout and Tattenhoe Roundabout, and also on the south-eastern arm where the new road crosses Weasel Lane.

4.3.31. The design of the proposed roundabout access provides sufficient capacity at the junction to accommodate the development traffic. The analysis of the junction is included at Section 6.

4.3.32. Should the Grid Road reserve 'corridor' be called upon at some point in the future, an amended junction arrangement could be provided to accommodate additional lanes on the south-eastern and north-western arms of the roundabout. BC has confirmed that there is currently no policy requirement to provide a junction arrangement to specifically accommodate a new Grid Road.

Road Safety Audits

4.3.33. Stage 1 Road Safety Audits (S1 RSAs) were completed on all of the access points and include the proposed equestrian crossing to the south of Bottle Dump Roundabout. The S1 RSAs as submitted to BC and MKC in December 2015, with Designer's Responses to each point raised, are provided in **Appendix N** of this TA. Following amendments to the designs to meet BC and MKC requirements, a revised S1 RSA was completed in June/July 2016. That RSA and associated Designer's Response are also included in **Appendix N**.

4.3.34. The main comments within the June/July 2016 S1 RSA (auditing the current access proposals) relate to ensuring appropriate visibility splays are provided to the access on Whaddon Road given the undulating nature of the road, to the provision of vehicle restraint systems (safety barriers)

around the bend at the A421 access, and to ensuring the provision for pedestrians and cyclists at the Buckingham Road junction is safe and suitable for all users.

Summary

4.3.35. Access to the Site will be from three points; Buckingham Road (roundabout), A421 Standing Way (left-in only), and Whaddon Road (priority Ghosted Right Turn). The junctions have been designed in accordance with the relevant design standard for the speed of the roads. The proposed access arrangements more than adequately accommodate the demands of the Proposed Development.

STREET HIERARCHY

4.3.36. The key strategic route within the Proposed Development is the allocation of space for a future Grid Road, in line with Policy CT8 of Plan:MK and Policy NLV001 of the draft VALP. This is aligned from the proposed B4034 Buckingham Road access south to the disused railway line forming a part of East-West Rail. A new primary street will be sited within the reserved corridor such that a dual carriageway could be accommodated and extended as part of the Bletchley Southern Bypass in the future.

4.3.37. A network of primary streets will form the principal circulation route for all vehicular traffic through the Proposed Development. This route will connect with the existing highway network at the three proposed points of access. Primary streets will be designed to achieve three aims:

- to accommodate vehicular capacity without compromising character;
- to provide a network of legible, direct streets design in accordance with the principles set out in Manual for Streets (MfS) and Manual for Streets 2 (MfS2); and
- to complement and enhance the local network of public footpaths, cycle ways and bridleways.

4.3.38. Providing a ‘connector’ function, linking the primary streets through the development areas, will be secondary streets from which will lead a network of tertiary streets. Tertiary streets will provide a very low speed environment with shared space and ‘home zone’ principles applied to their design in accordance with MfS and MfS2. Throughout the Proposed Development on all streets, speeds will be limited to 30mph or less providing a safe, calm attractive environment to all road users.

TRAVEL DEMAND MANAGEMENT

4.3.39. Travel Demand Management is an important element of the Proposed Development. Sustainable development principles are accorded with and a number of key objectives which ensure consistency with relevant policy provisions are met. The design:

- minimises the need to travel by providing a mix of land uses that are within acceptable walking and cycling distances of each other;
- maximises the opportunity for travel by non-car modes of transport, particularly by the design of the urban form itself, by maximising priority to pedestrians and other non-car users;
- minimising the impact of traffic associated with the development; and
- maximising integration with adjacent development areas.

4.3.40. Furthermore, the Public Transport Strategy is designed to encourage people living and working at the Proposed Development to use alternative modes of transport than the private car.

4.3.41. It is recognised that communication is a key factor in influencing modal choice and in order to maximise communication to everyone living and working at the Proposed Development a series of Travel Plans will be implemented, maintained and monitored. As well as assisting in communicating the availability and benefits of non-car modes, the Travel Plans will contain the details of a number of measures and initiatives designed to encourage, promote and maintain mode shift from use of private vehicles, in particular single-occupancy car use, to more sustainable means such as walking, cycling, use of public transport, car sharing and taxis.

4.3.42. A FTP is provided as a separate document. Following receipt of permission for the first reserved matters a Travel Plan Co-ordinator will be appointed who will be the main point of contact for all travel planning matters.

Summary

4.3.43. Current national and local planning policy in respect of transportation matters requires that development should be sustainable and best use should be made of existing infrastructure. Development proposals should therefore encourage the use of sustainable modes of transport and give priority to pedestrian and cycle movements and provide access to high quality public transport facilities. This enables best use to be made of existing infrastructure.

4.3.44. In this regard, the Proposed Development is in a sustainable location, in close proximity to existing pedestrian and cycle facilities. The provision of suitable routes across the Site will influence travel behaviour and encourage greater use of these sustainable modes of travel. The Public Transport Strategy is designed to ensure that future residents and employees have access to high quality facilities both in terms of service and infrastructure provision.

4.4 SUMMARY

4.4.1. The Proposed Development will provide 1,855 residential units including 60 extra care units, education facilities, commercial space and a neighbourhood centre. Access will be via Buckingham Road, Whaddon Road and A421 Standing Way. Parking within the Proposed Development will be in line with prevailing policy at the time of completing the detailed design of the development. The Proposed Development will be designed to include permeability and connectivity for pedestrians and cyclists to ensure the best opportunity to influence travel behaviour and contribute towards achieving the policy objectives of both BC and MKC as well as national policy objectives enshrined in the NPPF.

5

TRIP GENERATION

5 TRIP GENERATION

5.1 INTRODUCTION

5.1.1. The approach taken to derive the trip generation for this TA has been to identify person trip rates for each land use and apply appropriate mode shares. For the residential land use, journey purpose has also been applied to disaggregate the trips and apply assumptions about internalisation. The methodology for the trip generation split down by land use is presented below is robust and is agreed with BC and MKC.

5.2 RESIDENTIAL LAND USE

5.2.1. The residential land use will consist of up to 1,855 dwellings including up to 60 extra care units. The trip generation for the extra care units is likely to be lower than an equivalent standard dwelling and as such the whole 1,855 dwellings has been assessed as standard dwellings. This approach presents a robust worst case assessment.

5.2.2. The TRICS trip generation database was interrogated to identify trip rates for the residential land use. The category 'Private Houses' was selected to reflect the likely mix of dwellings proposed on the Site. The 'Private Houses' trip rate was applied as this allows for up to 25% of the dwellings to be affordable (30% proposed) and up to 25% of the dwellings to be apartments (source: TRICS Land use definitions).

5.2.3. The TRICS search was then further refined to sites within England excluding Central London, and sites with more than 99 residential units. A total of 23 site surveys were identified through this method. A review of the 23 sites was then undertaken to determine whether any sites featured on-site facilities that could affect the trip making characteristics of the site and therefore undermine the person trip rate approach proposed. The results of this review are provided in **Appendix Q**. In total three sites were removed from the trip rate calculation.

5.2.4. The AM and PM peak trip rates (per dwelling) extracted from TRICS are shown in **Table 5.1** along with the resultant trip generation with the full TRICS report for the final selected trip rates in **Appendix R.**

Table 5.1 – Residential Person Trip Rates And Generation

Residential Trip Rates (per dwelling)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Residential Person Trip Rate	0.197	0.797	0.994	0.611	0.267	0.878
Residential Person Trip Generation	365	1478	1844	1133	495	1629

Source: TRICS, 2020

5.2.5. The person trip rates and the subsequent trip generation were then disaggregated by journey purpose and mode. This approach enabled detailed consideration of internalisation as well as providing an opportunity for different mode shares to be applied to each journey purpose.

5.2.6. This methodology utilised National Travel Survey (NTS 0502) data which identified journey purpose by time of day as shown in **Table 5.2**.

Table 5.2 – NTS0502 Journey Purpose By Start Time (2018)

Journey Purpose	AM Peak (08:00-09:00)	PM Peak (17:00-18:00)	Daily
Commuting	20%	32%	18%
Business	3%	4%	4%
Education	29%	3%	9%
Escort education	22%	2%	7%
Shopping	4%	12%	17%
Other work, other escort and personal business	14%	20%	19%
Visiting friends / entertainment / sport	3%	20%	18%
Holiday / Day trip / Other	4%	7%	8%

Source: DfT NTS 0502 2018

5.2.7. The journey purposes were then combined to reduce the number of trip generations required as follows:

- Commuting and Business
- Education
- Education Escort
- Shopping
- Other work, visiting friends, holiday

5.2.8. **Table 5.3** presents the person trip generation split by journey purpose based upon the trip rates shown in **Table 5.1**.

Table 5.3 – Residential Person Trip Generation By Journey Purpose

Journey Purpose/ Peak Period	Private Houses (Total)	Commuting / Business	Retail	Education	Escort education	Other work, visiting friends, holiday
AM Peak (08:00-09:00)	1844	433	73	531	413	392
PM Peak (17:00-18:00)	1629	586	195	49	33	765

5.2.9. Education trips are separated within NTS 0502 into those that are escorted and those that are not. For the purposes of the trip generation it was assumed that unescorted education trips represent those undertaken by secondary, further and higher education pupils, whilst education escort trips were assumed to be undertaken by primary school pupils.

5.2.10. The following mode share and internalisation assumptions were applied after the trips were split by journey purpose:

- Commuting and Business - Census Travel to Work data was used to provide a mode share. A 10% reduction in employment and business trips was assumed to reflect the presence of employment land uses on Site.
- Education – 90% of trips were internalised reflecting the presence of a secondary school on Site. The remaining 10% were considered external and the commuting and business mode share used.
- Education Escort – 90% of trips were internalised reflecting the presence of a secondary school on Site. The remaining 10% were considered external and the commuting and business mode share used.
- Shopping – 20% of trips were internalised reflecting the presence of a local centre on Site. The remaining trips were externalised using the commuting and business mode share.
- Other trips – all trips were considered external and utilised the commuting and business mode share.

5.2.11. A review of Census data was undertaken to identify the mode share for residential external trip making by all journey purposes.

5.2.12. Owing to the location of the Site, adjacent to Milton Keynes, the output areas in the south west of Milton Keynes along with the output area in which the Site is located were used as a proxy for the Proposed Development. For the employment and residential trips, the Middle Layer Super Output Areas (MSOAs) shown below were used.

- E02003486: Milton Keynes 028
- E02003487: Milton Keynes 029
- E02003489: Milton Keynes 031
- E02003490: Milton Keynes 032

- E02003654: Aylesbury Vale 003

5.2.13. **Table 5.4** provides the combined mode share for the five MSOAs selected (excluding categories not in employment, works from home and other method of travel).

Table 5.4 – Residential Outgoing Mode Share

Mode	Number of trips across MSOAs MK 28,29,31,32 and AV 003	Percentage
Underground/Light Rail	24	0%
Train	816	5%
Bus/Minibus/Coach	889	6%
Taxi	142	1%
Motorcycle	84	1%
Car Driver	11,687	74%
Car Passenger	1,080	7%
Bicycle	339	2%
On Foot	763	5%
Total	15824	100%

Source: nomisweb.co.uk – Census Table QS703EW – Method of Travel to Work (2001 specification)

5.2.14. **Table 5.5** presents the Commuting and Business trip generation by mode with the 10% internalisation factor applied.

Table 5.5 – Commuting And Business Journey Purpose Trip Generation (External Trips)[15]

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	4	16	20	18	8	26
Bus	5	19	23	22	10	32
Taxi	1	3	4	4	2	5
Motorcycle	1	3	4	4	2	5
Car Driver	57	231	289	272	119	390
Car Passenger	5	22	27	26	11	37
Cycle	2	6	8	7	3	11
Pedestrian	4	16	20	18	8	26
Total	78	316	394	371	162	533
Vehicular Total – (sum of Taxi, Motorcycle and Car Driver)	59	238	297	279	122	401

5.2.15. **Table 5.6** presents the Retail trip generation by mode with the 20% internalisation factor applied.

[15] Numbers may not add exactly due to rounding

Table 5.6 – Retail Journey Purpose Trip Generation (External Trips)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	1	2	3	5	2	7
Bus	1	3	4	7	3	10
Taxi	0	0	0	1	0	1
Motorcycle	0	0	1	1	0	1
Car Driver	9	35	44	81	35	116
Car Passenger	1	3	4	8	3	11
Cycle	0	1	1	2	1	3
Pedestrian	1	2	3	5	2	7
Total	12	47	59	110	48	158
Vehicular Total – (sum of Taxi, Motorcycle and Car Driver)	10	36	45	83	36	118

5.2.16. **Table 5.7** presents the Education trip generation by mode with the 90% internalisation factor applied.

Table 5.7 – Education Journey Purpose Trip Generation (External Trips)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	1	2	3	0	0	0
Bus	1	3	4	0	0	0
Taxi	0	0	0	0	0	0
Motorcycle	0	0	0	0	0	0
Car Driver	8	32	40	3	1	4
Car Passenger	1	3	4	0	0	0
Cycle	0	1	1	0	0	0
Pedestrian	1	2	3	0	0	0
Total	11	43	54	3	1	4
Vehicular Total – (sum of Taxi, Motorcycle and Car Driver)	8	32	40	3	1	4

5.2.17. **Table 5.8** presents the Education Escort trip generation by mode with the 90% internalisation factor applied.

Table 5.8 – Education Escort Journey Purpose Trip Generation (External Trips)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	0	2	2	0	0	0
Bus	0	2	2	0	0	0
Taxi	0	0	0	0	0	0
Motorcycle	0	0	0	0	0	0
Car Driver	6	24	30	2	1	3
Car Passenger	1	2	3	0	0	0
Cycle	0	1	1	0	0	0
Pedestrian	0	2	2	0	0	0
Total	8	33	41	2	1	3
Vehicular Total – (sum of Taxi, Motorcycle and Car Driver)	6	25	30	2	1	3

5.2.18. **Table 5.9** presents the Other trip generation by mode.

Table 5.9 – Other Journey Purpose Trip Generation (External Trips)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	4	16	20	27	12	38
Bus	5	19	24	32	14	46
Taxi	1	3	4	5	2	7
Motorcycle	1	3	4	5	2	7
Car Driver	57	233	290	394	172	566
Car Passenger	5	22	27	37	16	54
Cycle	2	6	8	11	5	16
Pedestrian	4	16	20	27	12	38
Total	78	317	396	538	235	773
Vehicular Total – (sum of Bus, Taxi, Motorcycle and Car Driver)	59	239	298	405	177	580

5.2.19. The trip generations shown in **Tables 5.5 to 5.9** were combined to provide the overall external to development residential land use trip generation. The resultant external residential land use trip generation is shown in **Table 5.10**.

Table 5.10 – Residential Land Use Trip Generation (External Trips)

Residential Trip Generation	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	9	40	49	51	22	73
Bus	11	48	59	61	27	88
Taxi	2	8	10	10	4	15
Motorcycle	2	8	10	10	4	15
Car Driver	137	592	729	753	328	1081
Car Passenger	13	56	69	71	31	102
Cycle	4	16	20	20	9	29
Pedestrian	9	40	49	51	22	73
Total	187	807	995	1028	448	1476
Vehicular Total – (sum of Taxi, Motorcycle and Car Driver)	141	608	748	774	337	1110

5.2.20. The resultant external trip generation (**Table 5.10**) has been compared with the previously agreed trip generation from the 2016 TA (**Table 7.3** of the 2016 TA) which used the MKTM. The comparison of trip generations is shown in **Table 5.11**.

Table 5.11 – Comparison Of Residential Land Use Vehicular Trip Generation

Scenario	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
2016 TA	207	1035	1242	680	307	987
Updated TA (excluding Travel Planning)	141	608	748	774	337	1110
Difference	-66	-427	-494	94	30	123

5.2.21. Within this TA, at the request of BC, the impact of the FTP on development trips is accounted for within a sensitivity test rather than within the main scenario, despite the FTP being a requirement that will be secured via a planning condition. Within the sensitivity test, a 12% point reduction (as agreed with BC and MKC) was applied to car driver trips generated by the residential land use at the Proposed Development. This 12% point reduction was then distributed between bus (6%), walking (3%) and cycling (3%) in accordance with the aspirations of the FTP. The change in trips is shown in **Table 5.12** whilst **Table 5.13** shows the resultant residential trip generation.

Table 5.12 – Residential Trip Generation Travel Plan Targets Based Upon A 12% Point Reduction In Car Driver Trips

Mode	AM Peak Baseline Mode Share	TP Target Mode Share	PM Peak Baseline Mode Share	TP Target Mode Share
Rail	49	49	73	73
Bus	59	119	88	176
Taxi	10	10	15	15
Motorcycle	10	10	15	15
Car Driver	729	609	1081	904
Car Passenger	69	69	102	102
Cycle	20	50	29	73
Pedestrian	49	79	73	117
Total	995	995	1476	1476
Vehicular Total – (sum of Bus, Taxi, Motorcycle and Car Driver)	748	629	1110	933

Table 5.13 – Residential Trip Generation With Travel Planning Reduction Applied (External Trips)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	9	40	49	51	22	73
Bus	22	96	119	123	53	176
Taxi	2	8	10	10	4	15
Motorcycle	2	8	10	10	4	15
Car Driver	115	495	609	630	274	904
Car Passenger	13	56	69	71	31	102
Cycle	9	40	50	51	22	73
Pedestrian	15	64	79	82	36	117
Total	187	807	995	1028	448	1476
Vehicular Total – (sum of Bus, Taxi, Motorcycle and Car Driver)	120	513	633	652	285	937

5.3 EMPLOYMENT TRIPS

5.3.1. The TRICS trip generation database was interrogated to identify appropriate employment person trip rates that reflect the land uses proposed on Site. The TRICS category 'Business Park' was used to reflect the multiple tenant employment area proposed. The TRICS search was constrained to sites within England excluding London with over 99 employees and the trip rates have been agreed with BC and MKC. **Table 5.14** shows the employment trip rates extracted from TRICS along with the

resultant person trip generation based upon provision of 895 jobs[16]. TRICS trip rate information is contained in **Appendix R**.

Table 5.14 – Employment Person Trip Rates And Generation

Employment Trip Rates (per employee) and Generation	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Trip Rate	0.420	0.066	0.486	0.042	0.324	0.366
Trip Generation (895 jobs)	376	59	435	38	290	328

Source: TRICS, 2020

5.3.2. The employment trip generation was adjusted to remove the internal employment trips generated by the residential land use. Rather than apply a percentage reduction the actual number of internalised residential trips were subtracted from the gross external employment trip generation (**Table 5.14**), as agreed with BC and MKC. **Table 5.15** compares the employment trip generation with and without internalisation.

Table 5.15 – Comparison Of Employment Trip Generation With And Without Internalisation

Employment Trip Generation	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Employment All Person Trip Generation (without internalisation)	376	59	435	38	290	328
Employment All Person Trip Generation (with internalisation)	341	50	392	20	249	269
Net Change (residential to employment internalised trips)	-35	-9	-43	-18	-41	-59

[16] South West Milton Keynes Employment Assessment Report, May 2020. Estimated direct jobs at the Site is 777; the 895 jobs assessed reflects an additional 15% buffer.

5.3.3. The Census Travel to Work data was then further utilised for the same MSOAs as that of the residential land use to generate an employment mode share as shown in **Table 5.16**.

Table 5.16 – Employment Mode Share

Mode	Number of trips across MSOAs MK 28,29,31,32 and AV 003	Percentage
Underground/Light Rail	4	0%
Train	191	3%
Bus/Minibus/Coach	274	4%
Taxi	67	1%
Motorcycle	37	1%
Car Driver	5,267	75%
Car Passenger	519	7%
Bicycle	129	2%
On Foot	541	8%
Total	7029	100%

Source: nomisweb.co.uk – Census Table WP703EW – Method of Travel to Work (2001 specification)

5.3.4. The modal shares shown in **Table 5.16** have been agreed with BC and MKC and were applied to the employment trip generation presented in **Table 5.15**. **Table 5.17** presents the employment trip generation by mode taking account of internalisation.

Table 5.17 – Employment Trip Generation (External Trips)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	10	2	12	1	7	8
Bus	14	2	16	1	10	11
Taxi	3	1	4	0	2	3
Motorcycle	3	1	4	0	2	3
Car Driver	256	38	294	15	187	202
Car Passenger	24	4	27	1	17	19
Cycle	7	1	8	0	5	5
Pedestrian	27	4	31	2	20	22
Total	345	51	396	20	252	272
Vehicular Total – (sum of Taxi, Motorcycle and Car Driver)	263	39	302	15	192	207

5.3.5. As described above, the TA includes a sensitivity test that considers the impact of the development on the transport network once account has been made of the Travel Plan. To account for travel planning, a 12% point reduction was applied to car driver trips generated by the employment land use at the Proposed Development. This 12% point reduction was then distributed between bus (6%), walking (3%) and cycling (3%) in accordance with the aspirations of the Travel Plan. The change in trips is shown in **Table 5.18** whilst **Table 5.19** shows the resultant employment trip generation.

Table 5.18 - Employment Trip Generation Travel Plan Targets Based Upon A 12% Point Reduction In Car Driver Trips

Mode	AM Peak Baseline Mode Share	TP Target Mode Share	PM Peak Baseline Mode Share	TP Target Mode Share
Rail	12	12	8	8
Bus	16	39	11	27
Taxi	4	4	3	3
Motorcycle	4	4	3	3
Car Driver	294	246	202	169
Car Passenger	27	27	19	19
Cycle	8	20	5	14
Pedestrian	31	43	22	30
Total	396	396	272	272
Vehicular Total – (sum of Bus, Taxi, Motorcycle and Car Driver)	302	254	207	174

Table 5.19 - Employment Trip Generation With Travel Planning Reduction Applied (External Trips)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	10	2	12	1	7	8
Bus	34	5	39	2	25	27
Taxi	3	1	4	0	2	3
Motorcycle	3	1	4	0	2	3
Car Driver	215	32	246	12	157	169
Car Passenger	24	4	27	1	17	19
Cycle	17	3	20	1	13	14
Pedestrian	38	6	43	2	27	30
Total	345	51	396	20	252	272
Vehicular Total – (sum of Taxi, Motorcycle and Car Driver)	221	33	254	13	162	174

5.4 EDUCATION TRIPS

5.4.1. It was agreed with BC and MKC that the assumptions around education trips would be the same as those agreed for the 2016 TA. The proposed primary school trips were assumed to be fully internalised, in accordance with the trip generation approved within the 2016 TA. The secondary school trip generation was derived using the previously agreed external vehicular trip generation from the August 2016 TA shown below in **Table 5.20.**

Table 5.20 - External Secondary School Vehicular Trip Generation (2016 Ta)

Secondary School Trip Generation	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Staff	24	0	24	0	15	15
Pupils	73	73	146	0	0	0
Buses	3	3	6	0	0	0
Total	101	76	177	0	15	15

Source: 2016 TA, Mouchel.

5.4.2. The Secondary School vehicular trip generation has been factored up to represent an all mode trip generation. **Table 5.21** presents the staff all mode trip generation for the secondary school on the basis of the following assumptions, which were derived from the 2016 TA and associated TNs:

- 58 staff members of which 69% would be teaching staff and 31% non-teaching staff.
- 50% of teaching staff would arrive and depart in the peak hours. 90% of non-teaching staff would arrive in the AM peak and 10% depart in the PM peak.
- The Census Travel to Work mode share previously adopted in the 2016 TA has been used for the staff trips.

Table 5.21 - Secondary Education Trip Generation – Staff (Prior To Internalisation)

Mode	Staff Mode Share 2016 TA	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	5%	2	0	2	0	1	1
Bus	3%	1	0	1	0	1	01
Taxi	1%	0	0	0	0	0	0
Motorcycle	1%	0	0	0	0	0	0
Car Driver	73%	26	0	26	0	16	16
Car Passenger	5%	2	0	2	0	1	1
Cycle	2%	1	0	1	0	0	0
Pedestrian	11%	4	0	4	0	2	2
Total	100%	37	0	37	0	22	22

5.4.3. For student trips it was assumed that the four-form of entry school proposed would have a capacity of 600 students and that all would be present on Site each day for robustness. In addition, all pupil vehicular arrival trips would have a corresponding vehicular departure in the AM peak.

5.4.4. **Table 5.22** provides the all mode trip generation for students at the proposed secondary school utilising the mode share for students previously agreed as part of the 2016 work.

Table 5.22 - Secondary Education All Mode Trip Generation – Students (Prior To Internalisation)

Mode	Pupil Mode Share	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
		Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	2%	12	0	12	0	0	0
Bus	43%	252	0	252	0	0	0
Taxi	0%	0	0	0	0	0	0
Motorcycle	0%	0	0	0	0	0	0
Car Driver	*	115	115	230	0	0	0
Car Passenger	24%	144	0	144	0	0	0
Cycle	2%	12	0	12	0	0	0
Pedestrian	30%	180	0	180	0	0	0
Total	100%	715	115	715	0	0	0

*Car Driver Trips are estimated based upon the number of car passenger trips as derived from the 2016 TA

5.4.5. For staff trips, 20% were then assumed to be internalised and 50% of the student trips were internalised. The remaining external trips for staff and students are shown in **Tables 5.23** and **5.24**.

Table 5.23 - Secondary Education Trip Generation – External Staff Trips

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	1	0	1	0	1	1
Bus	1	0	1	0	1	1
Taxi	0	0	0	0	0	0
Motorcycle	0	0	0	0	0	0
Car Driver	21	0	21	0	13	13
Car Passenger	1	0	1	0	1	1
Cycle	1	0	1	0	0	0
Pedestrian	3	0	3	0	2	2
Total	29	0	29	0	17	17

Table 5.24 - Secondary Education All Mode Trip Generation – External Student Trips

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	6	0	6	0	0	0
Bus	128	0	128	0	0	0
Taxi	0	0	0	0	0	0
Motorcycle	0	0	0	0	0	0
Car Driver	73	73	146	0	0	0
Car Passenger	88	0	88	0	0	0
Cycle	6	0	6	0	0	0
Pedestrian	91	0	91	0	0	0
Total	392	73	465	0	0	0

5.4.6. The resultant combined external staff and pupil external all mode trip generation for the secondary school is presented in **Table 5.25**.

Table 5.25 - Secondary Education All Mode Trip Generation

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	8	0	8	0	1	1
Bus	129	0	129	0	1	1
Taxi	0	0	0	0	0	0
Motorcycle	0	0	0	0	0	0
Car Driver	98	73	171	0	13	13
Car Passenger	89	0	89	0	1	1
Cycle	7	0	7	0	0	0
Pedestrian	94	0	94	0	2	2
Total	413	73	498	0	18	18
Vehicular Total – (Total from 2016 TA – includes allowance for school buses)	101	76	177	0	15	15

5.5 NEIGHBOURHOOD CENTRE

5.5.1. The neighbourhood centre is proposed to serve the needs of the Proposed Development and as such will not have an external trip generation. The only trips associated with this land use will be servicing trips which have been addressed separately below. This is agreed with MKC and BC and is consistent with the methodology in the previous TAs of 2015/16.

5.6 SERVICING TRIPS

Servicing trips have been calculated based upon the LGV (Light Goods Vehicle) and OGV (Other Goods Vehicle) trip rates obtained for the various land uses from TRICS, as agreed with BC and MKC. It should be noted that as the trip generation presented throughout this TN has utilised the 'Total Person' trip rate from TRICS, therefore also extracting the LGV and OGV trip rates from the same dataset would result in the double-counting of trips. To prevent double counting the servicing trips were subtracted from the car driver trips in the final trip generation tables (**Tables 5.28 and 5.29)**. The LGV and OGV trip rates for each of the land uses is presented in **Table 5.26**.

Table 5.26 - Servicing Trip Rates

Servicing Trip Rates (per employee/student/dwellings/100m2)	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Residential OGV (per dwelling)	0.002	0.002	0.004	0.001	0.001	0.002
Employment OGV (per employee)	0.001	0.001	0.002	0	0	0
Employment LGV (per employee)	0.009	0.006	0.015	0.002	0.005	0.007
Neighbourhood Centre OGV (per 100m2)	0.099	0.06	0.159	0.04	0.04	0.08
Secondary Education OGV (per pupil)	0.001	0.001	0.002	0	0	0
Secondary Education LGV (per pupil)	0.002	0.002	0.004	0.004	0.001	0.005
Primary Education OGV (per pupil)	0.001	0.001	0.002	0	0	0
Primary Education LGV (per pupil)	0.002	0.002	0.004	0.004	0.001	0.005

Source: TRICS 2020

5.6.1. The trip rates in **Table 5.26** were applied to the proposed land use mix to provide a servicing trip generation as presented in **Table 5.27**.

Table 5.27 - Servicing Trip Generation

Servicing Trip Generation	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Residential (per dwelling)	4	4	7	2	2	4
Employment (per employee)	9	6	15	2	4	6
Neighbourhood Centre (per 100m2)	1	1	2	1	1	1
Secondary Education (per pupil)	2	2	4	2	1	3
Primary Education (per pupil) *	2	2	4	3	1	3
Total	18	14	32	9	8	17

*Note: Servicing trip rates from secondary school used for primary school

5.7 TOTAL EXTERNAL TRIP GENERATION

5.7.1. The Proposed Development total trip generation is a combination of all the proposed land uses (**Tables 5.10, 5.17, 5.25 and 5.27**) which includes external residential, employment and secondary education trips. The total trip generation split into the various modes of travel is shown below in **Table 5.28.**

Table 5.28 - Total Development Trip Generation (Excluding Travel Planning)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	27	41	69	51	31	82
Bus	153	50	203	62	37	99
Taxi	6	8	14	10	7	17
Motorcycle	6	8	14	10	7	17
Car Driver reduced to account for servicing trips	473	688	1161	759	520	1278
Car Passenger	126	59	185	73	49	122
Cycle	17	17	34	21	14	35
Pedestrian	131	44	175	52	44	96
Servicing	18	14	32	9	8	17
Total – Person Trips	957	931	1888	1048	717	1765
Vehicular Total – (sum of Taxi, Motorcycle and Car Driver and servicing)	502	719	1222	789	542	1331

5.7.2. As can be seen above, the Proposed Development is anticipated to generate 1888 person trips in the AM peak and 1765 in the PM peak. Prior to considering travel planning the total vehicular trip generation is anticipated to be 1222 movements in the AM peak and 1331 movements in the PM peak.

5.7.3. Taking account of travel planning and the 12% point reduction (explained above) in car driver trips applied to the residential and employment land uses, the total development trip generation is shown in **Table 5.29**.

Table 5.29 - Total Development Trip Generation (Including Travel Planning)

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	27	41	69	51	31	82
Bus	185	101	287	125	79	204
Taxi	6	8	14	10	7	17
Motorcycle	6	8	14	10	7	17
Car Driver (reduced to account for servicing trips)	410	585	995	633	436	1069
Car Passenger	126	59	185	73	49	122
Cycle	33	43	76	52	35	87
Pedestrian	147	70	217	84	65	149
Servicing	18	14	32	9	8	17
Total	957	931	1888	1048	717	1765
Vehicular Total – (sum of Taxi, Motorcycle and Car Driver and servicing)	438	616	1055	663	458	1121

5.7.4. Accounting for Travel Planning the anticipated vehicular trip generation will result in 1055 movements in the AM peak and 1121 in the PM peak.

5.7.5. At the request of MKC, rail based trips have been removed from the trip generation and applied across the potential modes that would be used to access rail based public transport. As such, the rail trips have been re-assigned to bus, car driver, car passenger and cycle. The re-assignment has been calculated per arriving and departing trip in each peak hour and so the proportion that the trips are re-assigned to each mode varies by time and whether it's an arrival or departure. The resultant trip generation prior to taking account of travel planning is shown in **Table 5.30.**

Table 5.30 - Total Development Trip Generation (Excluding Travel Planning) – Rail Reassigned

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	0	0	0	0	0	0
Bus	159	53	212	65	39	104
Taxi	6	8	14	10	7	17
Motorcycle	6	9	15	11	7	18
Car Driver reduced to account for servicing trips	490	723	1211	801	545	1346
Car Passenger	130	62	193	77	52	128
Cycle	18	18	36	22	15	37
Pedestrian	131	44	175	52	44	96
Servicing	18	14	32	9	8	17
Total – Person Trips	957	931	1888	1048	717	1765
Vehicular Total – (sum of Taxi, Motorcycle and Car Driver and servicing)	519	755	1272	832	567	1399

5.7.6. The resultant trip generation taking account of travel planning is shown in **Table 5.31**.

Table 5.31 - Total Development Trip Generation (Including Travel Planning) – Rail Reassigned

Mode	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Rail	0	0	0	0	0	0
Bus	192	107	299	132	83	215
Taxi	6	8	14	10	7	17
Motorcycle	6	9	15	11	7	18
Car Driver reduced to account for servicing trips	424	615	1038	670	458	1127
Car Passenger	130	63	194	77	52	129
Cycle	34	45	79	55	37	92
Pedestrian	147	70	217	84	65	149
Servicing	18	14	32	9	8	17
Total – Person Trips	957	931	1888	1048	717	1765
Vehicular Total – (sum of Taxi, Motorcycle and Car Driver and servicing)	453	647	1099	700	480	1180

5.7.7. Prior to being used in the highway network assessment, two bus trips per hour in each direction were also added to the vehicular trip generation to account for the proposed Public Transport Strategy. **Table 5.32** shows the vehicular trip generation that has been carried forwards to the highway network assessment.

Table 5.32 - Vehicular Trip Generation Including Public Transport Strategy

Vehicular Trip Generation	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Excluding Travel Planning	521	757	1278	834	569	1403
Including Travel Planning	455	649	1104	702	482	1184

5.8 DAILY AND WEEKLY TRAFFIC

5.8.1. The Annual Average Daily Traffic (AADT) and Annual Average Weekday Traffic (AAWT) for the Proposed Development was calculated from the peak hour trip generation presented in this chapter for use in the ES.

5.8.2. **Table 5.33** and **Table 5.34** below illustrates the AADT and AAWT flows developed and used in the ES.

Table 5.33 –Annual Average Daily Traffic (AADT) Development Trips

Mode	Arrivals	Departures	Total
Rail	322	329	652
Bus	475	484	959
Taxi	67	68	135
Motorcycle	67	68	135
Car Driver	5077	5174	10251
Car Passenger	531	541	1072
Cycle	139	141	280
Pedestrian	429	435	864
Servicing	132	127	259
Total	7107	7241	14348
Vehicular Total	5211	5311	10522

Table 5.34 – Annual Average Weekday Traffic (AAWT) Development Trips

Mode	Arrivals	Departures	Total
Rail	332	339	672
Bus	523	531	1053
Taxi	70	71	141
Motorcycle	70	71	141
Car Driver	5322	5416	10738
Car Passenger	575	584	1159
Cycle	146	148	294
Pedestrian	477	483	960
Servicing	157	150	307
Total	7514	7643	15158
Vehicular Total	5462	5558	11020

5.9 CONSTRUCTION TRIP GENERATION

5.9.1. The impact of the trips generated by construction traffic during the build out of the development have been calculated within the ES.

5.9.2. The Applicant has provided the following assumptions in relation to construction activity:

Daily HGV Volumes and type of vehicle

- Infrastructure Phase – 20 HGVs per day. NB The Earthworks Strategy is to retain everything on Site, so there will be limited vehicle movements associated with removal of earth.
- Residential development - 15 HGVs per day (based on 5 per day for each build phase with 3 build phases per development phase).
- Local Centre - 5 HGVs per day (in the first phase).
- Employment Land – 5 HGVs per day (in the second phase).

Number of staff

- Infrastructure Phase – 30 per day.
- Residential development - 195 per day (based on typical 65 per day per build phase).
- Local Centre - 30 per day.
- Employment Land – 30 per day.

Working Hours

- Monday-Friday – 08:00-19:00
- Saturday – 08:00-13:00

5.9.3. The assumptions have been used to develop a profile of the likely construction traffic trip generation and are included within the ES. **Table 5.35** provides a summary of likely construction traffic per phase of development.

Table 5.35 – Construction Phase Trip Generation

Phase	Land Use	Staff (per day)	Staff Vehicles (75% car driver)	HGVs (vehicles per day)
Infrastructure	Site Setup	30	23	20
1	Residential	195	146	15
	Local centre	30	23	5
	Education	30	23	5
2	Residential	195	146	15
	Employment	30	23	5
3	Residential	195	146	15

5.9.4. The construction trip generation shown in **Table 5.35** above illustrates that phase 1 of the development is likely to generate the largest number of movements. As such this phase was utilised for appraisal in the ES. **Table 5.36** provides the peak construction phase trip generation presented as an AADT and AAWT.

Table 5.36 – Construction Phase AADT/AAWT Trip Generation

AADT/AAWT	Light Vehicle Movements	HGV Movements	Total Movements
AAWT	383	50	433
AADT	328	43	371

6

TRANSPORT NETWORK ASSESSMENT METHODOLOGY

6 TRANSPORT NETWORK ASSESSMENT METHODOLOGY

6.1 INTRODUCTION

6.1.1. This section of the TA outlines the methodology adopted to assess the impacts of the Proposed Development on the transport network including a description of the method used to distribute trips on the transport network, the scenarios considered, the committed developments included, and the process undertaken to develop, validate and calibrate the junction capacity assessments.

6.2 APPROACH TO ASSESSMENT

6.2.1. The original 2015 TA used the MKTM strategic model approach, whilst the 2016 TA used a combined approach, with the strategic model within Milton Keynes and a manual spreadsheet-based model in Buckinghamshire.

6.2.2. It was agreed with both BC and MKC as part of the approved TASN that this TA would adopt a manual spreadsheet-based assessment approach instead of utilising a strategic transport model. The reason for this was that neither the Buckinghamshire Countywide Model or the MKMMM covered the entire study area for the TA in sufficient detail. Therefore, a manual spreadsheet-based approach to assessment was requested by the local authorities to provide a consistent assessment across the study area. The results presented in this TA therefore use the manual spreadsheet approach to comply with the request from BC and MKC.

6.2.3. The use of a manual spreadsheet-based approach to distribute and assign traffic is unable to account for the benefits of any dynamic reassignment that would arise in a congested urban network. It also assumes that traffic volumes would increase at a junction indefinitely and ignores the fact that motorists will only accept a certain level of queueing and delay before either re-routing (to balance traffic flows across the network), re-timing (to outside of peak hours), or re-moding (to sustainable transport) their journey. When used on a congested urban network, a manual-spreadsheet based approach therefore presents a robust assessment of the development impacts in that the extent of the impacts it identifies are unlikely to occur.

6.2.4. The main benefit of a strategic transport model is the ability to dynamically distribute and assign vehicle flows which can allow for traffic re-routing as a result of congestion/ future changes in highway infrastructure. Acknowledging that strategic modelling has been used by both authorities within their local plan evidence bases, the results presented in this TA draw correlation with the more strategic evidence base where appropriate to establish how the local road network is likely to perform in the future year 2033.

SUMMARY

6.2.5. Overall it is considered that a manual spreadsheet-based approach within this TA will yield greater impacts on the highway network than a strategic transport model and as such the results in this TA should be considered to be a robust assessment in that the extent of the impacts it identifies are unlikely to occur.

6.3 TRIP DISTRIBUTION & ASSIGNMENT

6.3.1. The trip generation presented in Section 5 of this TA has been produced for each of the land uses on the Site, namely:

- Residential;
- Employment; and
- Secondary school.

6.3.2. With the exception of servicing movements, the neighbourhood centre and primary school were considered integral elements to support the needs of the Proposed Development and therefore did not generate any external trips.

6.3.3. To distribute and assign the vehicular trips on the highway network two distributions were derived:

- residential trip distribution
- employment trip distribution

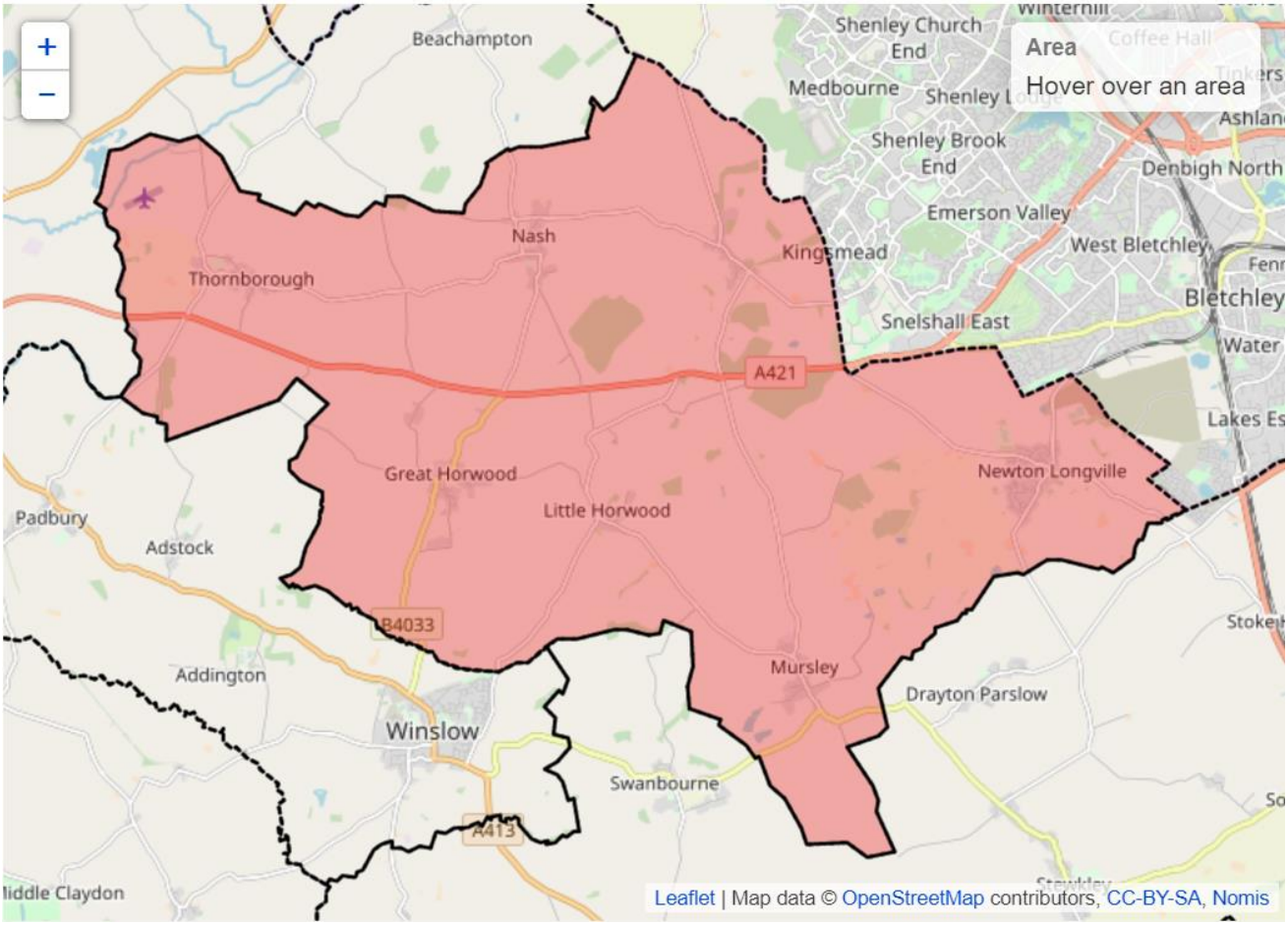
6.3.4. The residential trip generation (for all journey purposes) was distributed using the residential trip distribution and all other land uses, including servicing trips were distributed using the employment trip distribution. The methodology for deriving the trip distribution was agreed with BC and MKC through scoping discussions. The process for deriving the two trip distributions is provided below.

RESIDENTIAL TRIP DISTRIBUTION

6.3.5. A two-stage trip distribution was adopted for the residential trips. Firstly, 2011 Census, 'Location of usual residence and place of work by method of travel to work' data at the MSOA level (WU02EW) was extracted from Nomis to provide the proportion of trips to each MSOA across the Country from the five MSOAs used to derive the mode share for the Site. These MSOAs are as follows and as shown in **Figures 6.1** and **6.2**:

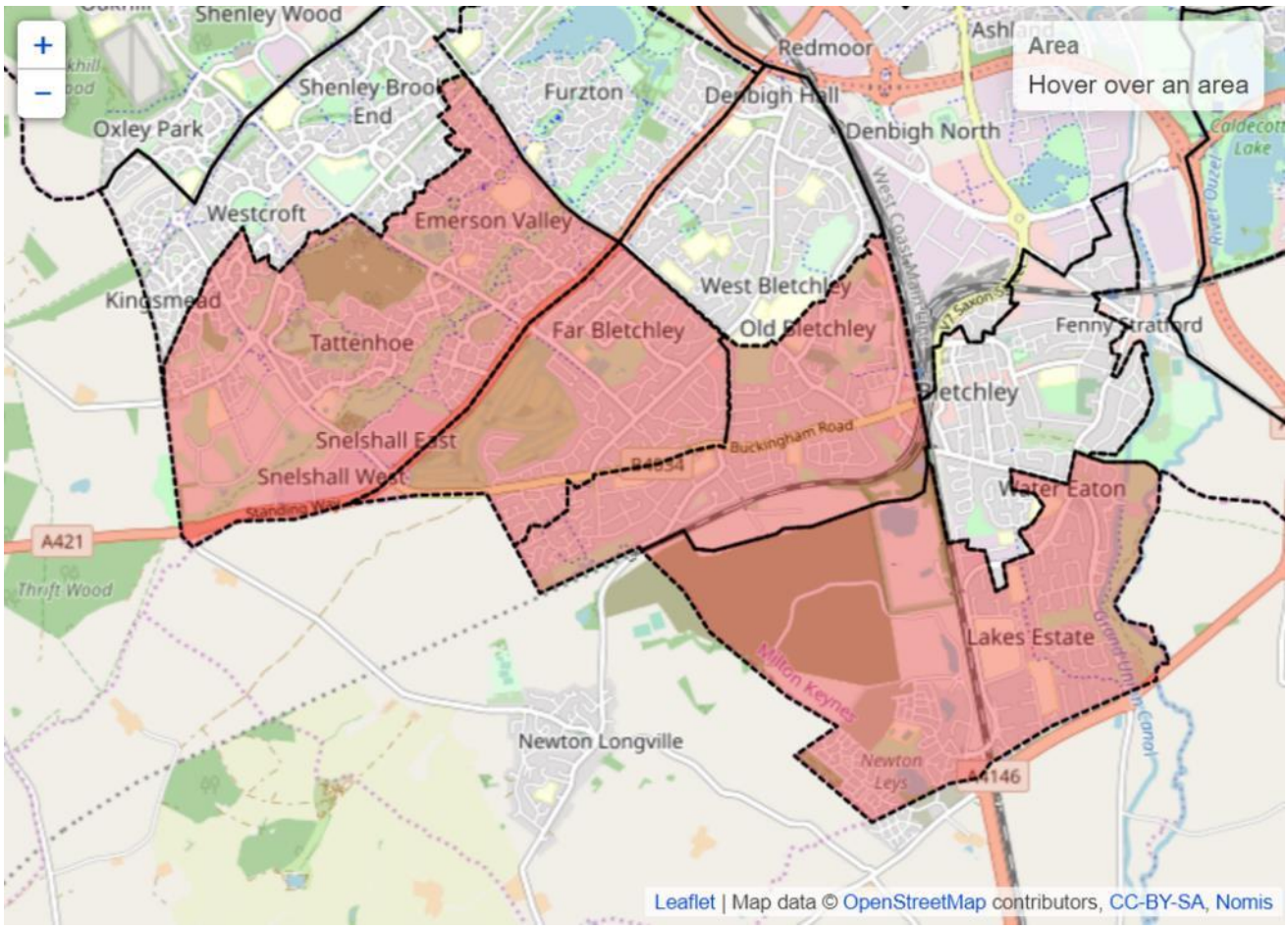
- E02003486: Milton Keynes 028
- E02003487: Milton Keynes 029
- E02003489: Milton Keynes 031
- E02003490: Milton Keynes 032
- E02003654: Aylesbury Vale 003

Figure 6.1 – MSOA Aylesbury Vale 003



Source: Nomis

Figure 6.2 – MSOA Milton Keynes 028, 029, 031, 032



Source: Nomis

6.3.6. Data for the mode car driver was used to ensure that trip patterns replicated the mode to be used within the highway network assessment. The destination MSOAs were then ranked by the total number of people making the journey per MSOA and the most popular destinations were analysed.

6.3.7. An online journey planner was then used to find the quickest route to the destination MSOA from the Site in order to assign the trips to the network. The journey planner was set to a weekday 8am start time to ensure that peak period congestion was accounted for.

6.3.8. Where more than one route was identified the trips were split proportionally between those routes. For example, if two routes were identified by the online journey planner with a similar journey time the trips would be split 50% to each route.

6.3.9. The analysis identified that the vast majority of trips remained within Milton Keynes (75%) with other key destinations including Aylesbury (1%), Newton Longville and environs (1%), Buckingham (1%), Luton (1%), Northampton (1%) and Leighton Buzzard (1%). A breakdown of the distribution and assignment is provided in **Appendix S**.

EMPLOYMENT TRIP DISTRIBUTION

6.3.10. The same methodology that was developed for the residential trip distribution was applied to the employment trip distribution. However, instead of using outgoing trips (workplace trips from the five

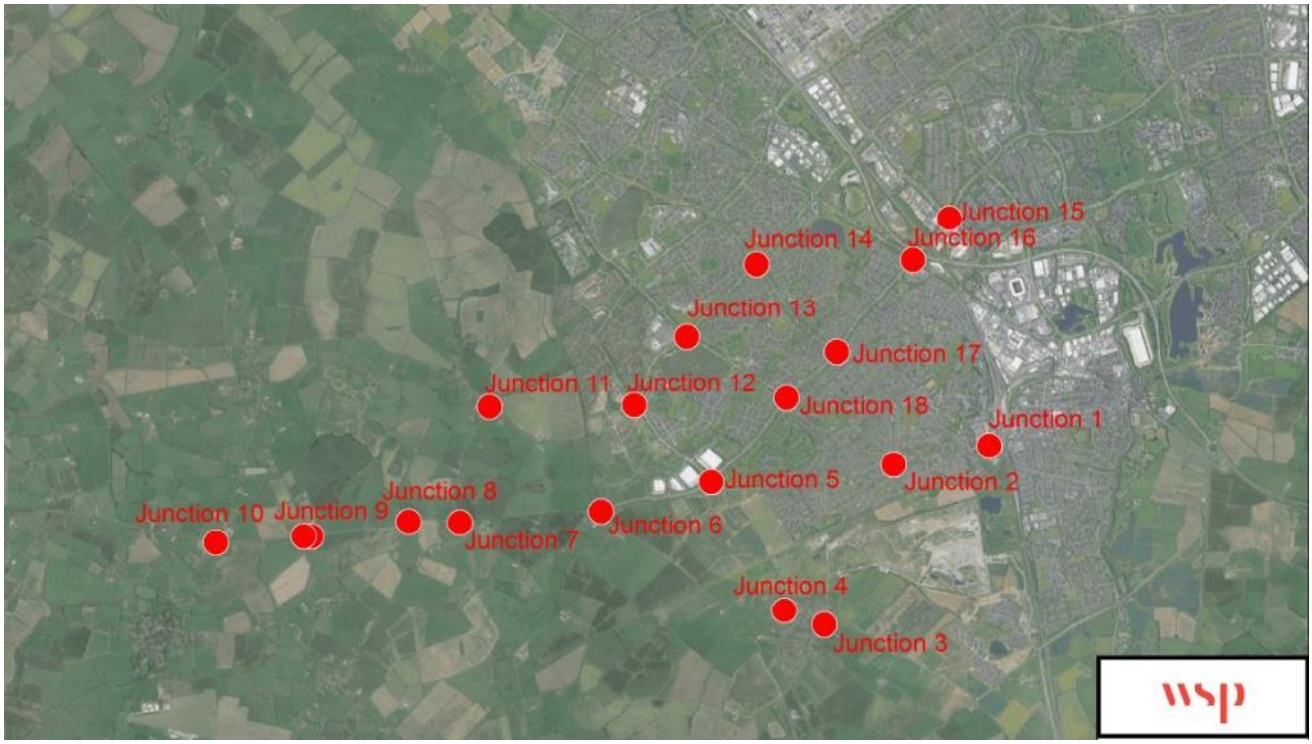
selected MSOAs to all other MSOAs) incoming trips were selected (trips to the five selected MSOAs from all other MSOAs).

6.3.11. The analysis identified that the vast majority of trips originated from within Milton Keynes (63%) with other key origins including the area around the Site (Newton Longville and environs) (3%), Old Stratford, Deanshanger and environs (2%), Winslow (2%), Buckingham (2%) and Leighton Buzzard (1%). A breakdown of the distribution and assignment is provided in **Appendix S.**

STUDY AREA

6.3.12. A traffic flow diagram was created that represented the study area for the TA. This study area included 18 off-Site junction locations where it had been agreed as part of the scoping process that capacity assessments would be required. The location of the off-Site junctions that have been assessed are shown in **Figure 6.3.**

Figure 6.3 – TA Study Area



6.3.13. The distribution was then applied to the trip generation using a two-stage approach. Firstly, routes across the traffic flow diagram were coded by the junctions that traffic would travel through to get to and from the Site.

6.3.14. Once at the Site boundary, trips were then assigned to one of the three access points based upon their land use and location within the Site. To do this a review of the masterplan was undertaken and a judgement made about the proportion of development that would use each access point based upon the layout of the Site. The trip assignment is summarised in **Table 6.1.**

Table 6.1 - Site Access Assignment

Land Use	Movement	Direction	Site Access	Proportion
Residential	Departures	East	Buckingham Road	75%
		East	Whaddon Road	25%
		West	Buckingham Road	25%
		West	Whaddon Road	75%
		South	Whaddon Road	100%
	Arrivals	East	Buckingham Road	40%
		East	Standing Way	60%
		West	Buckingham Road	20%
		West	Whaddon Road	80%
		South	Whaddon Road	100%
Employment – also used for servicing trips	Departures	East	Buckingham Road	100%
		West	Buckingham Road	100%
		South	Whaddon Road	100%
	Arrivals	East	Buckingham Road	25%
		East	Standing Way	75%
		West	Buckingham Road	100%
		South	Whaddon Road	100%
Secondary School	Departures	East	Buckingham Road	100%
		West	Buckingham Road	75%
		West	Whaddon Road	25%
		South	Whaddon Road	100%
	Arrivals	East	Buckingham Road	25%
		East	Standing Way	75%
		West	Buckingham Road	100%
		South	Whaddon Road	100%

6.3.15. Traffic flow diagrams showing the final trip distribution for the employment and residential trips are provided in **Appendix T**.

6.4 SCENARIO TESTING

6.4.1. To determine the impact of the Proposed Development on the highway network, the roads and junctions in the vicinity of the Site have been tested in a number of development scenarios. The purpose of scenario testing is to determine the level of impact that the Proposed Development is likely to have taking into account external factors such as background growth on the highway network and other committed developments in the surrounding area.

6.4.2. The future assessment year prepared to assess the effects of the Proposed Development on the transport network was 2033. This year was selected to align with the anticipated year of completion of the development and the end of the VALP period (2033).

6.4.3. A further assessment year of 2026 was considered as a comparison with the assessment year used in the 2016 TA. However, this assessment is not included within the main body of this TA but can be found in the traffic flow diagrams and modelling results in the appendices.

6.4.4. For the purposes of this TA a number of scenarios were included for assessment. At the request of BC, the effects of the FTP were not considered within the main assessment scenario. Instead the effects of the development including consideration of the targets established in the FTP are established through a separate sensitivity test. In addition, at the request of BC, the neighbouring draft allocation site at Shenley Park was also considered within a separate sensitivity test.

6.4.5. The scenarios presented within this TA and as agreed with BC and MKC are split between 'Do Nothing' and 'Do Something' :

- Do Nothing - base traffic with committed developments but without the Proposed Development
- Do Something – base traffic with committed developments with the Proposed Development

6.4.6. A full list of scenarios considered is as follows:

- 2020 Base Year
- 2033 Do Nothing
- 2033 Do Something 1
- 2033 Do Something 2 (Do Something 1 + reduction to account for travel planning at the Proposed Development)
- 2033 Do Something 3 (Do Something 1 + Shenley Park draft allocation)

6.4.7. Traffic flow diagrams representing all of the above scenarios are included in **Appendix T**.

6.4.8. These scenarios were agreed with BC and MKC. The exclusion of travel planning measures in the Do Something 1 results in a robust worst case scenario, particularly given that any planning permission for the Proposed Development will require the implementation of a FTP and subsequent detailed Travel Plans that would be secured either by way of an appropriate planning condition or obligation. Nonetheless, this scenario has been assessed at the request of both MKC and BC.

6.4.9. No further sensitivity tests have been requested by BC or MKC.

6.5 COMMITTED DEVELOPMENT

6.5.1. It was agreed with BC and MKC that the only committed developments requiring consideration within the core scenarios of this TA are Tattenhoe Park and Kingsmead South. These developments are both currently under construction and are considered certain to take place.

6.5.2. In regard to Shenley Park, as the development was included within the Draft VALP following the Examination in Public (EiP) Hearings, with very little information available within the public domain regarding likely programme for completion it was agreed with BC and MKC that this development should not be included within the TA as a committed development and should instead be assessed separately within a sensitivity test.

6.5.3. This approach differs to the ES which considers Tattenhoe Park, Kingsmead South and Shenley Park as cumulative developments within the core assessment.

6.5.4. Tattenhoe Park and Kingsmead South are included in the traffic flows for all future year scenarios (Do Nothing and Do Something 1-3)

6.5.5. To derive the trip generation for Tattenhoe Park and Kingsmead South the following process was undertaken:

- Vehicular trip rates were extracted from the residential land use person trip rates extracted from TRICS (**Appendix R**).
- Both Tattenhoe Park and Kingsmead South are currently under construction with a proportion of each development already completed and occupied. As the data collection exercise that underpins this TA was completed in February 2020, it is not appropriate to add the full development quantum associated with Tattenhoe Park and Kingsmead South as this would result in double-counting of trips. To derive an appropriate quantum of development for each, a review of the MKC Housing Trajectory 2019-2024 was undertaken (**Appendix U**). The number of completions anticipated from April 2020 within the housing trajectory document indicates that there are 178 dwellings at Kingsmead South and 883 dwellings at Tattenhoe Park still be completed and occupied.

6.5.6. **Table 6.2** provides the trip rates and trip generation associated with the two committed developments for the future forecast year 2033.

Table 6.2 - Tattenhoe Park And Kingsmead South Trip Generation

	AM Peak			PM Peak		
	Arrivals	Departures	Two-way	Arrivals	Departures	Two-way
Trip rate	0.126	0.375	0.501	0.333	0.156	0.489
Kingsmead South Trip Generation	22	67	89	59	28	87
Tattenhoe Park	111	331	442	294	138	432
Total	134	398	532	353	166	519

6.5.7. The trip generation outlined within **Table 6.2** was distributed across the highway network study area using the same distribution as that derived for the residential land use on the Proposed Development with access to the committed developments assumed from V1 Snelshall Street.

6.6 SHENLEY PARK SENSITIVITY TEST

6.6.1. Owing to the limited information available within the public domain regarding the development proposals for Shenley Park discussions were held with BC regarding how Shenley Park should be assessed within the TA. It was agreed with BC and MKC that the trip generation for 1,150 homes and a secondary school would be considered within the Shenley Park sensitivity test. The approach taken to deriving the trip generation for Shenley Park is as follows:

- Vehicular trip rates for the residential land use were extracted from the residential land use person trip rates extracted from TRICS (**Appendix R**).
- No information was available regarding the likely education provision on the site. Therefore, the same secondary school trip generation used for the Proposed Development was adopted for Shenley Park also.
- No information was available regarding likely timescales for the build-out of the Shenley Park development. It was therefore assumed that the development would be fully completed and fully occupied in the 2033 future year.

6.6.2. **Table 6.3** provides the trip rates used and trip generation for Shenley Park.

Table 6.3 – Shenley Park Trip Rates and Trip Generation

Scenario	AM Peak			PM Peak		
	Arrivals	Departures	Two-way	Arrivals	Departures	Two-way
Trip rate	0.126	0.375	0.501	0.333	0.156	0.489
Residential Trip Generation	145	431	576	383	179	562
Secondary School Trip Generation	101	76	177	0	15	15
Total Trip Generation	246	507	753	383	194	577

6.6.3. BC indicated that they would run the Buckinghamshire Countywide Model to ascertain the potential trip reassignment given that Shenley Park includes provision of a new grid road, V0, which could considerably alter trip patterns in the local area, however the information has not yet been made available by BC.

6.6.4. The trip generation outlined within **Table 6.3** was distributed across the highway network study area using the same distribution as that derived for the residential land use on the Proposed Development with access to the committed developments assumed from V1 Snelshall Street.

6.6.5. The Shenley Park allocation within the Draft VALP includes the provision of a new Grid Road (V0). This grid road would link the A421 west of Bottle Dump Roundabout to either H7 Chaffron Way or H6 Childs Way. A review was undertaken of the illustrative masterplan prepared by Crest Nicholson[17] and the existing highway network and it was determined that H6 Childs Way would most likely be the point of connection of a new Grid Road onto the highway network within Milton Keynes.

6.6.6. To account for the potential redistribution of traffic from the A421 Standing Way/V1 Snelshall Street a review was undertaken of turning movements at the Tattenhoe Roundabout (A421 Standing Way/V1 Snelshall Street). The reason this junction was selected for analysis was that it is the first 'V' road encountered by traffic when heading into Milton Keynes and therefore the first opportunity for traffic to change course if heading to/from the town centre.

6.6.7. It is considered likely that a significant volume of traffic that currently makes the movement from A421 Standing Way to V1 Snelshall Street would divert and reassign onto the new Grid Road V0. BC requested that 35% be considered to limit the reduction in trips on the corridor of A421. This TA has therefore adopted the 35% diversion rate requested by BC, albeit a significantly higher diversion rate would be more realistic to conclude that the business case for provision of a new grid road would be acceptable.

[17] Shenley Park Masterplan Update Document, Crest/Scott Brownrigg, 2016

6.6.8. Accordingly, 35% of the traffic making the left turn from the A421 Standing Way to V1 Snelshall Street and the right turn from V1 Snelshall Street to the A421 Standing Way in the AM and PM peaks was removed from the highway network between the anticipated Site access point west of Bottle Dump roundabout and was added to the junction of V1 Snelshall Street/H6 Childs Way. The adjustments made are shown in **Figure 6.4** and **Figure 6.5**.

Figure 6.4 – Shenley Park AM Peak Background Traffic Reassignment

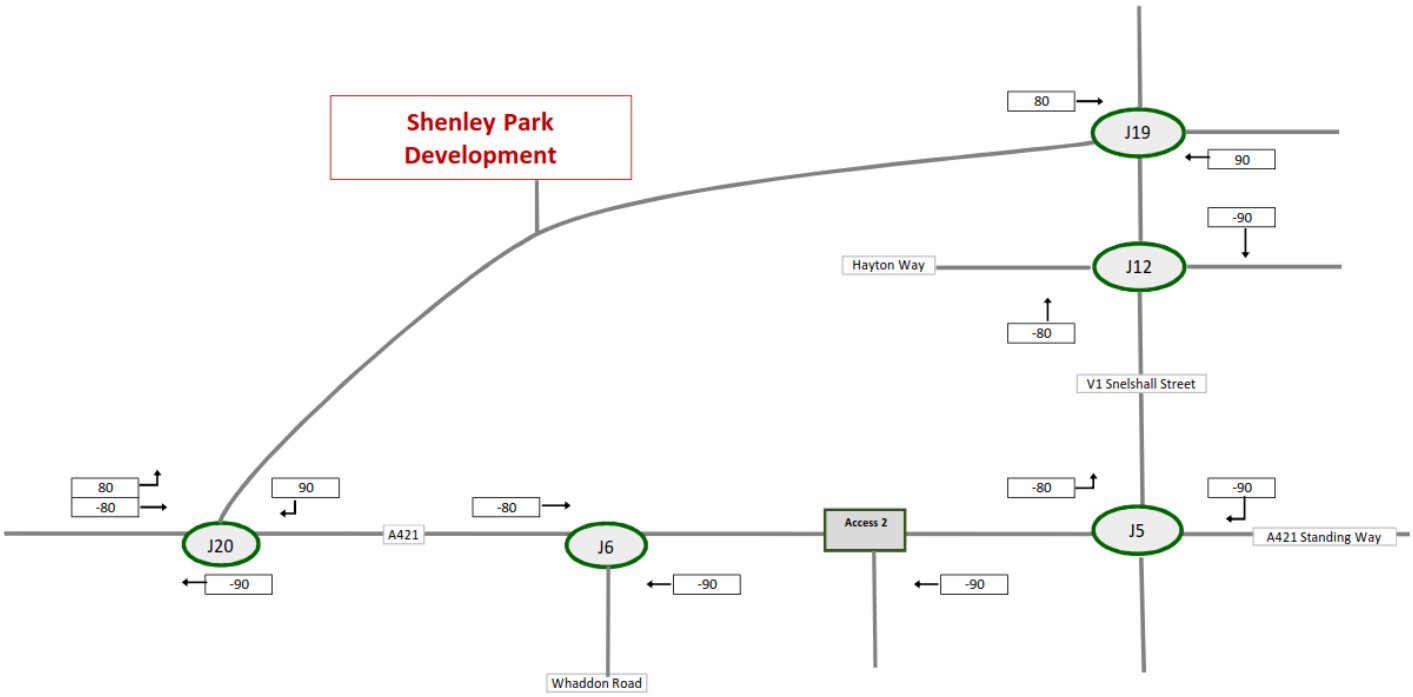
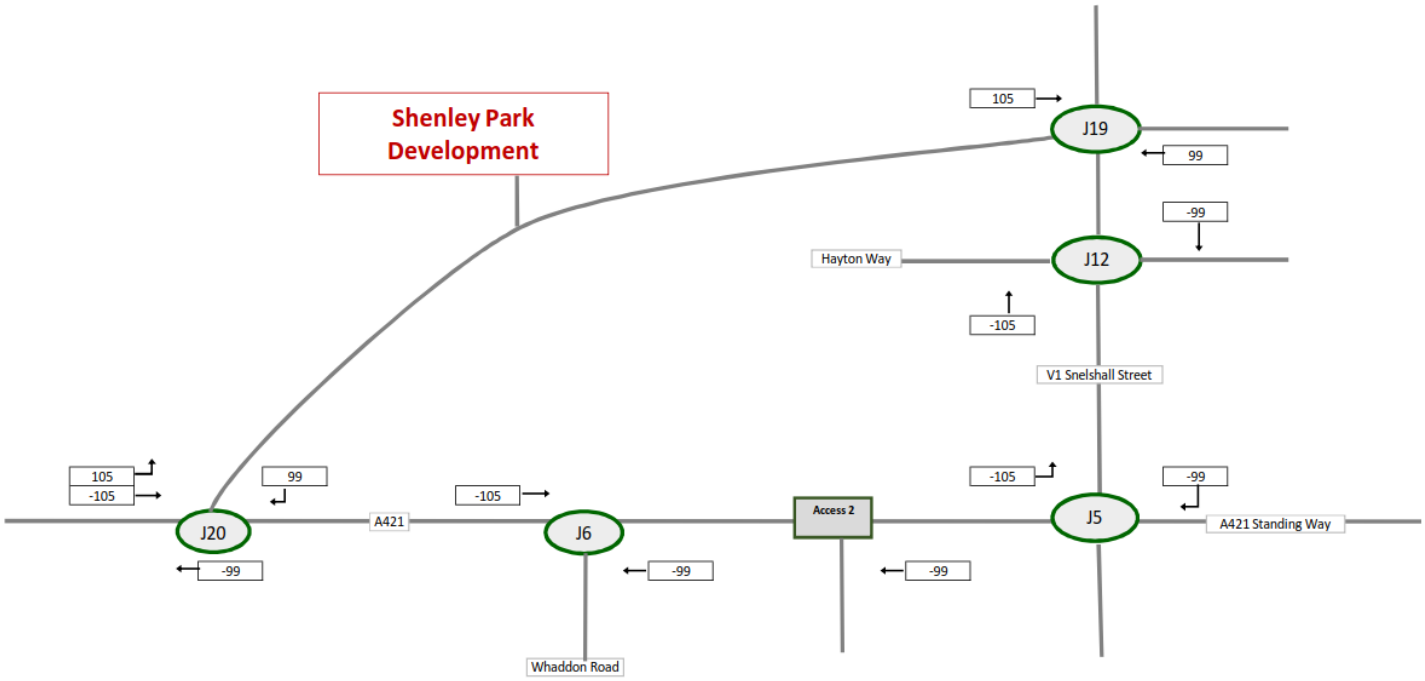


Figure 6.5 – Shenley Park PM Background Traffic Reassignment



6.6.9. Assuming a new grid road V0 is provided, then there is likely to be a higher reassignment of trips away from V1 Snelshall Street as previously indicated. Hence, the assumed re-distribution of 35% of traffic presents a robust demand assessment along the corridor of A421 east of the Bottle Dump Roundabout.

6.7 BACKGROUND TRAFFIC GROWTH

6.7.1. In addition to committed development, and as agreed with BC and MKC the traffic model developed also includes a TEMPro growth factor. The Trip End Model Presentation Programme (TEMPro) is an industry standard tool used to estimate traffic growth. Any smaller developments not explicitly included as committed developments within the highway network assessment are accounted for through the use of a growth factor.

6.7.2. Background traffic growth to create the future forecast year 2033 has been derived by extracting growth factors from TEMPro. The forecasts are based on economic and housing projections for the upcoming years; it should be noted that the current TEMPro dataset is based on high economic forecasts derived prior to 'Brexit' in January 2020 and also the current COVID-19 Pandemic health crisis. For these reasons, the forecasts are likely overestimate the economic growth in the UK over the coming years through to 2033.

6.7.3. For the purposes of this TA, the geographic area of Milton Keynes was selected and growth factors for car driver trips selected and agreed with MKC and BC.

6.7.4. The National Trip End Model growth factors contained within TEMPro were adjusted using the alternative assumption tool to remove the housing associated with Kingsmead South and Tattenhoe Park as these development sites are included as committed developments. As such, 1,061 dwellings were removed from the growth factor assumptions for 2033 commensurate with the level of completions anticipated in the MKC Housing Trajectory 2019-2024 (**Appendix U**).

6.7.5. The adjusted NTEM growth factors were combined with National Transport Model forecasts using the urban principal road category to derive the factors for the AM and PM peaks, daily and weekday. **Table 6.4** presents the growth factors used in the updated TA.

Table 6.4 – Traffic Growth Factors

Scenario	AM Peak	PM Peak	Daily	Weekday
2020-2033	1.147	1.154	1.168	1.166

6.8 HIGHWAY NETWORK ASSESSMENT APPROACH

6.8.1. Junction capacity assessments have been undertaken using the industry standard software PICADY for priority junctions and ARCADY for roundabouts as part of the 'Junctions 9' software package and 'LinSig' (version 3) for traffic signal junctions, as agreed with BC and MKC.

6.8.2. The output from PICADY and ARCADY provides a number of measurements to provide information on junction operation. These relate to the 'Ratio of Flow to Capacity' (RFC), maximum queue length, and delay in seconds per vehicle. The main indication of a junction's performance is provided by the RFC for each arm. The capacity of a junction is realised when the demand flow at the entry is great enough to cause a continuous queue of vehicles to wait on the approach. This is reached when the RFC attains a value of 1 or more. A junction with an RFC of 1 or above is still able to operate but would be more sensitive to changes in queueing and delay.

6.8.3. To account for daily fluctuations in traffic flow which are generally regarded to be as much as +/- 10%, a junction operating with an RFC of 0.85 or below is considered to be performing satisfactorily[18].

6.8.4. Where a junction has been modelled using the lane simulation mode within ARCADY, to better reflect the vehicles per lane where movements are restricted, an RFC is not provided by the software and instead a Level of Service (LoS) is reported. The LoS is a measured result based on average vehicle delay and is defined within the Highway Capacity Manual (HCM 2016)[19] with the scale of results as follows:

- A – free flowing
- B – reasonably free flowing
- C – stable flow
- D – approaching unstable flow
- E – unstable flow, operating at capacity
- F – forced or breakdown flow.

[18] Page 92 Section 9.3. Junctions 9 User Guide (Issue D), TRL, 2018

[19] Highway Capacity Manual, 2016, Transportation Research Board, Washington DC

6.8.5. LinSig provides a number of measurements to ascertain information of a junction's operation. These relate to the 'Degree of Saturation' (DoS), mean maximum queue length, Practical Reserve Capacity (PRC) and delay in minutes per arriving vehicle. The main indication of a junction's performance is provided by the DoS for each arm.

6.8.6. The peak capacity is realised when the demand flow at the entry is such that not all vehicles queueing at the beginning of the green phase are able to clear the junction by the end of the green phase. This is reached when the DoS attains a value of 100% or more. However, to account for daily fluctuations in traffic flow a DoS of 90% is generally used to represent when a junction begins to operate at capacity and the PRC is zero.

6.8.7. RFC, DoS and LoS are indicators by which congestion levels at a junction can be considered and are the initial means by which junction capacity is interpreted. However, interpretation of other indicators such as queueing and delay are also required to understand junction performance and to understand the likely impact of changes in traffic flow. Where a junction is congested, interpretation of a range of metrics (RFC, Dos, Los, queueing and delay) is required and professional judgement has to be applied to determine the severity of the impact at a junction.

6.9 BASELINE MODEL DEVELOPMENT AND VALIDATION

6.9.1. The existing conditions on the highway network were assessed based on observed data. A series of traffic surveys were commissioned in February 2020, including Automatic Traffic Counts (ATCs), junction turning counts, and queue length surveys. The ATC data covered a two-week period, and the turning counts and queue length surveys were carried out over three consecutive mid-week days. Analysis of the ATC data demonstrated that traffic conditions on the days the turning counts and queue length surveys were carried out were 'typical', i.e. no major incidents on the network were identified.

6.9.2. The traffic data has been collected and processed into two data sets to provide input flows for the individual junction capacity assessments:

- Three-day peak hour average actual turning movements at each junction; and
- Average demand at each junction calculated from upstream data collection points and split across turning proportions for each arm of each junction using the three-day average turning count data.

6.9.3. Junction capacity assessment models were developed at each of the 18 locations within the agreed study area by following the below approach:

- Geometries were measured by overlaying OS mastermap (1:1250 scale) mapping with aerial photography. The geometric measurements at each junction are shown on the plans contained in **Appendix V**.
- The geometries were then validated through a site visit undertaken in February 2020 at the time of the traffic surveys to observe any significant difference between the layouts identified from the desktop geometric calculations and the layouts on-site.
- Junction capacity assessment models were then run for the AM and PM peak hours using the three-day peak hour average actual turning movements at each junction.
- Modelled queue lengths were then compared to the average maximum queue length identified from the queue length surveys (measured across the three survey days) on each arm of each of

the junctions to identify where the modelled junction differed from that identified from the observed data collected.

- The observed queue length data collected was compared with the queueing shown on a typical day within the Google Traffic application to consider whether the observed queue data was indeed typical of conditions on the local highway network.

6.9.4. Where the average observed queue varied from the modelled queue by more than five vehicles and the Google Traffic data suggested that the observed data was typical of conditions in that location, further consideration was given to calibration of the model.

6.10 MODEL CALIBRATION AND VALIDATION

6.10.1. To ensure the junction capacity assessments replicate existing traffic conditions in the baseline year (2020) the modelled results were compared to average maximum queue length data collected at the same time as the turning counts. The comparison was coded to identify arms of junctions where the average observed queue varied from the modelled queue by more than five vehicles. This threshold was used to identify whether further consideration was given to calibration of the model. The results of this comparison are provided in **Table 6.5** with each row coded as green (i.e. a difference of less than five vehicles), or amber (i.e. where a difference of five or more vehicles between the observed and modelled queue was evident).

Table 6.5 – Observed And Modelled Queue Length Comparison – Pre-Calibration

Junction / Arm Name			Weekday AM Peak Hour (07:45 to 08:45 hours)		Weekday PM Peak Hour (17:00 to 18:00 hours)		Model Calibration
			Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	
Junction 1	A	Sherwood Drive	4	48	3	13	
	B	B4034	2	3	16	66	
	C	Water Eaton Road	2	1	4	3	
	D	B4034 Buckingham Road	18	89	6	4	
Junction 2	A	Shenley Road	1	1	1	1	
	B	B4034 Buckingham Road (S)	1	1	2	1	
	C	Newton Road	2	1	2	0	
	D	B4034 Buckingham Road (N)	3	1	1	1	
Junction 3	A	Bletchley Road	0	11	0	5	
	B	Stoke Road	5	0	4	0	
	C	Drayton Road	0	1	0	1	

		Junction / Arm Name	Weekday AM Peak Hour (07:45 to 08:45 hours)		Weekday PM Peak Hour (17:00 to 18:00 hours)		Model Calibration
			Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	
	D	Whaddon Road	3	1	3	1	
Junction 4	A	Whaddon Road (N)	-	0	-	0	
	B	Westbrook Road	1	0	0	0	
	C	Whaddon Road (S)	0	0	0	0	
Junction 5	A	V1 Snelshall Street	6	41	5	4	
	B	A421 Standing Way (E)	2	1	2	1	
	C	B4034 Buckingham Road	2	1	3	1	
	D	A421 Standing Way (W)	2	2	1	2	
Junction 6	A	A421 Standing Way (E)	2	16	4	71	
	B	Whaddon Road	2	1	2	1	
	C	A421 Buckingham Road	1	5	1	3	
Junction 7	A	Coddimoor Lane	1	1	1	0	
	B	A421 Buckingham Road	2	15	3	36	
	C	Whaddon Road	4	1	5	1	
	D	A421 Buckingham Road	5	5	3	3	
Junction 8	A	A421 Buckingham Road	-	1	-	0	
	B	Warren Road	2	6	1	0	
	C	A421 Buckingham Road	0	0	0	0	
Junction 9	A	A421 Buckingham Road	0	0	1	0	
	B	Shucklow Hill	1	1	1	0	
	C	A421 Buckingham Road	0	0	0	0	
	D	Little Horwood Road	1	0	1	0	
Jun	A	A421 Buckingham Road	2	4	2	5	

Junction / Arm Name			Weekday AM Peak Hour (07:45 to 08:45 hours)		Weekday PM Peak Hour (17:00 to 18:00 hours)		Model Calibration
			Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	
	B	B4033 Nash Road	2	1	2	0	
	C	A421 Buckingham Road	11	2	5	3	
	D	Winslow Road	1	0	1	0	
Junction 11	A	Stock Lane	-	0	-	0	
	B	Shenley Road	1	0	1	0	
	C	Coddimoor Lane	0	0	0	0	
Junction 12	A	V1 Snelshall Street (N)	1	2	1	1	
	B	H7 Chaffron Way	2	1	1	1	
	C	V1 Snelshall Street (S)	1	1	1	1	
	D	Hayton Way	1	0	0	0	
Junction 13	A	V2 Tattenhoe Street (N)	2	1	2	1	
	B	H7 Chaffron Way (E)	1	1	3	1	
	C	V2 Tattenhoe Street (S)	3	2	2	1	
	D	H7 Chaffron Way (W)	3	1	1	1	
Junction 14	A	V3 Fulmer Street (N)	1	1	2	2	
	B	H7 Chaffron Way (E)	1	1	14	3	
	C	V3 Fulmer Street (S)	3	3	3	1	
	D	H7 Chaffron Way (W)	9	3	1	1	
Junction 15	A	V6 Grafton Street (N)	4	1	14	2	
	B	A421 Standing Way (E)	6	4	12	2	
	C	V6 Grafton Street (S)	10	9	6	4	
	D	A421 Standing Way (W)	20	4	5	3	
Jun	A	V4 Watling Street (N)	2	2	7	12	

Junction / Arm Name			Weekday AM Peak Hour (07:45 to 08:45 hours)		Weekday PM Peak Hour (17:00 to 18:00 hours)		Model Calibration
			Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	
	B	A421 Standing Way (E)	13	3	26	6	
	C	V4 Watling Street (S)	6	23	18	31	
	D	A421 Standing Way (W)	20	6	7	3	
Junction 17	A	V3 Fulmer Street	5	6	5	2	
	B	A421 Standing Way (E)	1	1	3	3	
	C	Shenley Road	3	1	3	2	
	D	A421 Standing Way (W)	4	6	4	2	
Junction 18	A	V2 Tattenhoe Street	32	24	4	2	
	B	A421 Standing Way (E)	3	1	2	1	
	C	Tattenhoe Lane	2	2	2	2	
	D	A421 Standing Way (W)	2	2	2	1	

6.10.2. The modelled and observed queue data was then compared to identify locations where a significant (i.e. more than five vehicle) difference was evident on any arm of a junction. Locations where the modelled and observed maximum queue on each arm was less than five were considered to validate satisfactorily and no calibration was considered necessary.

6.10.3. Locations where a five or more than five vehicle difference was observed were then calibrated to achieve a more realistic model. The junctions where model calibration was considered appropriate were as follows:

- Junction 1 – Sherwood Drive/Water Eaton Road/Buckingham Road Roundabout
- Junction 3 – Bletchley Road/Stoke Road/Drayton Road/Whaddon Road
- Junction 5 – Tattenhoe Roundabout
- Junction 6 – Bottle Dump Roundabout
- Junction 7 – Whaddon Crossroads Roundabout
- Junction 10 – A421 Nash Road/Winslow Road Roundabout
- Junction 14 – Furzton Roundabout
- Junction 15 – Bleak Hall Roundabout
- Junction 16 – Elfield Park Roundabout

- Junction 18 – Windmill Hill Roundabout

6.10.4. Professional judgement was applied at each junction location to decide on the most appropriate means of calibrating each model to suitably replicate the observed queue length data. **Table 6.6** provides a description of the calibration undertaken.

Table 6.6 – Model Calibration Summary

Junction	Google Traffic Observations	Adjustments Made	Junctions 9 Summary
Junction 1 – Sherwood Drive/Water Eaton Road/Buckingham Road Roundabout	Long moderate delays are observed on all the arms for both AM and PM Peaks.	Intercept adjustments of 350, 300 and 360PCU/hr have been used on Arm A, B and D respectively.	Using lane simulation model, the modelled queues match well with observed queues.
Junction 3 – Bletchley Road/ Stoke Road/ Drayton Road/ Whaddon Road	Heavy delays and medium delays are observed in AM Peak on Arm B and D. Model also depicts the same.	No Intercept adjustment has been used to match the observed queues with modelled queues. Geometrical adjustments have been taken into consideration.	The highest difference is for Stoke Road where a difference of 6 was observed. As this difference is only just above the threshold set for calibration no further adjustments considered necessary.
Junction 5 – Tattenhoe Roundabout	Heavy delays are observed on Arm A in both AM and PM Peaks. Arm B and D exhibit moderate delays.	Intercept adjustment of 150PCU/hr has been used on Arm A to match with the observed queues.	Except for Arm A, all the results match with the observed queues. With adjustments all arms match.
Junction 6 – Bottle Dump Roundabout	Moderate delays in AM Peak on Arm A and B. Heavy delay and blocking back can be observed on Exit arm C in PM Peak.	No intercept adjustment used.	Lane usage is unbalanced and therefore lane simulation mode used.
Junction 7 - Whaddon Crossroads Roundabout	Heavy delays are observed on Arm C AM Peak. Observed queues and modelled queues do not depict this. Also, Moderate delays on all the arms are observed, which is reflected in the model.	Intercept adjustments of 220PCU/hr and 150PCU/hr have been input for Arm B and Arm D respectively.	With adjustments all arms operating within threshold set.
Junction 10 – A421 Nash Road/Winslow Road Roundabout	Heavy delays on Arm C in AM Peak. Moderate delays on all the other arms.	Intercept adjustment has been calculated based on CCTV analysis. Mean entry flow and circulatory flow have been input to	With adjustments all arms operating within threshold set.

Junction	Google Traffic Observations	Adjustments Made	Junctions 9 Summary
		calculate the intercept adjustment.	
Junction 14 – Furzton Roundabout	Heavy delays on Arm B, and moderate delays on the other arms. Model also depicts the same.	Intercept adjustments of -260PCU/hr and -200PCU/hr have been used on Arm B and Arm D respectively.	With adjustments all arms operating within threshold set.
Junction 15 – Bleak Hall Roundabout	Heavy delays and blocking back on Exit arm C in AM Peak Exit arm A in PM Peak, restricting the junction capacity.	Intercept adjustments of -450, -150, 50 and -200PCU/hr have been used in the model to match with the observed queues.	With adjustments all arms operating within threshold set.
Junction 16 – Elfield Park Roundabout	Heavy delays on Arm D and Moderate delays on other arms in both AM and PM Peaks.	Intercept adjustments of -250, 70 and -200PCU/hr have been used on Arms B, C and D respectively. The adjustments have been increased and decreased to cross check and results closest to the observed queues are considered.	With adjustments results show difference of up to 6 vehicles. Junction is nearing capacity and appears sensitive to the adjustments made therefore no further refinement considered possible.
Junction 18 - Windmill Hill Roundabout	Short Moderate delays on Arms A, C and D during both peaks is observed.	Arm A seems to be operating close to its capacity in Base. To replicate this, a minor adjustment of 30PCU/hr has been used in the model.	The observed and modelled queues are matching except for Arm A. There seems to be very high queues on Arm A and a difference of 16 vehicles evident in the model. Junction is nearing capacity and appears sensitive to the adjustments made therefore no further refinement considered possible.

6.10.5. **Table 6.7** presents the queue validation post completion of the junction calibration process.

Table 6.7 – Observed And Modelled Queue Length Comparison – Post Calibration

Junction / Arm Name			Weekday AM Peak Hour (07:45 to 08:45 hours)		Weekday PM Peak Hour (17:00 to 18:00 hours)		Analysis Green = less than five vehicle difference, amber = five or more vehicle difference
			Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	
Junction 1	A	Sherwood Drive	4	7	3	3	
	B	B4034	2	2	16	19	
	C	Water Eaton Road	2	1	4	4	
	D	B4034 Buckingham Road	18	18	6	2	
Junction 2	A	Shenley Road	1	1	1	1	
	B	B4034 Buckingham Road (S)	1	1	2	1	
	C	Newton Road	2	1	2	0	
	D	B4034 Buckingham Road (N)	3	1	1	1	
Junction 3	A	Bletchley Road	0	0	0	0	
	B	Stoke Road	5	11	4	5	
	C	Drayton Road	0	0	0	0	
	D	Whaddon Road	3	1	3	1	
Junction 4	A	Whaddon Road (N)	0	0	0	0	
	B	Westbrook Road	1	0	0	0	
	C	Whaddon Road (S)	0	0	0	0	
Junction 5	A	Snelshall Street	6	8	5	2	
	B	A421 Standing Way (E)	2	1	2	1	
	C	B4034 Buckingham Road	2	1	3	1	
	D	A421 Standing Way (W)	2	2	1	2	
Junction 6	A	A421 Standing Way (E)	2	4	4	8	
	B	Whaddon Road	2	1	2	1	

Junction / Arm Name			Weekday AM Peak Hour (07:45 to 08:45 hours)		Weekday PM Peak Hour (17:00 to 18:00 hours)		Analysis Green = less than five vehicle difference, amber = five or more vehicle difference
			Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	
	C	A421 Buckingham Road	1	4	1	3	
Junction 7	A	Coddimoor Lane	1	1	1	0	
	B	A421 Buckingham Road	2	5	3	7	
	C	Whaddon Road	4	1	5	1	
	D	A421 Buckingham Road	5	5	3	3	
Junction 8	A	A421 Buckingham Road					
	B	Warren Road	2	2	1	0	
	C	A421 Buckingham Road	0	0	0	0	
Junction 9	A	A421 Buckingham Road	0	0	1	0	
	B	Shucklow Hill	1	1	1	0	
	C	A421 Buckingham Road	0	0	0	0	
	D	Little Horwood Road	1	0	1	0	
Junction 10	A	A421 Buckingham Road	2	4	2	5	
	B	B4033 Nash Road	2	1	2	0	
	C	A421 Buckingham Road	11	6	5	7	
	D	Winslow Road	1	0	1	0	
Junction 11	A	Stock Lane	0	0	0	0	
	B	Shenley Road	1	0	1	0	
	C	Coddimoor Lane	0	0	0	0	
Junction 12	A	V1 Snelshall Street (N)	1	2	1	1	
	B	H7 Chaffron Way	2	1	1	1	
	C	V1 Snelshall Street (S)	1	1	1	1	

Junction / Arm Name			Weekday AM Peak Hour (07:45 to 08:45 hours)		Weekday PM Peak Hour (17:00 to 18:00 hours)		Analysis Green = less than five vehicle difference, amber = five or more vehicle difference
			Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	
	D	Hayton Way	1	0	0	0	
Junction 13	A	V2 Tattenhoe Street (N)	2	1	2	1	
	B	H7 Chaffron Way (E)	1	1	3	1	
	C	V2 Tattenhoe Street (S)	3	2	2	1	
	D	H7 Chaffron Way (W)	3	1	1	1	
Junction 14	A	V3 Fulmer Street (N)	1	1	2	2	
	B	H7 Chaffron Way (E)	1	1	14	13	
	C	V3 Fulmer Street (S)	3	3	3	1	
	D	H7 Chaffron Way (W)	9	9	1	1	
Junction 15	A	V6 Grafton Street (N)	4	3	14	9	
	B	A421 Standing Way (E)	6	11	12	8	
	C	V6 Grafton Street (S)	10	12	6	2	
	D	A421 Standing Way (W)	20	21	5	7	
Junction 16	A	V4 Watling Street (N)	2	2	7	13	
	B	A421 Standing Way (E)	13	7	26	21	
	C	V4 Watling Street (S)	6	12	18	13	
	D	A421 Standing Way (W)	20	21	7	4	
Junction 17	A	V3 Fulmer Street	5	6	5	2	
	B	A421 Standing Way (E)	1	1	3	3	
	C	Shenley Road	3	1	3	2	
	D	A421 Standing Way (W)	4	6	4	2	
Jun	A	V2 Tattenhoe Street	32	16	4	2	

Junction / Arm Name		Weekday AM Peak Hour (07:45 to 08:45 hours)		Weekday PM Peak Hour (17:00 to 18:00 hours)		Analysis Green = less than five vehicle difference, amber = five or more vehicle difference
		Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	Observed Queue Length (vehicles)	Modelled Queue Length (vehicles)	
B	A421 Standing Way (E)	3	1	2	1	
C	Tattenhoe Lane	2	2	2	2	
D	A421 Standing Way (W)	2	2	2	1	

6.10.6. **Table 6.7** demonstrates that the majority of the junctions validated within the criteria (i.e. less than five vehicle difference) set with the exception of the following:

- Junction 3 - Bletchley Road Stoke Road Drayton Road Whaddon Road – Stoke Road arm
- Junction 10 - A421 Shucklow Hill Little Horwood Road - Standing Way western arm
- Junction 15 – Bleak Hall Roundabout – Grafton Street northern arm and Standing Way eastern arm
- Junction 16 – Elfield Park Roundabout – Watling Street western and eastern arms and Standing Way northern arm
- Junction 18 – Windmill Hill Roundabout – Tattenhoe Street arm

6.10.7. Overall, with the exception of Junction 18 - Windmill Hill junction (Tattenhoe Street arm), all junctions calibrated to within a queue difference of six vehicles or less. This was considered to offer a good level of calibration and deemed acceptable. Based upon the calibration results for Junction 18, the modelling results for that junction should be interpreted carefully using appropriate professional judgement.

6.11 SUMMARY

6.11.1. This section has provided the methodology that has been completed to assess the impact of the Proposed Development on the transport network.

6.11.2. It was agreed at the scoping stage that the development proposals would be tested within a static spreadsheet-based transport model. The alternative approach, to use one of the strategic transport models for the area, was not considered appropriate because neither model offered sufficient coverage of the entire TA study area. As a result, the assessment presented in Section 7 is a robust worst case across the study area because it uses a number of static junction models that do not allow for dynamic redistribution of traffic across the wider road network.

6.11.3. The assessment of highway impacts includes provision for committed development at Tattenhoe Park and Kingsmead South with smaller committed developments included within the TEMPro derived growth factors. A separate sensitivity test was undertaken to consider the impacts of the draft allocation for the Shenley Park development in combination with the development proposals.

6.11.4. Junction capacity assessment models were developed for 18 off-Site junctions and were calibrated using observed queue length data where appropriate to provide representative assessment of existing junction performance.

7

IMPACT OF DEVELOPMENT

7 IMPACT OF DEVELOPMENT

7.1 INTRODUCTION

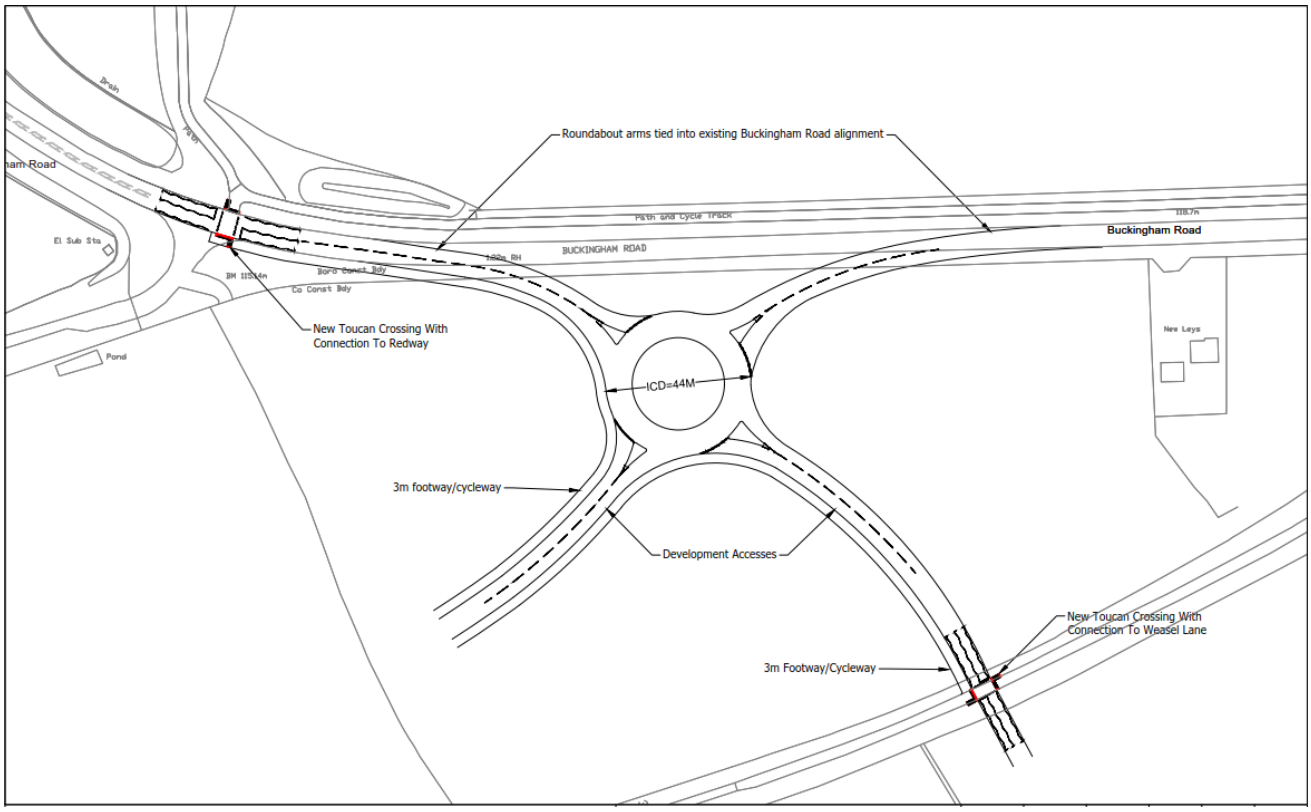
7.1.1. This section of the TA outlines the results of the assessments completed, determining the impact of the Proposed Development on the transport network prior to mitigation. Details of the industry standard software, the scenarios assessed in the future year 2033, and the criteria for the interpretation of results are contained in Section 6 of this TA.

7.2 SITE ACCESS JUNCTION CAPACITY ASSESSMENTS

BUCKINGHAM ROAD ACCESS

7.2.1. The proposed access onto Buckingham Road will be via a new four arm roundabout, as shown on the agreed Drawing D017C (**Appendix P**) and in **Figure 7.1**. During the planning application determination period, and subsequent to agreement of the layout with BC and MKC, revisions were undertaken at the request of BC to provide minor lane marking improvements. These revisions were shown on Drawing 0017D (also in **Appendix P** for information). Revision D would be taken forwards to detailed design if required by BC.

Figure 7.1 - Buckingham Road Access



7.2.2. The proposed access junction was modelled using Junctions 9 (ARCADY) to ensure the capacity of the access point would be suitable to meet the needs of the Proposed Development without causing undue delay to traffic on Buckingham Road. The results of the analysis are presented in **Table 7.1**, with full model output contained in **Appendix W**.

Table 7.1 - Buckingham Road Access

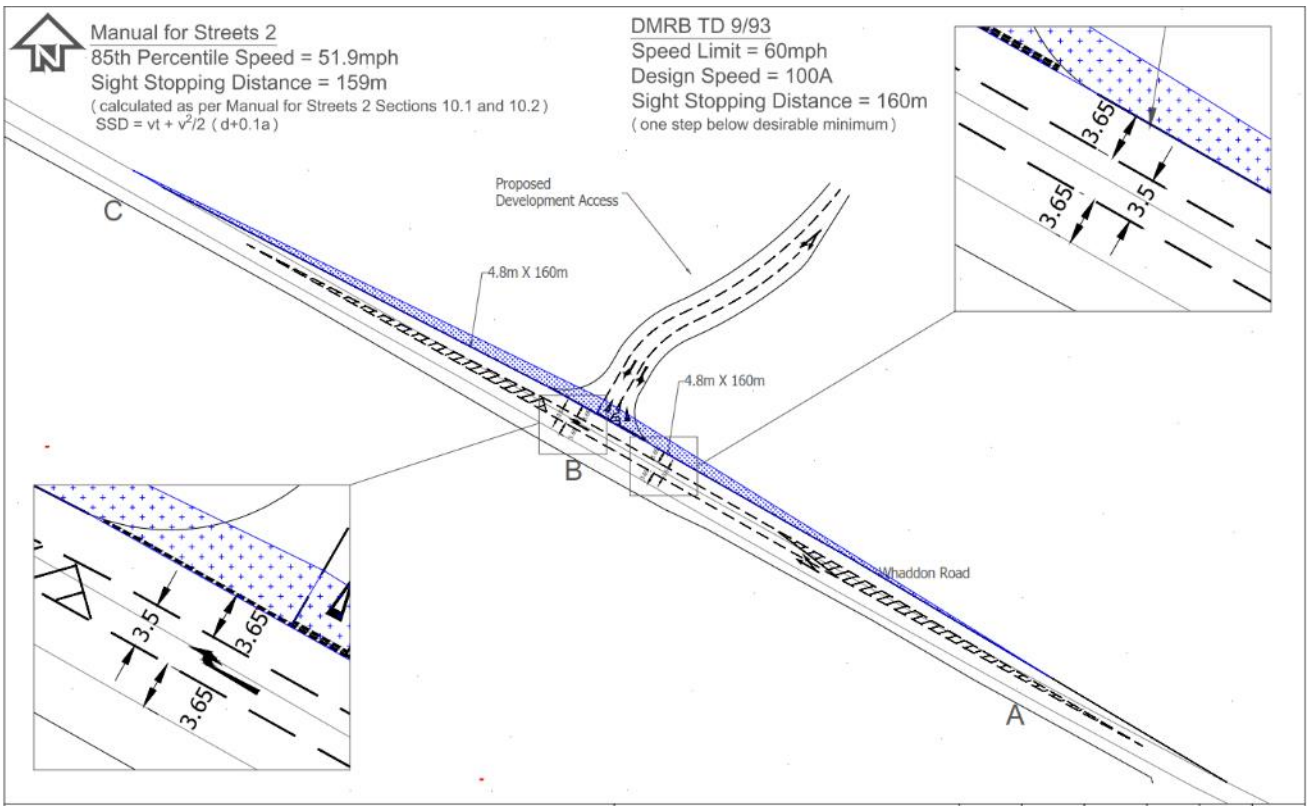
Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Something 1						
Buckingham Road S	0.7	4.20	0.41	1.3	6.06	0.56
Access SW	0.2	4.46	0.14	0.2	5.49	0.15
Access NW	1.0	7.66	0.50	0.7	6.45	0.40
Buckingham Road N	1.3	6.54	0.56	2.4	9.91	0.72
2033 Do Something 2						
Buckingham Road S	0.7	4.10	0.40	1.1	5.51	0.53
Access SW	0.2	4.37	0.14	0.2	5.13	0.14
Access NW	0.7	6.41	0.40	0.4	5.62	0.31
Buckingham Road N	1.2	6.18	0.54	2.0	8.43	0.67
2033 Do Something 3						
Buckingham Road S	0.7	4.28	0.43	1.5	6.64	0.60
Access SW	0.2	4.54	0.15	0.2	5.75	0.15
Access NW	1.0	7.90	0.51	0.7	6.85	0.41
Buckingham Road N	1.6	7.35	0.61	2.8	10.68	0.74

7.2.3. The results of the assessment at the Buckingham Road access roundabout shown in **Table 7.1**, identify that the junction is anticipated to operate with satisfactory performance (with an RFC below 0.85) in both the AM and PM peaks in the 2033 scenarios.

WHADDON ROAD ACCESS

The proposed access onto Whaddon Road will be via a new 'ghosted right turn' priority junction, as shown Drawing D014D (**Appendix M**) and in **Figure 7.2**. During the planning application determination period, and subsequent to agreement of the layout with BC and MKC, revisions were undertaken to provide amendments to the visibility splays. These revisions were shown on Drawing D014E (also in **Appendix M** for information). Revision E would be taken forwards to detailed design if required by BC.

Figure 7.2 - Whaddon Road Access



7.2.4. The proposed access junction was modelled using Junctions 9 (PICADY) to ensure the capacity of the access point would be suitable to meet the needs of the Proposed Development without causing undue delay to traffic using Whaddon Road. The results of the analysis are presented in **Table 7.2**, with full model output contained in **Appendix W**.

Table 7.2 - Whaddon Road Access

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Something 1						
Site Access to Whaddon Road (S)	0.1	5.73	0.07	0.1	5.69	0.05
Site Access to Whaddon Road (N)	0.5	10.32	0.32	0.3	9.22	0.22
Whaddon Road (S) to Site Access	0.1	6.19	0.05	0.1	6.72	0.09
2033 Do Something 2						
Site Access to Whaddon Road (S)	0.1	5.59	0.06	0	5.49	0.04
Site Access to Whaddon Road (N)	0.4	9.55	0.27	0.2	8.37	0.17
Whaddon Road (S) to Site Access	0	6.14	0.04	0	6.05	0.03
2033 Do Something 3						
Site Access to Whaddon Road (S)	0.1	5.81	0.07	0.1	5.63	0.05
Site Access to Whaddon Road (N)	0.5	10.63	0.32	0.3	9.14	0.22
Whaddon Road (S) to Site Access	0.1	6.26	0.05	0.1	6.43	0.08

7.2.5. The results of the assessment at the Whaddon Road access shown in **Table 7.2** show that the junction operates with satisfactory performance (RFC below 0.75[20]) in both the AM and PM peaks in 2033.

A421 LEFT-IN ACCESS

7.2.6. The access into the Proposed Development from A421 Standing Way does not require capacity assessment as it comprises an 'access only' with a satisfactory deceleration lane as an exit point from the existing local highway network. As such, there would not be a constraint imposed on A421 Standing Way as a result of this proposed access.

[20] Appropriate RFC = 0.75 as this is priority junction on a high-speed road (50mph +) in accordance with the Junctions 9 User Guide.

SUMMARY

7.2.7. Junction assessments using Junctions 9 (ARCADY and PICADY) have been completed at the two main access/egress junctions. The junctions are forecast to operate within capacity in the 2033 future forecast year.

7.3 OFF-SITE JUNCTION CAPACITY ASSESSMENTS

7.3.1. Junction capacity assessments for the 18 off-Site junctions agreed to be assessed with BC and MKC have been undertaken using Junctions 9 (ARCADY for roundabouts) and Junctions 9 (PICADY for priority junctions). Junction geometries are provided in **Appendix V.** The results are summarised below with full modelling outputs provided in **Appendix W**.

BUCKINGHAMSHIRE

Junction 3 Bletchley Road/Stoke Road/Drayton Road/Whaddon Road

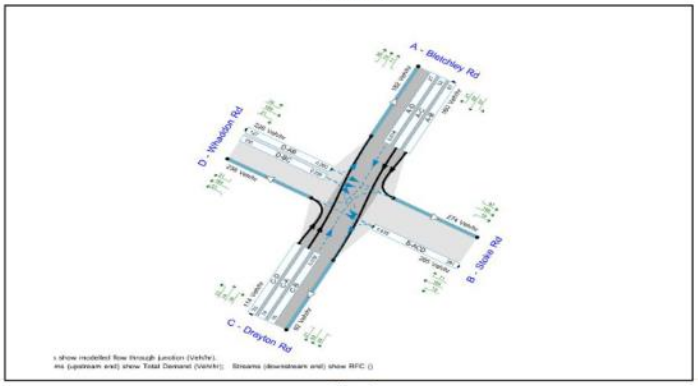
7.3.2. The priority crossroads junction in Newton Longville has been assessed using Junctions 9 (PICADY). The layout and geometry of this junction is shown in **Figure 7.3** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.3.**

Figure 7.3 – Junction 3 – Bletchley Road/Stoke Road/Drayton Road/Whaddon Road

Junction 3 : Bletchley Road Stoke Road Drayton Road Whaddon Road

CAD

Junction 9 Model



Measurements

Major Arm Measurements						Arm	Name
Opposite Arm B			Opposite Arm D			A	Bletchley Rd.
Width carriage	6.4	m	Width carriage	6.4	m	B	Stoke Rd.
kerbed central reserve	-	m	kerbed central reserve	-	m	C	Drayton Rd.
Right turners into B			Right turners into D			D	Whaddon Rd.
Visibility along A fo C-B turn	49.2	m	Visibility along A fo C-B turn	56.8	m		
Right turn bay for C-B traffic	-	m	Right turn bay for C-B traffic	-	m		
C-B traffic Blocks C-A traffic	-	PCU	C-B traffic Blocks C-A traffic	-	PCU		
Minor Arm Measurements							
Main carriageway opp. Arm B			Main carriageway opp. Arm B				
Visibility to Left	18	m	Visibility to Left	40	m		
Visibility to Right	34	m	Visibility to Right	46	m		
Minor arm type	Single Lane		Minor arm type	Single Lane			
Width at give way	6.1	m	Width at give way	15	m		
Width at give way Width at 5 m	3	m	Width at give way Width at 5 m	7.3	m		
Width at give way Width at 10 m	3	m	Width at give way Width at 10 m	4.6	m		
Width at give way Width at 15 m	3	m	Width at give way Width at 15 m	2.9	m		
Width at give way Width at 20 m	3	m	Width at give way Width at 20 m	2.9	m		

Satellite View

Table 7.3 – Junction 3 - Bletchley Road/Stoke Road/Drayton Road/Whaddon Road

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A- Bletchley Road	0.1	7	0.06	0.1	7.11	0.11
B-Stoke Road	11.1	98.57	0.96	5.4	54.18	0.87
C-Drayton Road	0.1	6.95	0.05	0.0	6.81	0.03
D-Whaddon Road*	0.8	14.87	0.44	0.7	14.06	0.41
2033 Do Nothing						
A- Bletchley Road	0.1	7.14	0.07	0.1	7.31	0.13
B-Stoke Road	41.5	308.75	1.16	23.1	179.77	1.06
C-Drayton Road	0.1	7.12	0.06	0	6.96	0.03
D-Whaddon Road*	1.4	22.43	0.59	1.1	19.03	0.53
2033 Do Something 1						
A- Bletchley Road	0.1	7.17	0.07	0.1	7.35	0.13
B-Stoke Road	46.4	355.87	1.18	36.2	260.46	1.13
C-Drayton Road	0.1	7.12	0.06	0	6.96	0.03
D-Whaddon Road*	2	30.71	0.68	1.4	22.25	0.58
2033 Do Something 2						
A- Bletchley Road	0.1	7.17	0.07	0.1	7.34	0.13
B-Stoke Road	45.5	347.52	1.18	33.8	245.87	1.12
C-Drayton Road	0.1	7.12	0.06	0	6.96	0.03
D-Whaddon Road*	1.9	28.94	0.67	1.3	21.6	0.57
2033 Do Something 3						
A- Bletchley Road	0.1	7.18	0.07	0.1	7.36	0.13
B-Stoke Road	49.7	387.76	1.2	42.1	313.74	1.16
C-Drayton Road	0.1	7.12	0.06	0	6.96	0.03
D-Whaddon Road*	2.6	38.13	0.74	1.5	23.52	0.6

*Note: Worst case movement shown

7.3.3. The results presented in **Table 7.3** show that in the 2020 Base, the Stoke Road arm is approaching capacity (RFC of 1) in the AM peak. In the future year of 2033 (Do Nothing) the Stoke Road arm

operates at/above capacity (RFC of 1) in both peak hours with a maximum queue of 42 vehicles and a delay of 309 seconds in the AM peak.

7.3.4. With the addition of the Proposed Development (Do Something 1), performance of the junction decreases slightly with a maximum queue on Stoke Road of 46 vehicles and a delay of 356 seconds, an increase of 4 vehicles and 47 seconds in the AM peak. In the PM peak the delay increases from 180 seconds tin the Do Nothing scenario to 261 seconds in Do Something 1; an increase of 81 seconds.

7.3.5. Similar results are evident in both the travel planning (Do Something 2) and Shenley Park (Do Something 3) scenarios.

7.3.6. As a result of the increase in delay at the junction in the Do Something scenarios, mitigation should be considered. The 2016 TA included a mini-roundabout improvement, although this was discarded by BC who preferred to secure a contribution through a s106 planning obligation towards appropriate traffic calming measures through Newton Longville. It was considered more beneficial to reduce the attractiveness of the route through Newton Longville by introducing additional delay through the use of design features, thereby negating the need for a capacity improvement at the junction, but also improving highway safety due to the reduced speed of traffic entering the village.

7.3.7. Notwithstanding, the previous mini-roundabout option has been tested as potential mitigation in Section 8 of this TA .

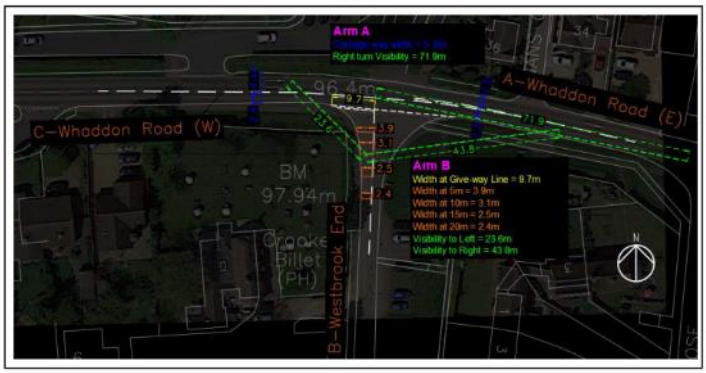
Junction 4 Whaddon Road/Westbrook End Priority Junction

7.3.8. The Whaddon Road/Westbrook End priority junction has been assessed using Junctions 9 (PICADY). The layout and geometry of this junction is shown in **Figure 7.4** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.4.**

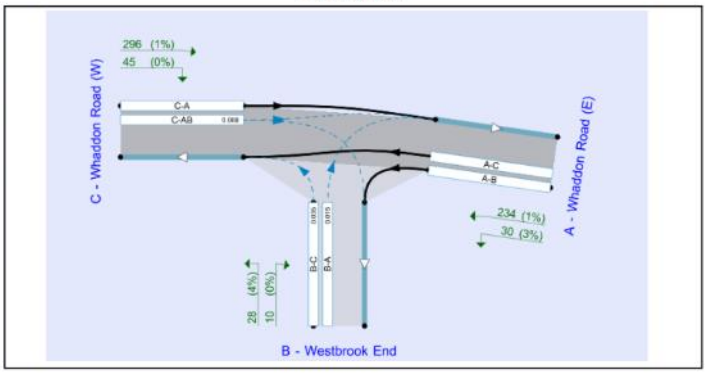
Figure 7.4 – Junction 4 – Whaddon Road/Westbrook End

Junction 4 : Whaddon Road Westbrook End

CAD



Junction 9 Model



Measurements

Major Arm Measurements		
Main carriageway Opposite Arm B		
Width carriage	5.8	m
kerbed central reserve	-	m
Right turners into B		
Visibility along A fo C-B turn	71.9	m
Right turn bay for C-B traffic	-	m
C-B traffic Blocks C-A traffic	-	PCU

Minor Arm Measurements		
Opposite Arm A		
Visibility to Left	23.6	m
Visibility to Right	43.8	m
Minor arm type	One Lane plus Flare	
Width at give way	9.7	m
Width at give way Width at 5 m	3.9	m
Width at give way Width at 10 m	3.1	m
Width at give way Width at 15 m	2.5	m
Width at give way Width at 20 m	2.4	m

Arm	Name
A	Whaddon Road [E]
B	Westbrook End
C	Whaddon Road [W]

Satellite View

Table 7.4 – Junction 4 - Whaddon Road/Westbrook End

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
B-Westbrook End*	0.1	9.43	0.05	0	8.38	0.02
C-Whaddon Road	0.2	5.66	0.1	0.2	5.38	0.11
2033 Do Nothing						
B-Westbrook End*	0.1	10.2	0.06	0	9.03	0.03
C-Whaddon Road	0.3	5.6	0.13	0.3	5.34	0.14
2033 Do Something 1						
B-Westbrook End*	0.1	10.69	0.06	0	9.51	0.03
C-Whaddon Road	0.3	5.47	0.13	0.3	5.28	0.15
2033 Do Something 2						
B-Westbrook End*	0.1	10.62	0.06	0.1	6.96	0.06
C-Whaddon Road	0.3	5.5	0.13	0.3	5.29	0.14
2033 Do Something 3						
B-Westbrook End*	0.1	10.3	0.06	0	9.68	0.03
C-Whaddon Road	0.3	5.46	0.14	0.3	5.29	0.15

*Note: Worst case movement shown

7.3.9. The results presented in **Table 7.4** show that the junction operates with satisfactory performance (RFC below 0.85) in all scenarios assessed.

7.3.10. The impacts of the Proposed Development are not considered to be significant at this junction and mitigation is therefore not necessary as the junction can accommodate traffic associated with the Proposed Development.

Junction 7 Whaddon Crossroads

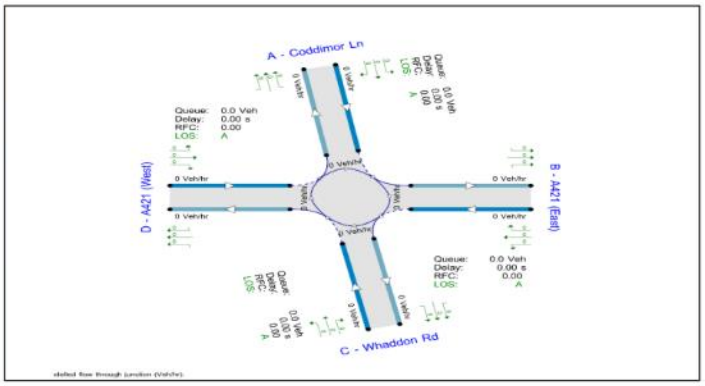
7.3.11. The Whaddon Crossroads roundabout junction has been assessed using Junctions 9 (ARCADY). The layout and geometry of this junction is shown in **Figure 7.5** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.5**.

Figure 7.5 – Junction 7 – Whaddon Crossroads

Junction 7 : Whaddon Crossroads

CAD

Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
7	Whaddon Crossroads	A-Coddimor Ln	2.8	6.7	8.53	21.5	50.6	40
		B-A421 (East)	2.9	7.7	8.6	26.3	50.6	25.5
		C-Whaddon Rd.	2.9	6.1	9.03	19.7	50.6	17
		D-A421 (West)	3.1	7.5	12.94	28	50.6	32

Satellite View

Table 7.5 – Junction 7 - Whaddon Crossroads

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A - Coddimoor Ln	0.5	11.04	0.32	0.4	9.14	0.29
B - A421 (East)	4.6	13.64	0.83	6.9	19.17	0.88
C - Whaddon Rd	1.1	10.48	0.52	0.8	9.42	0.44
D - A421 (West)	5.4	16.21	0.85	3.4	10.6	0.78
2033 Do Nothing						
A - Coddimoor Ln	0.9	18.14	0.47	0.7	14.43	0.43
B - A421 (East)	18.3	47.26	0.97	43.9	94.03	1.03
C - Whaddon Rd	2.2	18.77	0.7	1.3	14.31	0.58
D - A421 (West)	26.5	66.42	1	10.2	28.15	0.92
2033 Do Something 1						
A - Coddimoor Ln	0.9	19.27	0.48	0.9	17.09	0.47
B - A421 (East)	36.3	81.75	1.02	66.2	132.13	1.07
C - Whaddon Rd	2.5	21.24	0.73	1.7	16.35	0.63
D - A421 (West)	40.2	92.63	1.03	17.7	46.37	0.97
2033 Do Something 2						
A - Coddimoor Ln	0.9	19.12	0.48	0.8	16.63	0.47
B - A421 (East)	32.6	75.16	1.01	62	125.06	1.06
C - Whaddon Rd	2.5	20.92	0.72	1.6	16.03	0.63
D - A421 (West)	37.9	88.33	1.03	15.9	42.45	0.96
2033 Do Something 3						
A - Coddimoor Ln	0.9	19.61	0.49	0.9	17.9	0.48
B - A421 (East)	48.8	103.77	1.04	71.9	141.93	1.08
C - Whaddon Rd	2.6	22.05	0.74	1.8	16.95	0.65
D - A421 (West)	46.3	103.83	1.04	21.4	54.46	0.98

7.3.12. The results presented in **Table 7.5** show that in the 2020 Base, the eastern arm of A421 is approaching capacity (RFC of 1) in the PM peak. In the future year of 2033 (Do Nothing), A421 is approaching capacity (RFC of 1) in the AM peak and A421 eastern arm operates at/above capacity

(RFC of 1) in the PM peak. Maximum queueing and delay are 44 vehicles and 94 seconds in the PM peak on the eastern arm.

7.3.13. With the addition of the Proposed Development (Do Something 1), performance of the junction decreases with the arms of A421 operating at/above capacity (RFC of 1) in the AM peak. In the PM peak the eastern arm of A421 operates at/above capacity (RFC of 1) and the western arm is approaching capacity (RFC of 1) in the PM peak. Maximum queueing and delay are 66 vehicles and 132 seconds in the PM peak on A421 eastern arm; an increase of 22 vehicles and 38 seconds compared to the Do Nothing scenario.

7.3.14. Similar results are evident in both the Do Something 2 (travel planning) and Do Something 3 (Shenley Park) scenarios.

7.3.15. As a result of the negligible increase in queueing and delay at the junction in the Do Something scenarios assessed within this TA, mitigation is not considered necessary at this junction to ensure that there is no severe residual cumulative impact of development.

7.3.16. The analysis within the 2016 TA suggested improvements to kerb entry widths to provide a *nil detriment* solution to mitigate the impact of the Proposed Development. That previously agreed mitigation has been assessed in Section 8 of this TA. Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.

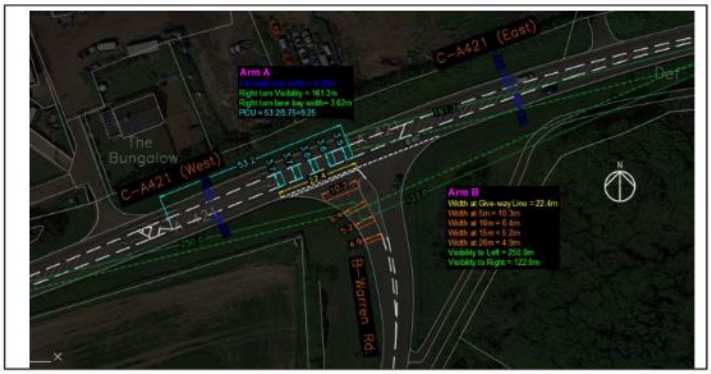
Junction 8 Warren Road

7.3.17. The priority junction of A421/Warren Road has been assessed using Junctions 9 (PICADY). The layout and geometry of this junction is shown in **Figure 7.6** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.6.**

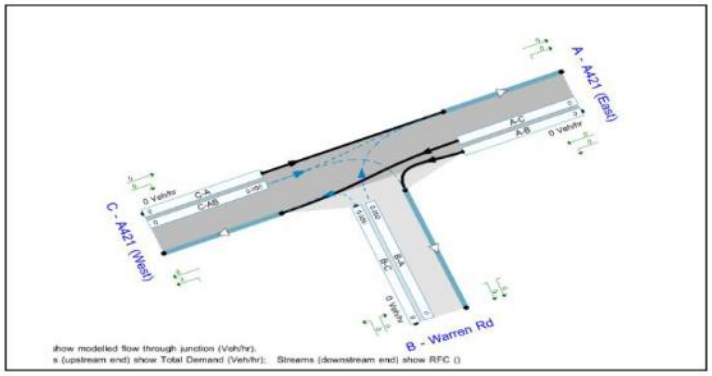
Figure 7.6 – Junction 8 - A421/Warren Road

Junction 8 : Warren Road

CAD



Junction 9 Model



Measurements

Major Arm Measurements		
Opposite Arm B		
Width carriage	6.25	m
kerbed central reserve	-	m
Right turners into B		
Visibility along A fo C-B turn	161.3	m
Right turn bay for C-B traffic	3.62	m
C-B traffic Blocks C-A traffic	9.25	PCU

Minor Arm Measurements		
Main carriageway opp. Arm B		
Visibility to Left	250	m
Visibility to Right	122	m
Minor arm type	Single Lane With Flare	
Width at give way	22.4	m
Width at give way Width at 5 m	10.3	m
Width at give way Width at 10 m	6.4	m
Width at give way Width at 15 m	5.2	m
Width at give way Width at 20 m	4.9	m

Arm	Name
A	A421 (West)
B	Warren Rd.
C	A421 (East)

Satellite View

Table 7.6 – Junction 8 - A421/Warren Road

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
B-Warren Road	2.1	82.53	0.71	0.3	39.25	0.24
C-A421 (West)	0	8.63	0.01	0	9.19	0
2033 Do Nothing						
B-Warren Road	38.4	2753.04	2.87	2.4	270.29	0.83
C-A421 (West)	0	10	0.01	0	10.87	0
2033 Do Something 1						
B-Warren Road	38.6	2777.18	2.87	2.4	272.93	0.83
C-A421 (West)	0	10.45	0.01	0	11.27	0
2033 Do Something 2						
B-Warren Road	38.6	2772.59	2.87	2.4	272.42	0.83
C-A421 (West)	0	10.37	0.01	0	11.2	0
2033 Do Something 3						
B-Warren Road	38.8	2793.01	2.87	2.4	273.77	0.83
C-A421 (West)	0	10.68	0.01	0	11.36	0

7.3.18. The results presented in **Table 7.6** show that in the 2020 Base the junction operates with satisfactory performance (RFC below 0.75[21]) . In the future year of 2033 (Do Nothing), the Warren Road arm operates well above capacity (RFC of 1) in the AM peak with a maximum queue of 38 vehicles and a delay of 2,753 seconds. The analysis at this junction indicates disproportionate queueing and delays that are unlikely to occur because the model has become unstable with such a high RFC. Traffic would more likely re-route to alternative points on the local highway network. However, the results are useful for the purposes of comparison with the Do Something 1 scenario.

7.3.19. With the addition of the Proposed Development (Do Something 1), performance of the junction decreases slightly with a maximum queue of 39 vehicles and a delay of 2,777 seconds, representing an increase of one queueing vehicle and 24 seconds additional delay. Similar results are evident in both the travel planning (Do Something 2) and Shenley Park (Do Something 3) scenarios. It is evident that the development has very little impact on the operation of this junction.

[21] Appropriate RFC = 0.75 as this is priority junction on a high-speed road (50mph +) in accordance with the Junctions 9 User Guide.

7.3.20. As a result of the negligible increase in queueing and delay at the junction in the Do Something scenarios assessed within this TA, mitigation is not considered necessary at this junction to ensure that there is no severe residual cumulative impact of development.

7.3.21. The analysis within the 2016 TA suggested conversion of the junction to incorporate traffic signals and provide a *nil detriment* solution to mitigate the impact of the Proposed Development. That previously agreed mitigation has been assessed in Section 8 of this TA. Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.

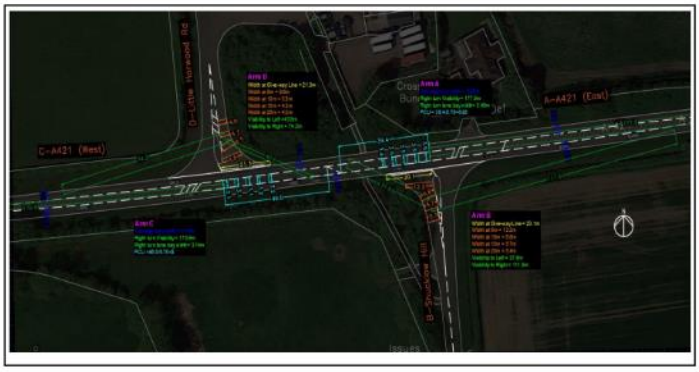
Junction 9 A421/Shucklow Hill/Little Horwood Road

7.3.22. The priority staggered junction has been assessed using Junctions 9 (PICADY). The layout and geometry of this junction is shown in **Figure 7.7** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.7.**

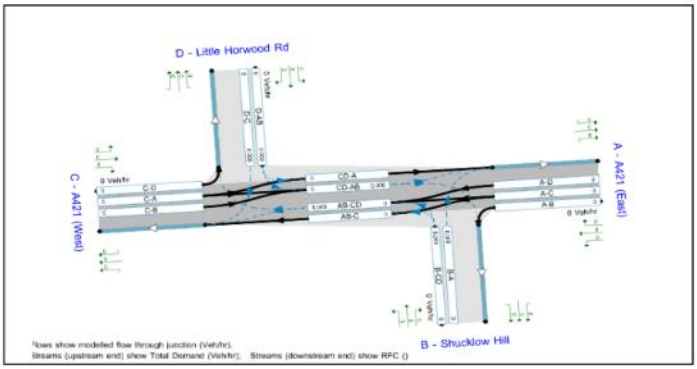
Figure 7.7 – Junction 9 - A421/Shucklow Hill/Little Horwood Road

Junction 9 : A421 Shucklow Hill Little Horwood Road

CAD



Junction 9 Model



Measurements

Major Arm Measurements					
Opposite Arm D			Opposite Arm B		
Width carriage	6.15	m	Width carriage	5.85	m
kerbed central reserve	-	m	kerbed central reserve	-	m
Right turners into B			Right turners into D		
Visibility along A fo C-B turn	170.9	m	Visibility along A fo C-B turn	177.9	m
Right turn bay for C-B traffic	3.14	m	Right turn bay for C-B traffic	3.48	m
C-B traffic Blocks C-A traffic	8	PCU	C-B traffic Blocks C-A traffic	6.85	PCU
Minor Arm Measurements					
Main carriageway opp. Arm D			Main carriageway opp. Arm B		
Visibility to Left	40.6	m	Visibility to Left	37.8	m
Visibility to Right	74.2	m	Visibility to Right	111	m
Minor arm type	Single Lane With Flare		Minor arm type	Single Lane With Flare	
Width at give way	21.3	m	Width at give way	20.1	m
Width at give way Width at 5 m	8.8	m	Width at give way Width at 5 m	12.2	m
Width at give way Width at 10 m	5.5	m	Width at give way Width at 10 m	6.8	m
Width at give way Width at 15 m	4.3	m	Width at give way Width at 15 m	5.7	m
Width at give way Width at 20 m	4	m	Width at give way Width at 20 m	5.4	m

Arm	Name
A	A-A421 (East)
B	B-Shucklow Hill
C	C-A421 (West)
D	D-Little Horwood Rd.

Satellite View

Table 7.7 – Junction 9 – A421/Shucklow Hill/Little Horwood Road

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A - A421 (East)	0.1	10.87	0.11	0.1	9.79	0.08
B – Shucklow Hill*	0.3	80.34	0.23	0.3	88.39	0.21
C - A421 (West)	0.1	10.43	0.11	0.1	10	0.08
D - Little Horwood Road*	0.1	10.48	0.11	0.1	9.77	0.1
2033 Do Nothing						
A - A421 (East)	0.3	12.13	0.25	0.2	11.49	0.16
B – Shucklow Hill*	7.7	1547.11	>3	6.5	1479.91	>3
C - A421 (West)	0.3	11.69	0.22	0.1	11.88	0.11
D - Little Horwood Road*	24.1	1414.27	>3	0.2	16.77	0.18
2033 Do Something 1						
A - A421 (East)	0.3	12.59	0.23	0.2	12.07	0.17
B – Shucklow Hill*	33	1545.79	>3	21	1411.93	>3
C - A421 (West)	0.3	12.23	0.23	0.1	12.32	0.11
D - Little Horwood Road*	24.1	1417	>3	0.2	17.75	0.19
2033 Do Something 2						
A - A421 (East)	0.3	12.52	0.24	0.2	11.96	0.17
B – Shucklow Hill*	33	1536.64	>3	21	1410.67	>3
C - A421 (West)	0.3	12.14	0.23	0.1	12.24	0.11
D - Little Horwood Road*	24.1	1416.48	>3	0.2	17.57	0.19
2033 Do Something 3						
A - A421 (East)	0.3	12.76	0.21	0.2	12.26	0.17
B – Shucklow Hill*	33	1578.36	>3	21.1	1414.27	>3
C - A421 (West)	0.3	12.5	0.23	0.1	12.42	0.11
D - Little Horwood Road*	24.1	1418.86	>3	0.2	18.08	0.2

*Note: Worst case movement shown

7.3.23. The results presented in **Table 7.7** show that in the 2020 Base the junction operates with satisfactory performance (RFC below 0.75[22]). In the future year of 2033 (Do Nothing) the Shucklow Hill and Little Horwood Road arms operate above capacity (RFC of 1) in the AM peak and similarly the Shucklow Hill arm in the PM peak.

7.3.24. It should be noted that where results of >3 have been reported this is because the model is unable to display a result for RFC given that the arm is operating considerably above capacity (RFC of 1). The analysis at this junction indicates disproportionate queueing and delays that are unlikely to occur because the model has become unstable with such a high RFC. Traffic would more likely re-route to alternative points on the local highway network. However, the results are useful for the purposes of comparison with the Do Something 1 scenario.

7.3.25. With the additional 3.2% of traffic associated with the Proposed Development (Do Something 1), performance of the junction decreases slightly. It is evident from the Do Something 1 scenario that the impact of the Proposed Development is marginal with an increase in queueing on the minor side road arms, such as on Shucklow Hill arm of 25 vehicles, in the AM peak as a result of the junction operating over capacity (RFC of 1).

7.3.26. Similar results are evident in both the travel planning (Do Something 2) and Shenley Park (Do Something 3) scenarios.

7.3.27. As a result of the negligible increase in queueing and delay at the junction in the Do Something scenarios assessed within this TA, mitigation is not considered necessary at this junction to ensure that there is no severe residual cumulative impact of development.

7.3.28. The analysis within the 2016 TA suggested conversion of the junction to incorporate traffic signals and provide a *nil detriment* solution to mitigate the impact of the Proposed Development. That previously agreed mitigation has been assessed in Section 8 of this TA. Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.

Junction 10 A421/Nash Road/Winslow Road

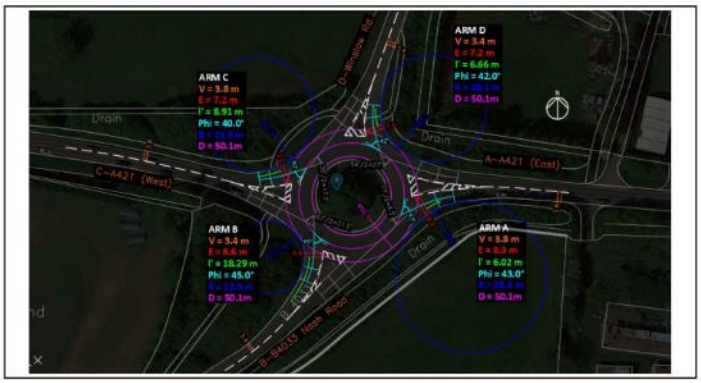
7.3.29. The roundabout junction at A421/Nash Road/Winslow Road has been assessed using Junctions 9 (ARCADY). The layout and geometry of this junction is shown in **Figure 7.8** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.8.**

[22] Appropriate RFC = 0.75 as this is priority junction on a high-speed road (50mph +) in accordance with the Junctions 9 User Guide.

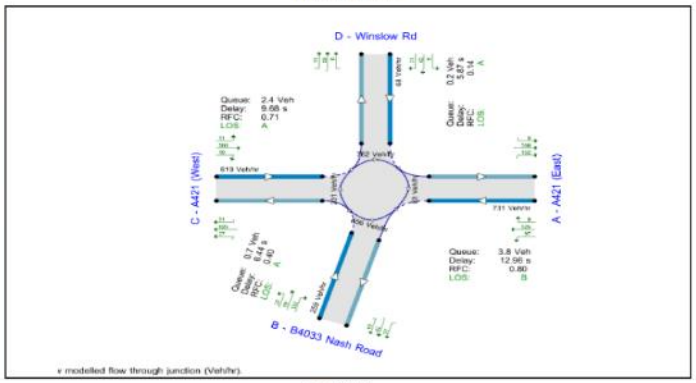
Figure 7.8 – Junction 10 - A421/Nash Road/Winslow Road

Junction 10 : A421 Nash Rd Windslow

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
10	A421 Nash Rd Windslow	A - A421 (East)	3.8	8.3	6.02	28.6	50.1	43
		B - B4033 Nash Road	3.4	6.6	18.29	13.9	50.1	45
		C - A421 (West)	3.8	7.2	8.91	21.6	50.1	40
		D - Winslow Rd	3.4	7.2	6.66	20.1	50.1	42

Satellite View

Table 7.8 – Junction 10 - A421 Nash Road/Winslow Road Roundabout

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A - A421 (East)	3.8	12.95	0.8	4.5	14.38	0.82
B - B4033 Nash Road	0.7	6.44	0.4	0.4	5.33	0.28
C - A421 (West)	6.4	26.6	0.88	6.7	25.32	0.88
D - Winslow Rd	0.2	5.86	0.14	0.2	5.68	0.14
2033 Do Nothing						
A - A421 (East)	10.9	33.38	0.93	16.2	45.65	0.96
B - B4033 Nash Road	1	8.67	0.51	0.6	6.59	0.36
C - A421 (West)	34.3	111.87	1.04	40.7	117.5	1.05
D - Winslow Rd	0.2	6.75	0.18	0.2	6.6	0.18
2033 Do Something 1						
A - A421 (East)	16.7	48.5	0.97	23.5	61.94	0.99
B - B4033 Nash Road	1.1	9.28	0.53	0.6	6.85	0.38
C - A421 (West)	48	147.79	1.07	61.1	165.69	1.09
D - Winslow Rd	0.2	6.82	0.18	0.2	6.67	0.18
2033 Do Something 2						
A - A421 (East)	15.5	45.63	0.96	22	58.72	0.99
B - B4033 Nash Road	1.1	9.19	0.53	0.6	6.81	0.37
C - A421 (West)	45.9	142.16	1.07	57.3	156.73	1.08
D - Winslow Rd	0.2	6.81	0.18	0.2	6.66	0.18
2033 Do Something 3						
A - A421 (East)	21	58.79	0.99	25.6	66.22	1
B - B4033 Nash Road	1.2	9.55	0.54	0.6	6.9	0.38
C - A421 (West)	53.5	162.2	1.08	68.2	182.48	1.1
D - Winslow Rd	0.2	6.84	0.18	0.2	6.68	0.18

7.3.30. The results presented in **Table 7.8** show that in the 2020 Base the A421 western arm is approaching capacity (RFC of 1) in both the AM and PM peaks. In the future year of 2033 (Do

Nothing) the A421 western arm is operating above capacity (RFC of 1) in both peak hours with the A421 eastern arm approaching capacity (RFC of 1).

7.3.31. With the additional 3.1% of traffic associated with the Proposed Development (Do Something 1) the performance of the junction decreases slightly with an increase in queueing of 21 vehicles in the PM peak as a result of the junction operating with an RFC over 1. Similar results are evident in both the travel planning (Do Something 2) and Shenley Park (Do Something 3) scenarios. It is considered that the development has very little impact on the operation of this junction.

7.3.32. As a result of the negligible increase in queueing and delay at the junction in the Do Something scenarios assessed within this TA, mitigation is not considered necessary at this junction to ensure that there is no severe residual cumulative impact of development.

7.3.33. The analysis within the 2016 TA improvements to kerb entry widths to provide a *nil detriment* solution to mitigate the impact of the Proposed Development. That previously agreed mitigation has been assessed in Section 8 of this TA. Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.

Junction 11 Stock Lane/Shenley Road/Coddimoor Lane

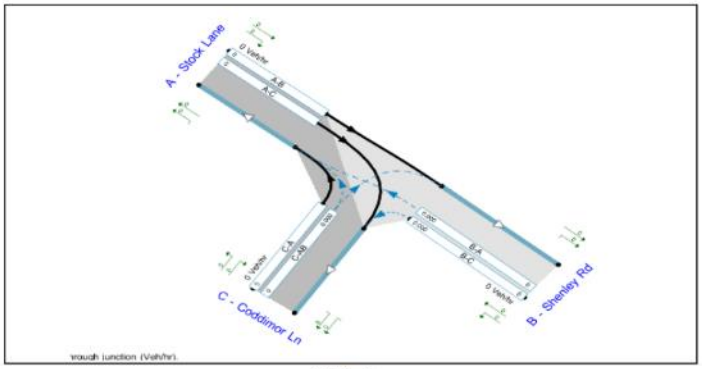
7.3.34. The junction at Whaddon village is a priority junction that has been assessed using Junctions 9 (PICADY). The layout and geometry of this junction is shown in **Figure 7.9** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.90.**

Figure 7.9 – Junction 11 – Stock Lane/Shenley Road/Coddimoor Lane

Junction 11 : Stock Lane Coddimoor Lane Shenley Road

CAD

Junction 9 Model



Measurements

Major Arm Measurements		
Opposite Arm B		
Width carriage	5.1	m
kerbed central reserve	-	m
Right turners into B		
Visibility along A fo C-B turn	75.2	m
Right turn bay for C-B traffic	-	m
C-B traffic Blocks C-A traffic	-	PCU

Minor Arm Measurements		
Main carriageway opp. Arm B		
Visibility to Left	51.2	m
Visibility to Right	96.3	m
Minor arm type	Single Lane with Flare	
Width at give way	10.4	m
Width at give way Width at 5 m	5.6	m
Width at give way Width at 10 m	3.3	m
Width at give way Width at 15 m	2.4	m
Width at give way Width at 20 m	2.4	m

Arm	Name
A	Stock Lane
B	Shenley Rd.
C	Coddimor Ln

Satellite View

Table 7.9 – Junction 11 - Stock Lane/Shenley Road/Coddimoor Lane

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
B-Shenley Road*	0.2	7.87	0.14	0.2	6.49	0.16
C-Coddimoor Lane	0.1	6.4	0.05	0.1	6.12	0.07
2033 Do Nothing						
B-Shenley Road*	0.2	8.25	0.16	0.2	6.79	0.18
C-Coddimoor Lane	0.1	6.45	0.06	0.1	6.18	0.08
2033 Do Something 1						
B-Shenley Road*	0.2	8.25	0.16	0.2	6.79	0.18
C-Coddimoor Lane	0.1	6.45	0.06	0.1	6.18	0.08
2033 Do Something 2						
B-Shenley Road*	0.2	8.25	0.16	0.2	6.79	0.18
C-Coddimoor Lane	0.1	6.45	0.06	0.1	6.18	0.08
2033 Do Something 3						
B-Shenley Road*	0.2	8.25	0.16	0.2	6.79	0.18
C-Coddimoor Lane	0.1	6.45	0.06	0.1	6.18	0.08

*Note: Worst case movement shown

7.3.35. The results presented in **Table 7.9** show that the junction operates with satisfactory performance (RFC below 0.85) in all scenarios assessed. No development traffic is routed via this junction within this TA and therefore there is no impact as a result of the Proposed Development. Mitigation is therefore not necessary.

MILTON KEYNES

Junction 1 Sherwood Drive/Water Eaton Road/B4034 Buckingham Road

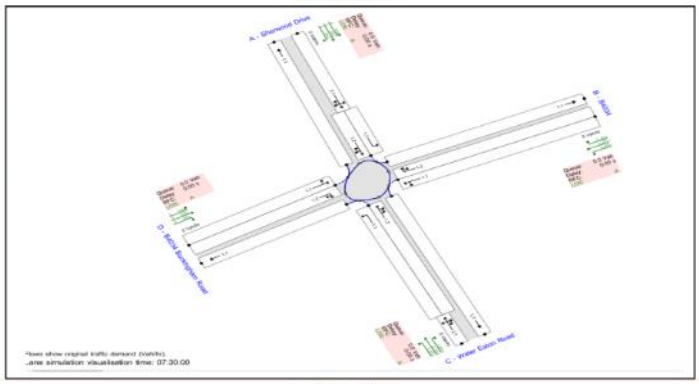
7.3.36. The roundabout junction at Sherwood Drive / Water Eaton Road / B4034 Buckingham Road has been assessed using Junctions 9 (ARCADY) in 'lane simulation' mode to accurately reflect the uneven usage of the lanes at this junction. The layout and geometry of this junction is shown in **Figure 7.10** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.10.**

Figure 7.10 – Junction 1 - Sherwood Drive/Water Eaton Road/B4034 Buckingham Road

Junction 1 : Buckingham Road / Sherwood Drive / Water Eaton Road

CAD

Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
1	Buckingham Road / Sherwood Drive / Water Eaton Road	A-Sherwood Drive	3.7	5.7	25.75	13.3	30.1	56
		B-B4034	6	6.6	0.97	22.9	30.1	29
		C-Water Eaton Road	5.7	6.4	1.51	12.9	30.1	37
		D-B4034 Buckingham Road	6.1	6.7	64.9	16	30.1	33

Satellite View

Table 7.10 – Junction 1 - Sherwood Drive/Water Eaton Road/B4034 Buckingham Road

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	LOS	Queue (Veh)	Delay (s)	LOS
2020 Base						
A - Sherwood Drive	8.7	41.74	E	2.6	13.93	B
B - B4034	2	8.14	A	17.7	44.63	E
C - Water Eaton Road	1.3	11.08	B	3.6	30.13	D
D - B4034 Buckingham Road	18.6	55.28	F	2.1	9.16	A
2033 Do Nothing						
A - Sherwood Drive	27.9	120.20	F	7.9	36.44	E
B - B4034	3	10.47	B	98.3	239.44	F
C - Water Eaton Road	2.1	15.35	C	11.9	84.03	F
D - B4034 Buckingham Road	109.9	325.16	F	4.4	15.45	C
2033 Do Something 1						
A - Sherwood Drive	24.4	105.45	F	9.5	38.56	E
B - B4034	3.6	11.64	B	177.7	456.49	F
C - Water Eaton Road	2.6	17.95	C	19.5	123.51	F
D - B4034 Buckingham Road	197.6	589.31	F	6.4	22.94	C
2033 Do Something 2						
A - Sherwood Drive	24.2	100.2	F	7.5	32.79	D
B - B4034	3.2	11.17	B	158.4	408.21	F
C - Water Eaton Road	2.3	16.79	C	18.7	120.93	F
D - B4034 Buckingham Road	176.4	525.12	F	5.9	22.02	C
2033 Do Something 3						
A - Sherwood Drive	24.8	101.71	F	10	39.56	E
B - B4034	4.5	14.02	B	223.3	570.63	F
C - Water Eaton Road	2.7	19.52	C	16	101.19	F
D - B4034 Buckingham Road	252.6	727.82	F	7.7	26.04	D

7.3.37. The results presented in **Table 7.10** show that in the 2020 Base, Buckingham Road is operating at/above capacity in the AM peak with a LoS of E on Sherwood Drive in the AM peak and on B4034 in the PM peak. By the future year of 2033 (Do Nothing), both Buckingham Road and Sherwood Drive are operating at/above capacity in the AM peak with a LoS of F. In the PM peak, both B4034 and Sherwood Drive are operating at/above capacity with a LoS of F.

7.3.38. With the addition of the Proposed Development in the Do Something 1 scenario, performance of the junction decreases further. Queueing and delay increase by 84 vehicles and 238 seconds on B4034 in the PM peak with an increase in the LoS from E in the Do Nothing scenario to F in the Do Something 1 scenario.

7.3.39. Maximum queueing and delay are reduced in the Do Something 2 scenario (travel planning) but increase beyond those of the Do Something 1 in the Shenley Park (Do Something 3) scenario.

7.3.40. The impact of the Proposed Development at this junction increases the LoS, increases queueing and increases delay to a degree that requires mitigation. Mitigation is proposed for this junction and is considered in Section 8.

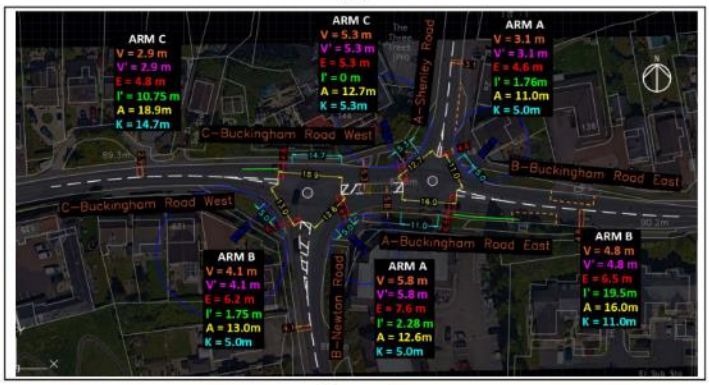
Junction 2 Shenley Road/Newton Road/B4034 Buckingham Road

7.3.41. The double roundabout junction on B4034 Buckingham Road has been assessed using Junctions 9 (ARCADY). The layout and geometry of this junction is shown in **Figure 7.11** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.11.**

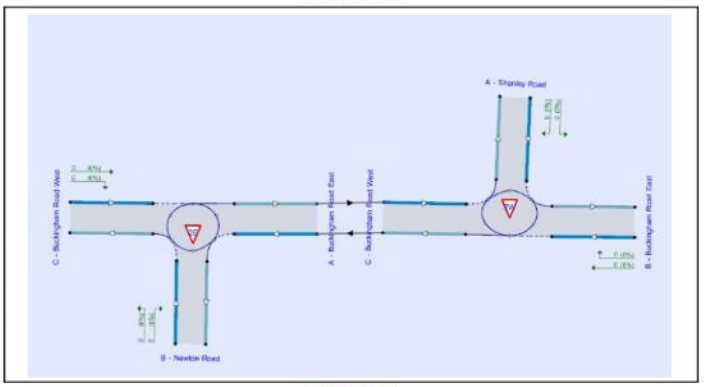
Figure 7.11 – Junction 2 - Shenley Road/Newton Road/B4034

Junction 2

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	V' - Minimum approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	A - Distance to next arm (m)	K - Entry Corner kerb line distance (m)
2	1 - Left	A-Buckingham Road East	5.8	5.8	7.6	2.28	12.6	5
		B-Newton Road	4.1	4.1	6.2	1.75	13	5
		C-Buckingham Road West	2.9	2.9	4.8	10.75	18.9	14.7
	2 - Right	A-Shenley Road	3.1	3.1	4.6	1.76	11	5
		B-Buckingham Road East	4.8	4.8	6.5	19.5	16	11
		C-Buckingham Road West	5.3	5.3	5.3	0	12.7	5.3

Satellite View

Table 7.11 – Junction 2 - Shenley Road/Newton Road/B4034 Buckingham Road

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
E – A - Shenley Road	0.9	9.13	0.48	0.8	8.35	0.44
E – B - Buckingham Road (E)	0.7	4.66	0.4	0.4	3.71	0.26
E – C - Buckingham Road (W)	1.4	7.4	0.59	1.2	6.51	0.56
W – A - Buckingham Road (E)	1.1	5.91	0.53	0.8	4.77	0.44
W – B - Newton Road	0.9	6.36	0.48	1.1	7.85	0.52
W – C - Buckingham Road (W)	0.8	5.52	0.44	0.7	5.12	0.42
2033 Do Nothing						
E – A - Shenley Road	1.4	11.87	0.58	2.6	24.33	0.73
E – B - Buckingham Road (E)	1.1	5.97	0.52	0.5	4.34	0.34
E – C - Buckingham Road (W)	2.2	10.18	0.7	4.4	15.8	0.82
W – A - Buckingham Road (E)	1.7	7.4	0.63	1.4	7.09	0.58
W – B - Newton Road	2.2	13.83	0.69	0.8	6.87	0.43
W – C - Buckingham Road (W)	1.1	6.3	0.51	5.5	18.3	0.85
2033 Do Something 1						
E – A - Shenley Road	1.6	13.85	0.62	5.2	50.74	0.87
E – B - Buckingham Road (E)	1.6	7.6	0.62	0.7	4.85	0.41
E – C - Buckingham Road (W)	3	12.68	0.76	10.5	34.22	0.93
W – A - Buckingham Road (E)	2.7	10.07	0.73	1.8	8.51	0.65
W – B - Newton Road	3.2	20.28	0.77	0.9	7.72	0.46
W – C - Buckingham Road (W)	1.3	7.19	0.57	16.4	48.75	0.97
2033 Do Something 2						
E – A - Shenley Road	1.5	13.5	0.61	4.5	44.1	0.84
E – B - Buckingham Road (E)	1.5	7.28	0.6	0.6	4.75	0.39
E – C - Buckingham Road (W)	2.9	12.21	0.75	8.9	29.61	0.92
W – A - Buckingham Road (E)	2.5	9.51	0.72	1.8	8.24	0.64
W – B - Newton Road	2.9	18.88	0.75	0.8	7.56	0.46

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
W – C - Buckingham Road (W)	1.3	7.03	0.56	13	39.84	0.95
2033 Do Something 3						
E – A - Shenley Road	1.7	15	0.64	6.9	67.12	0.91
E – B - Buckingham Road (E)	2.1	8.89	0.68	0.7	5.02	0.43
E – C - Buckingham Road (W)	3.5	14.26	0.78	14.5	44.92	0.96
W – A - Buckingham Road (E)	3.5	12.42	0.78	2	8.95	0.67
W – B - Newton Road	4.1	26.71	0.82	0.9	8	0.47
W – C - Buckingham Road (W)	1.5	7.68	0.6	28.1	75.23	1.01

7.3.42. The results presented in **Table 7.12** show that in the 2020 Base, the junction operates with satisfactory performance (RFC below 0.85). In the future year of 2033 (Do Nothing), the junction continues to perform satisfactorily.

7.3.43. With the addition of the development in the Do Something 1 scenario, performance of the junction decreases but remains below capacity (RFC of 1). The results indicate that the junction would operate with a maximum RFC of 0.97, a queue of 16.4 vehicles and a delay of 48.75 seconds in the PM peak on the Newton Road arm in the Do Something 1 scenario, which equates to a maximum increase in queueing of 11 vehicles and in delay by 31 seconds.

7.3.44. Maximum RFC's are lower in the Do Something 2 (travel planning) scenario and Shenley Park (Do Something 3) scenarios but indicate similar results to that of the Do Something 1 scenario.

7.3.45. The impacts of the Proposed Development are not considered to be significant at this junction as a result of the minor increases in queueing and delay despite the RFC approaching 1.0. Mitigation is therefore not necessary, as the junction can accommodate traffic associated with the Proposed Development whilst remaining within capacity (RFC of 1).

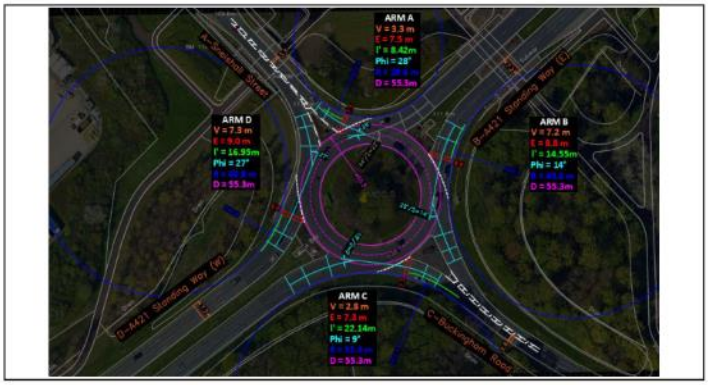
Junction 5 Tattenhoe Roundabout

7.3.46. This roundabout junction has been assessed using Junctions 9 (ARCADY). The layout and geometry of this junction is shown in **Figure 7.12** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.12.**

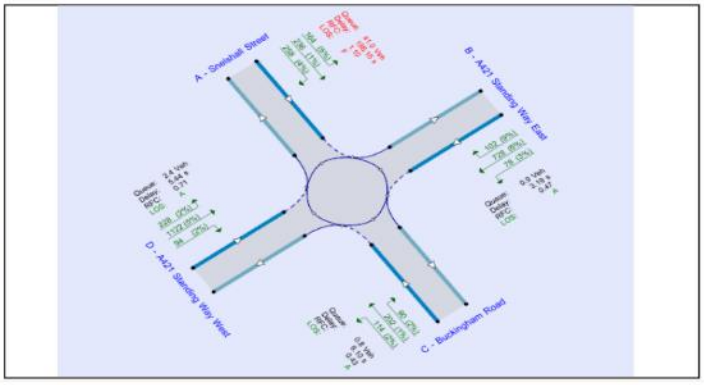
Figure 7.12 – Junction 5 - Tattenhoe Roundabout

Junction 5 : Tattenhoe Roundabout

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
5	Tattenhoe Roundabout	A-Sneishall Street	3.3	7.5	8.42	29.6	55.3	28
		B-A421 Standing Way (E)	7.2	8.8	14.55	49.8	55.3	14
		C-Buckingham Road	2.8	7.3	22.1	55.4	55.3	9
		D-A421 Standing Way (W)	7.3	9	16.95	48.8	55.3	27

Satellite View

Table 7.12 – Junction 5 - Tattenhoe Roundabout

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V1 Snelshall Street	7.5	39.66	0.9	2.1	11.24	0.68
B - A421 Standing Way (E)	0.9	3.3	0.48	1	3.38	0.5
C – B4034 Buckingham Road	0.8	6.28	0.44	0.9	6.78	0.48
D - A421 Standing Way (W)	2.4	5.45	0.71	1.5	3.94	0.61
2033 Do Nothing						
A – V1 Snelshall Street	130.2	493.42	1.36	9.2	42.68	0.92
B - A421 Standing Way (E)	1.2	3.85	0.55	1.6	4.57	0.61
C – B4034 Buckingham Road	1.3	8.89	0.57	2.2	13.36	0.69
D - A421 Standing Way (W)	5.1	10.2	0.84	2.9	6.3	0.74
2033 Do Something 1						
A – V1 Snelshall Street	390.8	1923.96	2.07	109	412.5	1.27
B - A421 Standing Way (E)	2	4.98	0.67	5	10.74	0.84
C – B4034 Buckingham Road	103	343.72	1.23	137.1	524.54	1.36
D - A421 Standing Way (W)	29.1	53.36	1	4.7	9.91	0.83
2033 Do Something 2						
A – V1 Snelshall Street	356.1	1659.88	1.99	90.1	320.51	1.22
B - A421 Standing Way (E)	1.8	4.72	0.65	3.9	8.74	0.8
C – B4034 Buckingham Road	56.9	199.09	1.12	89.2	319.51	1.22
D - A421 Standing Way (W)	25.3	47.66	0.99	4.6	9.75	0.82
2033 Do Something 3						
A – V1 Snelshall Street	325.9	1734.15	2.04	52.4	207.05	1.12
B - A421 Standing Way (E)	2.1	5.14	0.68	5.2	11.08	0.84
C – B4034 Buckingham Road	104.9	338.25	1.23	141.8	504.73	1.35
D - A421 Standing Way (W)	27.4	50.92	0.99	3.5	7.75	0.78

7.3.47. The results presented in **Table 7.12** show that in the 2020 Base AM peak, the majority of the junction operates within capacity (RFC of 1) with the exception of the V1 Snelshall Street where queueing and delay is evident. In the PM peak, the junction operates with satisfactory performance (RFC below 0.85). In the future year 2033, V1 Snelshall Street is shown to operate above capacity (RFC of 1) in the AM peak and approaching capacity (RFC of 1) in the PM peak.

7.3.48. With the addition of the Proposed Development, the junction is shown to operate above capacity (RFC of 1) in both the AM and PM peaks on V1 Snelshall Street, B4034 Buckingham Road and in the AM peak only on A421 Standing Way (W). In this regard, the junction is more sensitive to queueing and delay increases as the junction is operating with an RFC over 1.

7.3.49. Maximum RFC's are reduced in the Do Something 2 (travel planning) scenario but indicate similar results to that of Do Something 1. In the sensitivity test including Shenley Park (Do Something 3), some relief is provided to V1 Snelshall Street as a result of traffic redistributing to the new V0 grid road, however the junction remains operating at/over capacity with an RFC over 1 similar to the Do Something 1 scenario.

7.3.50. The impact of the Proposed Development at this junction increases the RFC, queueing and delay to a degree that requires mitigation. Mitigation is therefore proposed for this junction and is considered in Section 8.

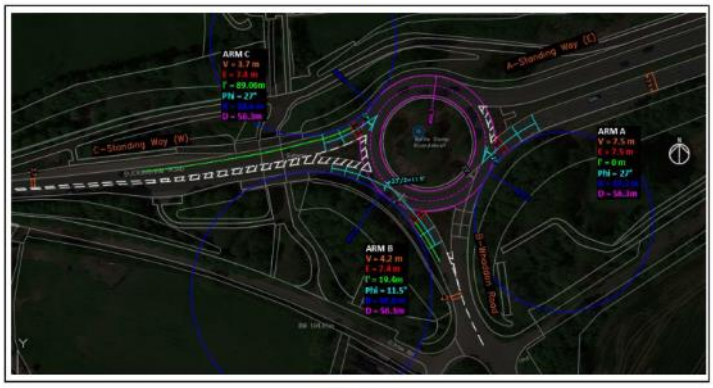
Junction 6 Bottle Dump Roundabout

7.3.51. The Bottle Dump roundabout junction has been assessed using Junctions 9 (ARCADY) in 'lane simulation' mode to accurately reflect the uneven usage of the lanes at this junction. The layout and geometry of this junction is shown in **Figure 7.13** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.13.**

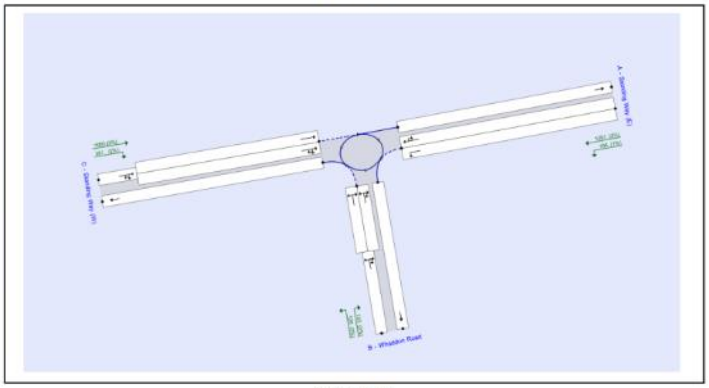
Figure 7.13 – Junction 6 - Bottle Dump Roundabout

Junction 6 : Bottledump Roundabout

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
6	Bottledump Roundabout	A-Standing Way (E)	7.5	7.5	0	37.2	56.3	27
		B-Whaddon Road	4.2	7.4	19.4	50	56.3	11.5
		C-Standing Way (W)	3.7	7.4	89.06	38.6	56.3	27

Satellite View

Table 7.13 – Junction 6 - Bottle Dump Roundabout

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	LOS	Queue (Veh)	Delay (s)	LOS
2020 Base						
A – A421 Standing Way	4.4	11.47	B	9.7	24.41	C
B - Whaddon Road	0.8	6.27	A	0.6	6.2	A
C – A421 Buckingham Road	4.7	10.68	B	2.8	7.32	A
2033 Do Nothing						
A – A421 Standing Way	10	25.43	D	52.9	99.69	F
B - Whaddon Road	1	7.51	A	0.7	7.42	A
C – A421 Buckingham Road	12.9	24.86	C	4.9	10.76	B
2033 Do Something 1						
A – A421 Standing Way	15.6	33.86	D	68	129.94	F
B - Whaddon Road	1.7	8.97	A	1.1	7.89	A
C – A421 Buckingham Road	24.4	44.54	E	6.9	15.17	C
2033 Do Something 2						
A – A421 Standing Way	13.9	32.04	D	63.6	119.75	F
B - Whaddon Road	1.7	8.88	A	1	7.69	A
C – A421 Buckingham Road	24.3	43.56	E	7	14.58	B
2033 Do Something 3						
A – A421 Standing Way	9	23.46	C	43.7	84.53	F
B - Whaddon Road	1.9	8.75	A	1.1	7.7	A
C – A421 Buckingham Road	30.6	54.7	F	5.8	11.55	B

7.3.52. The results presented in **Table 7.13** show that in the 2020 Base the junction operates within capacity (LoS below E/F). In the future year of 2033 (Do Nothing), A421 Standing Way is operating at/above capacity in the PM peak with a LoS of F, maximum queueing of 53 vehicles and a delay of 99 seconds.

7.3.53. With the addition of the Proposed Development (Do Something 1), performance of the junction decreases. A maximum increase in queueing of 15 vehicles and a delay of 30 seconds on A421 Standing Way occurs.

7.3.54. Maximum queueing and delay are lower in the Do Something 2 (travel planning) scenario than in Do Something 1. In the Shenley Park (Do Something 3) scenario, delay on A421 Standing Way

reduces to a level below the Do Nothing scenario, as a result of the reduction in trips through the junction following the introduction of the new grid road V0.

7.3.55. The junction operates at/above capacity (LoS E/F) in the 2033 Do Nothing scenario in the PM peak, with an increase in queueing and delay as a result of the Proposed Development, but the impact at Bottle Dump Roundabout is not considered to be severe.

7.3.56. As a result of the negligible increase in queueing and delay at the junction in the Do Something scenarios assessed within this TA, mitigation is not considered necessary at this junction to ensure that there is no severe residual cumulative impact of development.

7.3.57. The analysis within the 2016 TA improvements to kerb entry widths to provide a *nil detriment* solution to mitigate the impact of the Proposed Development. That previously agreed mitigation has been assessed in Section 8 of this TA. Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.

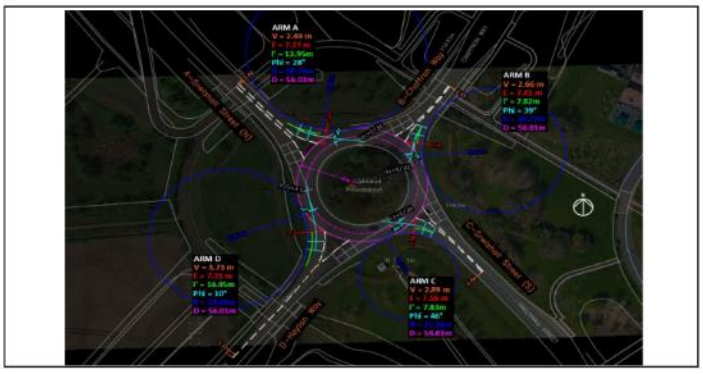
Junction 12 Kingsmead Roundabout

7.3.58. The Kingsmead Roundabout has been assessed using Junctions 9 (ARCADY). The layout and geometry of this junction is shown in **Figure 7.14** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.14.**

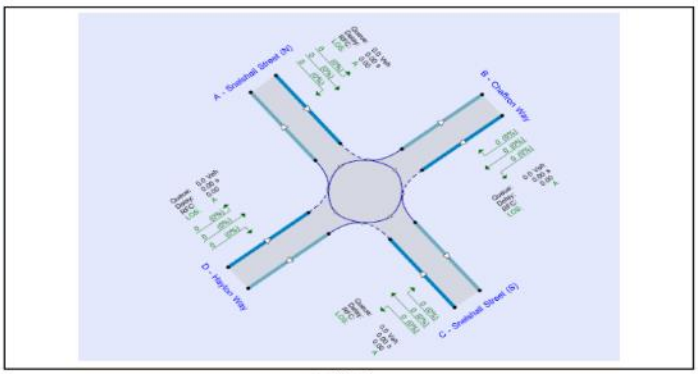
Figure 7.14 – Junction 12 - Kingsmead Roundabout

Junction 12 : Kingsmead Roundabout

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
12	Kingsmead Roundabout	A - Snelshell Street (N)	2.49	7.27	13.95	38.74	56.01	28
		B - Chaffron Way	2.66	7.41	7.82	30.77	56.01	39
		C - Snelshell Street (S)	2.89	7.56	7.83	21.36	56.01	46
		D - Hayton Way	3.73	7.31	16.95	34.08	56.01	10

Satellite View

Table 7.14 – Junction 12 - Kingsmead Roundabout

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V1 Snelshall Street (N)	1.7	7.64	0.63	0.6	4.44	0.39
B – H7 Chaffron Way	1.1	7.91	0.52	0.9	6.67	0.48
C – V1 Snelshall Street (S)	0.9	5.75	0.46	1.2	6.74	0.55
D - Hayton Way	0.1	2.65	0.08	0	2.62	0.04
2033 Do Nothing						
A – V1 Snelshall Street (N)	9.7	39.92	0.93	1.2	6.57	0.55
B – H7 Chaffron Way	3.4	19.26	0.78	5.5	25.46	0.86
C – V1 Snelshall Street (S)	1.5	8.26	0.6	4.7	20.62	0.83
D - Hayton Way	0.7	4.35	0.42	0.2	3.26	0.19
2033 Do Something 1						
A – V1 Snelshall Street (N)	26.4	90.72	1.02	1.8	8.46	0.65
B – H7 Chaffron Way	4.3	24.52	0.82	8.9	41.7	0.92
C – V1 Snelshall Street (S)	2.4	11.28	0.71	9.8	39.54	0.93
D - Hayton Way	0.8	4.79	0.45	0.2	3.45	0.19
2033 Do Something 2						
A – V1 Snelshall Street (N)	22.6	80.42	1	1.4	7.19	0.59
B – H7 Chaffron Way	4.2	23.78	0.82	6.5	30.12	0.88
C – V1 Snelshall Street (S)	2.2	10.67	0.69	8.5	34.77	0.91
D - Hayton Way	0.8	4.72	0.44	0.2	3.42	0.19
2033 Do Something 3						
A – V1 Snelshall Street (N)	7.6	32.22	0.9	1.2	6.51	0.54
B – H7 Chaffron Way	3.4	18.89	0.78	5.4	24.89	0.85
C – V1 Snelshall Street (S)	1.6	8.53	0.61	3.7	17.04	0.8
D - Hayton Way	0.7	4.4	0.43	0.2	3.19	0.18

7.3.59. The results presented in **Table 7.14** show that in the 2020 Base, the junction operates with satisfactory performance (RFC below 0.85) in both the AM and PM peaks. By the future year of

2033 (Do Nothing), V1 Snelshall Street (N) is shown to be approaching capacity (RFC of 1) in the AM peak with H7 Chaffron Way approaching capacity (RFC of 1) in the PM peak.

7.3.60. With the addition of the Proposed Development (Do Something 1), the junction is shown to operate at/above capacity (RFC of 1) on V1 Snelshall Street (N) in the AM peak and approaching capacity (RFC of 1) on H7 Chaffron Way and V1 Snelshall Street (S) in the PM peak. Queueing and delay increase by a maximum of 17 vehicles and 51 seconds on V1 Snelshall Street (N) in the AM peak as a result of the Proposed Development.

7.3.61. Maximum RFC's are lower in the Do Something 2 (travel planning) scenario but indicate similar results to that of the Do Something 1 scenario. In the sensitivity test with Shenley Park (Do Something 3) V1 Snelshall Street (N) is shown to be approaching capacity (RFC of 1) in the AM peak.

7.3.62. A review of the Plan:MK highway modelling evidence base indicates that this junction is expected to operate with satisfactory performance (V/C[23] below 85%) in both the AM and PM peaks in 2031 when accounting for the growth associated with Plan:MK.

7.3.63. The modelling within this TA indicates that a maximum RFC of 1.02 would result from the Proposed Development with a maximum increase in queueing of 16.7 vehicles and delay of 50.8 seconds. Whilst it is acknowledged that there would be a minor increase in queueing and delay, the modelling in support of Plan:MK[24] shows no issue at this junction because queues would not continue to build and increase as traffic would reassign to other routes and would be more balanced across the local highway network. The impacts of the Proposed Development are therefore not considered to be significant at this junction and mitigation is not necessary to ensure that the residual cumulative impact is not severe.

Junction 13 Westcroft Roundabout

7.3.64. The Westcroft Roundabout has been assessed using Junctions 9 (ARCADY). The layout and geometry of this junction is shown in **Figure 7.15** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.15.**

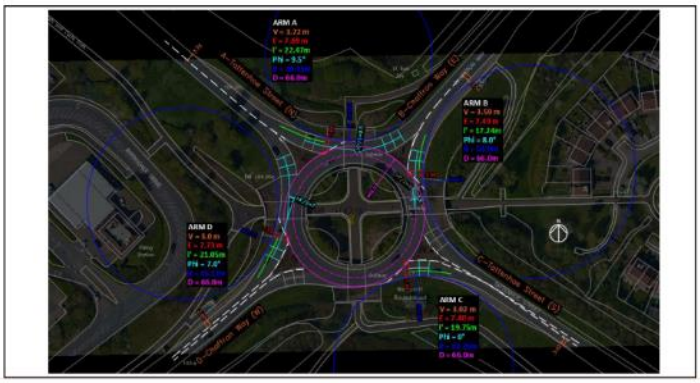
[23] V/C - Volume over Capacity of 100% is equivalent to an RFC of 1

[24] Milton Keynes Multi Modal Model – Impacts of Plan:MK, Aecom, November 2017

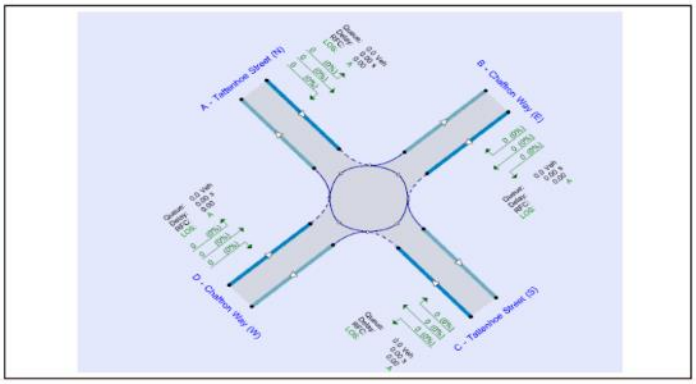
Figure 7.15 – Junction 13 - Westcroft Roundabout

Junction 13 : Westcroft Roundabout

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
13	Westcroft Roundabout	A-Tattenhoe Street (N)	3.72	7.69	22.47	39.43	66	9.5
		B-Chaffron Way (E)	3.59	7.49	17.24	50	66	8
		C-Tattenhoe Street (S)	3.02	7.4	19.75	42.26	66	0
		D-Chaffron Way (W)	3	7.73	21.05	45.17	66	7

Satellite View

Table 7.15 – Junction 13 - Westcroft Roundabout

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V2 Tattenhoe Street (N)	0.6	3.58	0.38	0.5	3.35	0.35
B – H7 Chaffron Way (E)	0.6	3.74	0.36	1.2	5.31	0.55
C – V2 Tattenhoe Street (S)	1.6	6.07	0.62	0.8	4.27	0.44
D – H7 Chaffron Way (W)	1.4	6.63	0.59	0.7	4.08	0.41
2033 Do Nothing						
A – V2 Tattenhoe Street (N)	1	5.24	0.5	0.8	4.25	0.45
B – H7 Chaffron Way (E)	1	4.96	0.49	4.2	13.51	0.82
C – V2 Tattenhoe Street (S)	3.2	10.49	0.76	1.5	6.81	0.6
D – H7 Chaffron Way (W)	12.8	41.68	0.95	1.3	5.86	0.57
2033 Do Something 1						
A – V2 Tattenhoe Street (N)	1	5.33	0.51	0.8	4.32	0.46
B – H7 Chaffron Way (E)	1	5.01	0.5	4.4	13.91	0.82
C – V2 Tattenhoe Street (S)	3.3	10.9	0.77	1.5	6.96	0.61
D – H7 Chaffron Way (W)	13.7	44.38	0.95	1.3	5.92	0.57
2033 Do Something 2						
A – V2 Tattenhoe Street (N)	1	5.31	0.51	0.8	4.31	0.46
B – H7 Chaffron Way (E)	1	5	0.5	4.3	13.84	0.82
C – V2 Tattenhoe Street (S)	3.3	10.84	0.77	1.5	6.93	0.61
D – H7 Chaffron Way (W)	13.6	43.95	0.95	1.3	5.91	0.57
2033 Do Something 3						
A – V2 Tattenhoe Street (N)	1	5.35	0.51	0.8	4.32	0.46
B – H7 Chaffron Way (E)	1	5.02	0.5	4.4	13.94	0.82
C – V2 Tattenhoe Street (S)	3.4	11.12	0.78	1.6	6.99	0.61
D – H7 Chaffron Way (W)	14.2	45.78	0.96	1.3	5.93	0.57

7.3.65. The results presented in **Table 7.15** show that in the 2020 Base, the junction operates with satisfactory performance (RFC below 0.85) in both the AM and PM peaks. By the future year of

2033 (Do Nothing),H7 Chaffron Way is shown to be approaching capacity (RFC of 1) in the AM peak.

7.3.66. With the addition of the Proposed Development in the Do Something 1 scenario, the junction is shown to operate at very similar levels to that of the 2033 Do Nothing scenario, indicating that the impact with the Proposed Development is negligible.

7.3.67. Similar results are evident in both the travel planning (Do Something 2) and Shenley Park (Do Something 3) scenarios.

7.3.68. The modelling within this TA indicates that the junction will operate within capacity (RFC of 1) in all scenarios, with a maximum RFC of 0.95 resulting from the Proposed Development. A maximum increase in queueing of 1 vehicle and delay of 3 seconds occurs.

7.3.69. The impacts of the Proposed Development are negligible and therefore, mitigation is not necessary to ensure that the residual cumulative impact is not severe.

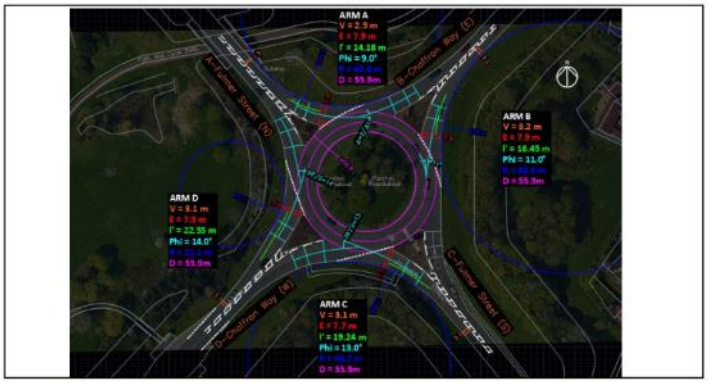
Junction 14 Furzton Roundabout

7.3.70. The Furzton Roundabout has been assessed using Junctions 9 (ARCADY). The layout and geometry of this junction is shown in **Figure 7.16** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.16.**

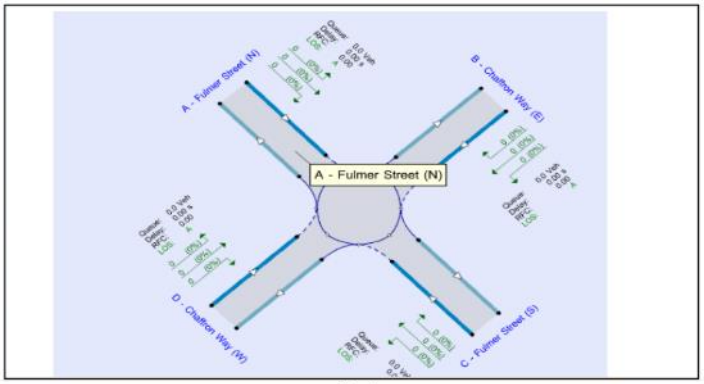
Figure 7.16 – Junction 14 - Furzton Roundabout

Junction 14 : Furzton Roundabout

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
14	Furzton Roundabout	A-Fulmer Street (N)	2.9	7.9	14.18	40.4	55.9	9
		B-Chaffron Way (E)	3.2	7.9	16.45	50.4	55.9	11
		C-Fulmer Street (S)	3.1	7.7	19.24	40.7	55.9	13
		D-Chaffron Way (W)	3.1	7.9	22.55	21.1	55.9	14

Satellite View

Table 7.16 – Junction 14 - Furzton Roundabout

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V3 Fulmer Street (N)	0.7	4.9	0.41	2.4	8.58	0.71
B – H7 Chaffron Way (E)	1	6.01	0.49	13	54.29	0.96
C – V3 Fulmer Street (S)	2.7	9.06	0.73	0.9	5.8	0.48
D – H7 Chaffron Way (W)	8.8	35.92	0.91	0.7	4.56	0.4
2033 Do Nothing						
A – V3 Fulmer Street (N)	1	5.98	0.49	6.9	22.33	0.88
B – H7 Chaffron Way (E)	1.8	8.71	0.64	226.9	784.7	1.47
C – V3 Fulmer Street (S)	8.3	25.91	0.91	1.4	7.34	0.58
D – H7 Chaffron Way (W)	215.8	704.16	1.42	1.2	6.23	0.55
2033 Do Something 1						
A – V3 Fulmer Street (N)	1	6.01	0.49	7.1	23.06	0.89
B – H7 Chaffron Way (E)	1.9	9	0.66	232.3	800.45	1.47
C – V3 Fulmer Street (S)	8.9	27.38	0.91	1.4	7.46	0.59
D – H7 Chaffron Way (W)	220.1	718.69	1.43	1.2	6.29	0.55
2033 Do Something 2						
A – V3 Fulmer Street (N)	1	6.01	0.49	7.1	22.91	0.89
B – H7 Chaffron Way (E)	1.9	8.96	0.65	231.2	797.34	1.47
C – V3 Fulmer Street (S)	8.8	27.17	0.91	1.4	7.44	0.59
D – H7 Chaffron Way (W)	219.5	716.61	1.43	1.2	6.27	0.55
2033 Do Something 3						
A – V3 Fulmer Street (N)	1	6.05	0.5	7.2	23.3	0.89
B – H7 Chaffron Way (E)	1.9	9.06	0.66	233.2	803.79	1.48
C – V3 Fulmer Street (S)	9.1	28.21	0.92	1.4	7.55	0.59
D – H7 Chaffron Way (W)	222.4	726.6	1.43	1.2	6.33	0.55

7.3.71. The results presented in **Table 7.16** show that in the 2020 Base, H7 Chaffron Way (W) is shown to approach capacity (RFC of 1) in the AM peak and similarly on H7 Chaffron Way (E) in the PM peak. By the future year of 2033 (Do Nothing), H7 Chaffron Way (W) is shown to operate above capacity

(RFC of 1) in the AM peak. Similarly, . H7 Chaffron Way (E) operates above capacity (RFC of 1) in the PM peak. peak

7.3.72. With the addition of the Proposed Development (Do Something 1), the results are very similar to the 2033 Do Nothing scenario, indicating that the Proposed Development would have a negligible impact on the performance of the junction. The maximum increase in queueing is 6 vehicles with an increased delay of 16 seconds in the PM peak on H7 Chaffron Way (E).

7.3.73. Similar results are evident in both the travel planning (Do Something 2) and Shenley Park (Do Something 3) scenarios.

7.3.74. The assessment of this junction indicates that it would operate over capacity (RFC of 1) in 2033, however the maximum increase in queueing as a result of the Proposed Development is 6 vehicles and with an associated delay of 16 seconds.

7.3.75. In this regard, the impact of the Proposed Development is negligible, and mitigation is not necessary.

Junction 15 Bleak Hall Roundabout

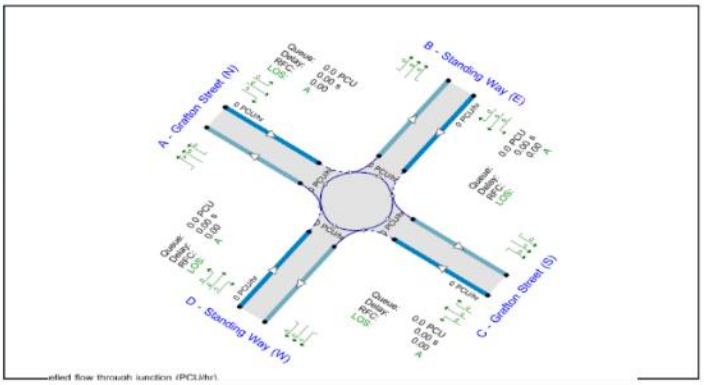
7.3.76. The Bleak Hall Roundabout has been assessed using Junctions 9 (ARCADY). The layout and geometry of this junction is shown in **Figure 7.17** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.17.**

Figure 7.17 – Junction 15 - Bleak Hall Roundabout

Junction 15 : Bleak Hall Roundabout

CAD

Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
15	Bleak Hall Roundabout	A - Grafton Street (N)	7.3	9.3	14.83	34.8	55.4	11
		B - Standing Way (E)	6.7	7.6	8.52	40.5	55.4	13.5
		C - Grafton Street (S)	7.1	9.7	4.24	29	55.4	19.5
		D - Standing Way (W)	7.3	8.5	3.69	43.2	55.4	14.5

Satellite View

Table 7.17 – Junction 15 - Bleak Hall Roundabout

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V6 Grafton Street (N)	2.8	10.94	0.75	8.7	31.82	0.91
B – A421 Standing Way (E)	10.9	30.71	0.93	7.7	23.67	0.9
C – V6 Grafton Street (S)	11.7	34.09	0.94	1.7	6.1	0.63
D – A421 Standing Way (W)	21.3	60.12	0.99	7.4	17.9	0.89
2033 Do Nothing						
A – V6 Grafton Street (N)	5.7	19.75	0.86	84.4	283.99	1.15
B – A421 Standing Way (E)	104.6	214.52	1.14	49.6	115.05	1.05
C – V6 Grafton Street (S)	86.2	209.61	1.11	3.5	10.92	0.78
D – A421 Standing Way (W)	128.2	346.09	1.19	78.2	137.41	1.08
2033 Do Something 1						
A – V6 Grafton Street (N)	7.5	25.13	0.9	178	625.25	1.27
B – A421 Standing Way (E)	204.8	491.57	1.29	188.6	498.36	1.25
C – V6 Grafton Street (S)	117.6	319.09	1.16	5.7	17.47	0.86
D – A421 Standing Way (W)	389.2	1030.46	1.44	210	403.39	1.23
2033 Do Something 2						
A – V6 Grafton Street (N)	7.2	24.11	0.89	159.4	551.43	1.25
B – A421 Standing Way (E)	188.7	444.93	1.26	158.6	414.5	1.21
C – V6 Grafton Street (S)	112.7	302.22	1.15	5.2	16.02	0.85
D – A421 Standing Way (W)	340.6	892.84	1.4	185.3	345.84	1.21
2033 Do Something 3						
A – V6 Grafton Street (N)	7.8	26.09	0.9	180.1	635.13	1.27
B – A421 Standing Way (E)	213.7	522.84	1.3	193.5	511.92	1.25
C – V6 Grafton Street (S)	121.7	328.81	1.16	6.4	19.34	0.87
D – A421 Standing Way (W)	417.4	1110.59	1.46	216.9	419.87	1.24

7.3.77. The results presented in **Table 7.17** show that in the 2020 Base, all arms except V6 Grafton Street (N) are approaching capacity (RFC of 1) in the AM peak. In the PM peak, all arms except V6 Grafton Street (S) are approaching capacity (RFC of 1). By the future year of 2033 (Do Nothing), all

arms except V6 Grafton Street (N) operate at/above capacity (RFC of 1) in the AM peak. In the PM peak, all arms except V6 Grafton Street (S) operate above capacity (RFC of 1).

7.3.78. With the addition of the Proposed Development (Do Something 1), the results are similar to the Do Nothing scenario however with increased queueing and delay, which become more sensitive to small increases in the RFC values above 1. Queueing and delay increase by a maximum of 100 vehicles and 277 seconds in the AM peak on A421 Standing Way (E).

7.3.79. Maximum RFC's are lower in the Do Something 2 (travel planning) scenario but indicate similar results to that of the Do Something 1 scenario. In the sensitivity test with Shenley Park (Do Something 3) results are similar to the Do Something 1 scenario.

7.3.80. The impact of the Proposed Development at this junction increases the RFC, increases queueing and increases delay to a degree to a degree that requires mitigation. Mitigation is therefore proposed for this junction and is considered in Section 8 of this TA.

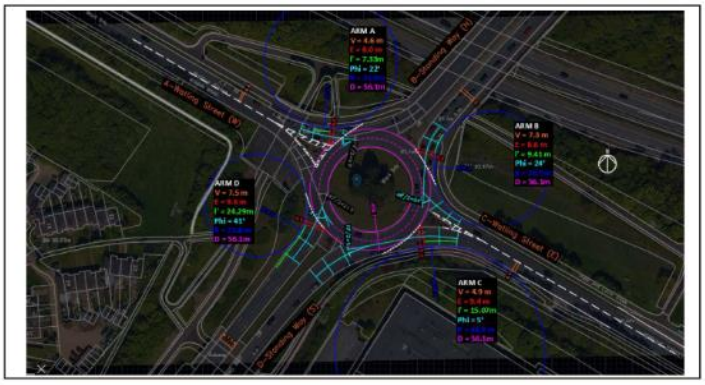
Junction 16 Elfield Park Roundabout

7.3.81. The Elfield Park Roundabout junction has been assessed using Junctions 9 (ARCADY). The layout and geometry of this junction is shown in **Figure 7.18** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.18.**

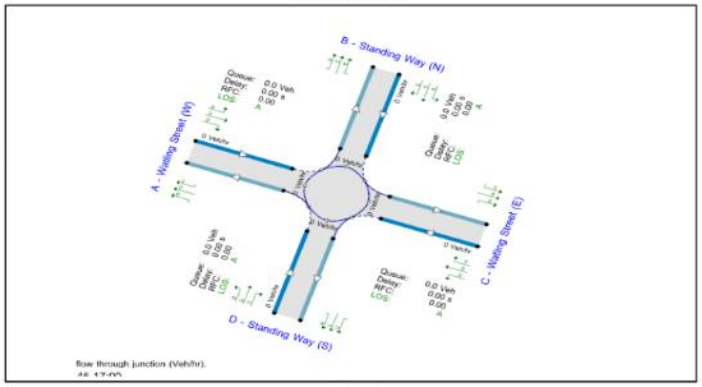
Figure 7.18 – Junction 16 - Elfield Park Roundabout

Junction 16 : Elfield Park Roundabout

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
16	Elfield Park Roundabout	A - Watling Street (W)	4.6	8	7.33	31	56.1	22
		B - Standing Way (N)	7.3	8.6	9.41	26.9	56.1	24
		C - Watling Street (E)	4.9	9.4	15.07	48.9	56.1	5
		D - Standing Way (S)	7.5	9.6	24.29	23.8	56.1	41

Satellite View

Table 7.18 – Junction 16 - Elfield Park Roundabout

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V4 Watling Street (W)	2	15.26	0.67	12.7	65.12	0.96
B – A421 Standing Way (N)	7.4	19.89	0.89	21	48.59	0.98
C – Watling Street (E)	12.2	36.35	0.94	12.5	44.63	0.95
D – A421 Standing Way (S)	20.6	49.08	0.98	3.7	9.03	0.79
2033 Do Nothing						
A – V4 Watling Street (W)	3.8	26.1	0.8	119.9	499.03	1.39
B – A421 Standing Way (N)	55.8	112.32	1.06	117.1	249.63	1.13
C – Watling Street (E)	111.3	286.19	1.17	78.8	235.90	1.13
D – A421 Standing Way (S)	121.0	253.29	1.14	10.6	23.23	0.93
2033 Do Something 1						
A – V4 Watling Street (W)	4.7	32.46	0.84	220.2	1217.19	1.66
B – A421 Standing Way (N)	147.1	295.44	1.17	381.8	839.44	1.33
C – Watling Street (E)	148.6	450.68	1.22	98.2	321.93	1.16
D – A421 Standing Way (S)	374.4	790.48	1.35	72.7	115.07	1.06
2033 Do Something 2						
A – V4 Watling Street (W)	4.5	31.47	0.83	200.6	1090.71	1.64
B – A421 Standing Way (N)	132	257.69	1.15	327.5	717.71	1.3
C – Watling Street (E)	142.1	428.87	1.22	95.4	309.23	1.16
D – A421 Standing Way (S)	323.9	691.43	1.32	53.9	89.84	1.04
2033 Do Something 3						
A – V4 Watling Street (W)	5.5	37	0.86	224.1	1239	1.66
B – A421 Standing Way (N)	154.4	314.02	1.18	402.6	880.87	1.35
C – Watling Street (E)	151.3	458.96	1.23	99	325.54	1.17
D – A421 Standing Way (S)	393.3	838.27	1.37	78.1	122.78	1.07

7.3.82. The results presented in **Table 7.18** show that in the 2020 Base, all arms except V4 Watling Street (W) are approaching capacity (RFC of 1) in the AM peak. In the PM peak, all arms except A421 Standing Way (S) are approaching capacity (RFC of 1). By the future year of 2033 (Do Nothing), all

arms except V4 Watling Street (W) operate above capacity (RFC of 1) in the AM peak. In the PM peak, all arms except A421 Standing Way (S) operate above capacity (RFC of 1) with A421 Standing Way (S) approaching capacity (RFC of 1).

7.3.83. With the addition of the Proposed Development (Do Something 1) all arms except V4 Watling Street (W) operate above capacity (RFC of 1), with V4 Watling Street (W) operating with satisfactory performance (RFC below 0.85) in the AM peak. In the PM peak all arms operate above capacity (RFC of 1). Delay in the PM peak on V4 Watling Street (W) increases by 718 seconds and the queue increases by 100 vehicles as a result of the Proposed Development.

7.3.84. Maximum RFC's are lower in the Do Something 2 (travel planning) scenario but indicate similar results to that of the Do Something 1 scenario. In the sensitivity test with Shenley Park (Do Something 3) the results show slightly higher RFCs than the Do Something 1 scenario.

7.3.85. The junction operates at/above capacity (RFC of 1) in the 2033 Do Nothing scenario and queueing and delay increase as a result of the Proposed Development. Mitigation is therefore proposed for this junction and is considered in Section 8 of this TA.

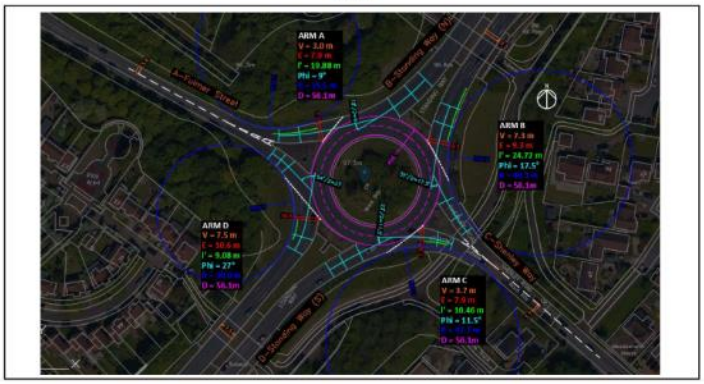
Junction 17 Emerson Roundabout

7.3.86. The Emerson Roundabout has been assessed using Junctions 9 (ARCADY). The layout and geometry of this junction is shown in **Figure 7.19** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.19.**

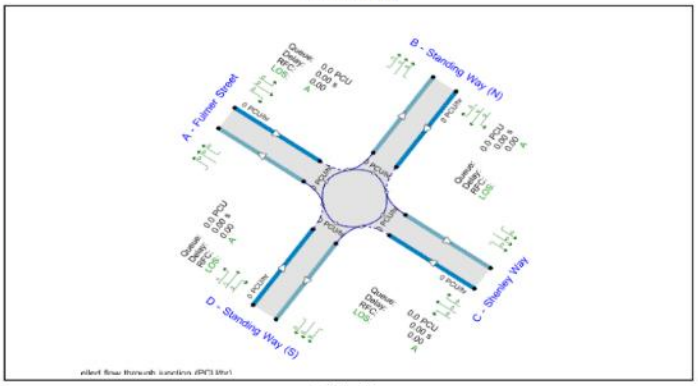
Figure 7.19 – Junction 17 - Emerson Roundabout

Junction 17 : Emerson Roundabout

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
17	Emerson Roundabout	A - Fulmer Street	3	7.9	19.88	35.5	56.1	9
		B - Standing Way (N)	7.3	9.3	24.72	40.3	56.1	17.5
		C - Shenley Way	3.7	7.9	10.46	42.1	56.1	11.5
		D - Standing Way (S)	7.5	10.6	9.08	30	56.1	27

Satellite View

Table 7.19 – Junction 17 - Emerson Roundabout

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V3 Fulmer Street	5.5	34.07	0.86	1.9	11.07	0.66
B – A421 Standing Way (N)	1.2	3.38	0.54	2.8	5.7	0.74
C - Shenley Way	1.3	8.07	0.56	2.2	15.69	0.69
D – A421 Standing Way (S)	5.8	11.45	0.86	1.5	4.14	0.61
2033 Do Nothing						
A – V3 Fulmer Street	69.4	325.25	1.24	6.8	36.49	0.89
B – A421 Standing Way (N)	1.6	4.06	0.62	7.2	13.12	0.89
C - Shenley Way	2.5	13.89	0.72	24.8	139.20	1.05
D – A421 Standing Way (S)	53.1	79.79	1.03	2.5	5.94	0.72
2033 Do Something 1						
A – V3 Fulmer Street	132.9	976.02	1.36	40.8	184.62	1.1
B – A421 Standing Way (N)	2.5	5.42	0.72	83.9	106.86	1.06
C - Shenley Way	6.7	38.64	0.89	142.7	1049.61	1.61
D – A421 Standing Way (S)	249.9	386.92	1.22	4.2	8.23	0.81
2033 Do Something 2						
A – V3 Fulmer Street	122.5	894.6	1.34	29	136.38	1.05
B – A421 Standing Way (N)	2.3	5.16	0.7	58	78.44	1.03
C - Shenley Way	5.4	30.96	0.86	114.3	692.83	1.55
D – A421 Standing Way (S)	215.6	321.03	1.19	3.7	7.56	0.79
2033 Do Something 3						
A – V3 Fulmer Street	139.5	1024.12	1.37	42.8	192.58	1.11
B – A421 Standing Way (N)	2.5	5.52	0.72	89.2	112.66	1.06
C - Shenley Way	7.3	42.05	0.9	148.4	1080.29	1.63
D – A421 Standing Way (S)	262.5	411.51	1.23	4.3	8.33	0.81

7.3.87. The results presented in **Table 7.19** show that in the 2020 Base, V3 Fulmer Street and A421 Standing Way (S) are approaching capacity (RFC of 1) in the AM peak. In the PM peak, the junction operates with satisfactory performance (RFC below 0.85). By the future year of 2033 (Do Nothing),

V3 Fulmer Street and A421 Standing Way (S) operate above capacity (RFC of 1) in the AM peak. In the PM peak Shenley Way operates above capacity (RFC of 1) with V3 Fulmer Street and A421 Standing Way (N) approaching capacity (RFC of 1).

7.3.88. With the addition of the Proposed Development (Do Something 1), V3 Fulmer Street and A421 Standing Way (S) operate above capacity (RFC of 1) and Shenley Way is approaching capacity (RFC of 1) in the AM peak. In the PM peak all arms except A421 Standing Way (S) operate above capacity (RFC of 1). Maximum delay increases by 910 seconds on Shenley Way, with a corresponding increase in queue of 118 vehicles as a result of the Proposed Development.

7.3.89. Maximum RFC's are lower in the Do Something 2 (travel planning) scenario but indicate similar results to the Do Something 1 scenario. In the sensitivity test with Shenley Park (Do Something 3), the results show slightly higher RFCs than the Do Something 1 scenario.

7.3.90. The junction operates at/above capacity (RFC of 1) in the 2033 Do Nothing scenario and queueing and delay increase as a result of the Proposed Development. Mitigation is therefore proposed for this junction and is considered in Section 8 of this TA.

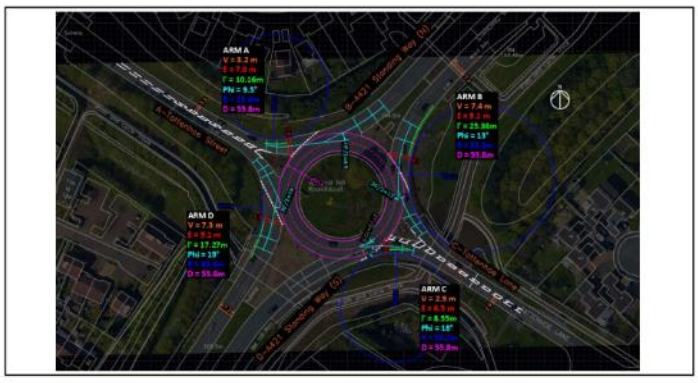
Junction 18 Windmill Hill Roundabout

7.3.91. The Windmill Hill Roundabout has been assessed using Junctions 9 (ARCADY). The layout and geometry of this junction is shown in **Figure 7.20** and the capacity assessment results for the AM and PM peaks are provided in **Table 7.20.**

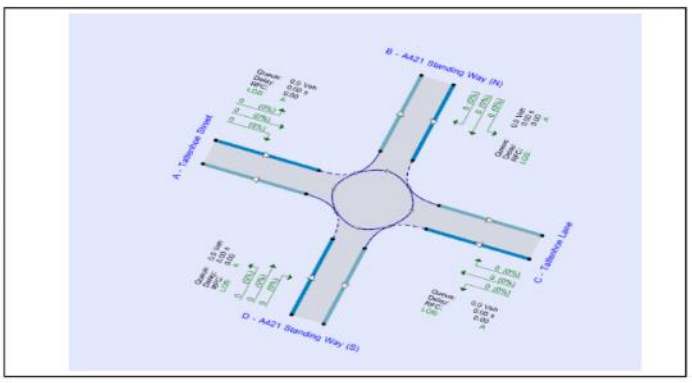
Figure 7.20 – Junction 18 - Windmill Hill Roundabout

Junction 18 : Windmill Hill Roundabout

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
18	Windmill Hill Roundabout	A-Tattenhoe Street	3.2	7	10.16	23.4	55.8	9.5
		B-A421 Standing Way (N)	7.4	9.1	25.36	32.5	55.8	13
		C-Tattenhoe Lane	2.9	6.5	8.55	24.2	55.8	18
		D-A421 Standing Way (S)	7.3	9.1	17.27	43.4	55.8	19

Satellite View

Table 7.20 – Junction 18 - Windmill Hill Roundabout

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V2 Tattenhoe Street	15.9	90.8	0.99	2.1	11.67	0.68
B - A421 Standing Way (N)	0.9	2.84	0.46	1.3	3.45	0.57
C - Tattenhoe Lane	2	14.23	0.67	1.5	14.28	0.61
D - A421 Standing Way (S)	2.4	5.62	0.71	0.9	3.04	0.48
2033 Do Nothing						
A –V2 Tattenhoe Street	133.7	641.38	1.52	7.1	35.23	0.89
B - A421 Standing Way (N)	1.1	3.13	0.52	2.2	4.8	0.68
C - Tattenhoe Lane	5	32.18	0.85	6.1	51.69	0.88
D - A421 Standing Way (S)	5.2	10.68	0.84	1.4	3.87	0.58
2033 Do Something 1						
A – V2 Tattenhoe Street	332.9	2509	2.56	49.3	205.6	1.12
B - A421 Standing Way (N)	1.6	3.8	0.62	6.3	11.36	0.87
C - Tattenhoe Lane	34.7	189.08	1.09	99.1	797.88	1.72
D - A421 Standing Way (S)	52.5	77.47	1.03	2.2	4.96	0.69
2033 Do Something 2						
A – V2 Tattenhoe Street	296.1	2211.53	2.43	37	157.19	1.07
B - A421 Standing Way (N)	1.5	3.67	0.61	5.1	9.36	0.84
C - Tattenhoe Lane	25.2	142.74	1.05	77.5	587.32	1.49
D - A421 Standing Way (S)	34.3	55.34	1	2	4.76	0.67
2033 Do Something 3						
A – V2 Tattenhoe Street	349	2624.21	2.61	51.4	213.8	1.13
B - A421 Standing Way (N)	1.6	3.84	0.62	6.7	11.9	0.88
C - Tattenhoe Lane	39.9	213.17	1.12	104	844.72	1.78
D - A421 Standing Way (S)	60.7	87.29	1.04	2.2	4.98	0.69

7.3.92. The results presented in **Table 7.20** show that in the 2020 Base, V2 Tattenhoe Street approaches capacity (RFC of 1) in the AM peak, with all other arms operating with satisfactory performance (RFC below 0.85). All arms of the junction operate with satisfactory performance (RFC below 0.85)

in the PM peak. By the future year of 2033 (Do Nothing), V2 Tattenhoe Street operates above capacity (RFC of 1) in the AM peak. In the PM peak, V2 Tattenhoe Street and Tattenhoe Lane are shown to be approaching capacity (RFC of 1).

7.3.93. With the addition of the Proposed Development in the Do Something 1 scenario, V2 Tattenhoe Street, Tattenhoe Lane and A421 Standing Way (S) are shown to operate above capacity (RFC of 1) in the AM peak. In the PM peak, V2 Tattenhoe Street and Tattenhoe Lane are shown to operate above capacity (RFC of 1) with A421 Standing Way (N) approaching capacity (RFC of 1). Maximum queueing increases on V2 Tattenhoe Street by 1,868 seconds with a corresponding increase in queueing of 199 vehicles.

7.3.94. Maximum RFC's are lower in the Do Something 2 (travel planning) scenario but indicate similar results to the Do Something 1 scenario. In the sensitivity test with Shenley Park (Do Something 3), the results show slightly higher RFCs than the Do Something 1 scenario.

7.3.95. The junction operates above capacity (RFC of 1) in the 2033 base and queueing and delay increase as a result of the Proposed Development. Mitigation is therefore proposed at this junction and is considered in Section 8 of this TA.

7.4 IMPACT ON VILLAGES

Introduction

7.4.1. An assessment of the likely impact on traffic flows through the villages of Newton Longville, Mursely, Great Horwood, Whaddon, Nash and Little Horwood (the 'Villages'). has been completed.

7.4.2. The impact on the Villages is considered with reference to the 'Guidelines for the Environmental Assessment of Road Traffic' (GEART) produced by the Institute of Environmental Assessment (1993). The GEART states that whilst traffic forecasting is not an exact science, a change in traffic flow of less than 10% creates no discernible environmental impact. As such two rules are presented within the GEART for screening whether a detailed assessment is required:

- Rule 1 – include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%)
- Rule 2 – include any other specifically sensitive areas where traffic flows have increased by 10% or more.

7.4.3. Rule 1 and 2 have been used as an appropriate methodology to assess likely impacts through the Villages.

Assessment

7.4.4. Traffic flows through the Villages have been identified from the flow diagrams presented within Section 6 (**Appendix T**).) The traffic flows for 2033 Do Nothing and the three Do Something scenarios have then been compared to identify the forecast percentage increase in traffic. The forecast traffic flows in 2033 Do Nothing are shown in **Table 7.21**. For comparative purposes, forecast traffic flows are also shown for 2033 Do Nothing including the allocation at Shenley Park in **Table 7.22**.

Table 7.21 – 2033 Do Nothing Traffic Flows

Location		AM Peak			PM Peak		
		N/b	S/b	Total	N/b	S/b	Total
1	Nash	135	104	240	82	110	192
2	Whaddon	154	220	374	138	120	258
3	Great Horwood	396	243	639	280	281	561
4	Little Horwood	103	76	179	30	103	133
5	Mursley	394	295	689	314	284	598
		E/b	W/b	Total	E/b	W/b	Total
6	Newton Longville	347	428	776	416	316	732

Table 7.22 – 2033 Do Nothing Traffic Flows Including Shenley Park Allocation

Location		AM Peak			PM Peak		
		N/b	S/b	Total	N/b	S/b	Total
1	Nash	135	104	240	82	110	192
2	Whaddon	154	220	374	138	120	258
3	Great Horwood	398	246	644	282	282	563
4	Little Horwood	103	76	179	30	103	133
5	Mursley	398	305	703	322	288	609
		E/b	W/b	Total	E/b	W/b	Total
6	Newton Longville	367	439	807	423	330	753

7.4.5. The increase in link flow through the villages as a result of the Proposed Development is shown in **Table 7.23** for Do Something 1, **Table 7.24** for Do Something 2 and **Table 7.25** for Do Something 3.

Table 7.23 – 2033 Do Something 1 Traffic Flows

Location		AM Peak			PM Peak		
		N/b	S/b	Total	N/b	S/b	Total
1	Nash	135	104	240	82	110	192
2	Whaddon	154	220	374	138	120	258
3	Great Horwood	404	252	656	289	288	578
4	Little Horwood	103	76	179	30	103	133
5	Mursley	404	317	721	343	298	641
		E/b	W/b	Total	E/b	W/b	Total
6	Newton Longville	389	457	846	447	362	809

Table 7.24 – 2033 Do Something 2 Traffic Flows

Location		AM Peak			PM Peak		
		N/b	S/b	Total	N/b	S/b	Total
1	Nash	135	104	240	82	110	192
2	Whaddon	154	220	374	138	120	258
3	Great Horwood	403	251	654	288	287	575
4	Little Horwood	103	76	179	30	103	133
5	Mursley	402	314	716	339	296	634
		E/b	E/b	W/b	Total	E/b	W/b
6	Newton Longville	383	452	835	442	354	796

Table 7.25 – 2033 Do Something 3 Traffic Flows

Location		AM Peak			PM Peak		
		N/b	S/b	Total	N/b	S/b	Total
1	Nash	135	104	240	82	110	192
2	Whaddon	154	220	374	138	120	258
3	Great Horwood	403	251	654	288	287	575
4	Little Horwood	103	76	179	30	103	133
5	Mursley	402	314	716	339	296	634
		E/b	E/b	W/b	Total	E/b	W/b
6	Newton Longville	383	452	835	442	354	796

7.4.6. The percentage change in traffic flows compared with the 2033 Do Nothing is presented in **Table 7.26** for Do Something 1 and **Table 7.27** for Do Something 2. The percentage change in traffic flows in **Table 7.28** for Do Something 3 are compared with the 2033 Do Nothing including Shenley Park allocation.

Table 7.26 – 2033 Do Something 1 Percentage Impact

Location		AM Peak			PM Peak		
		N/b	S/b	Total	N/b	S/b	Total
1	Nash	0%	0%	0%	0%	0%	0%
2	Whaddon	0%	0%	0%	0%	0%	0%
3	Great Horwood	2%	4%	3%	3%	3%	3%
4	Little Horwood	0%	0%	0%	0%	0%	0%
5	Mursley	2%	7%	4%	8%	5%	7%
		E/b	E/b	W/b	Total	E/b	W/b
6	Newton Longville	11%	6%	8%	7%	13%	10%

Table 7.27 – 2033 Do Something 2 Percentage Impact

Location		AM Peak			PM Peak		
		N/b	S/b	Total	N/b	S/b	Total
1	Nash	0%	0%	0%	0%	0%	0%
2	Whaddon	0%	0%	0%	0%	0%	0%
3	Great Horwood	2%	3%	2%	3%	2%	2%
4	Little Horwood	0%	0%	0%	0%	0%	0%
5	Mursley	2%	6%	4%	7%	4%	6%
		E/b	E/b	W/b	Total	E/b	W/b
6	Newton Longville	9%	5%	7%	6%	11%	8%

Table 7.28 – 2033 Do Something 3 Percentage Impact

Location		AM Peak			PM Peak		
		N/b	S/b	Total	N/b	S/b	Total
1	Nash	0%	0%	0%	0%	0%	0%
2	Whaddon	0%	0%	0%	0%	0%	0%
3	Great Horwood	2%	3%	2%	3%	2%	2%
4	Little Horwood	0%	0%	0%	0%	0%	0%
5	Mursley	2%	6%	4%	7%	4%	6%
		E/b	E/b	W/b	Total	E/b	W/b
6	Newton Longville	9%	5%	7%	6%	10%	8%

7.4.7. The increase in traffic flow is shown in **Table 7.26** to be greatest in Do Something 1 through Newton Longville. The biggest increase in peak hour traffic is anticipated in the PM peak westbound through Newton Longville where an increase of 13% is anticipated. This level of increase is significantly less than the 30% identified in the GEART as a threshold for assessment. However, as Newton Longville features a conservation area, some of the links through the village could be considered 'sensitive' in nature. As such, and to ensure a robust case, the assessment has been based on GEART Rule Two as previously indicated (i.e. a 10% or more change in traffic flow in a specifically sensitive area).

7.4.8. A scheme to introduce traffic calming through Newton Longville was previously developed and agreed with BC in 2016 to introduce additional delay to vehicles, reduce the attractiveness of the route, and minimise 'through traffic' entering the village. With the implementation of these measures, as described further in Section 8, the residual cumulative impact of the Proposed Development through Newton Longville would not be severe.

7.4.9. Changes in traffic flow through the other Villages are 10% or less, and no additional impacts have been identified that would require mitigation.

7.5 IMPACTS ON THE STRATEGIC ROAD NETWORK

7.5.1. The nearest connection from the Site to the Strategic Road Network (SRN) (operated by Highways England) is the Redmoor Roundabout on A5. A review of the trip distribution has been undertaken to determine the likely impact of the Proposed Development on the SRN by considering the increase in traffic anticipated to use this junction in the peak hours. The additional trips in the AM and PM peak hours anticipated to enter and leave the mainline carriageway on A5 via the Redmoor Roundabout are shown in **Figure 7.21** and **Figure 7.22** respectively.

Figure 7.21 - AM Proposed Development Impact On Strategic Road Network

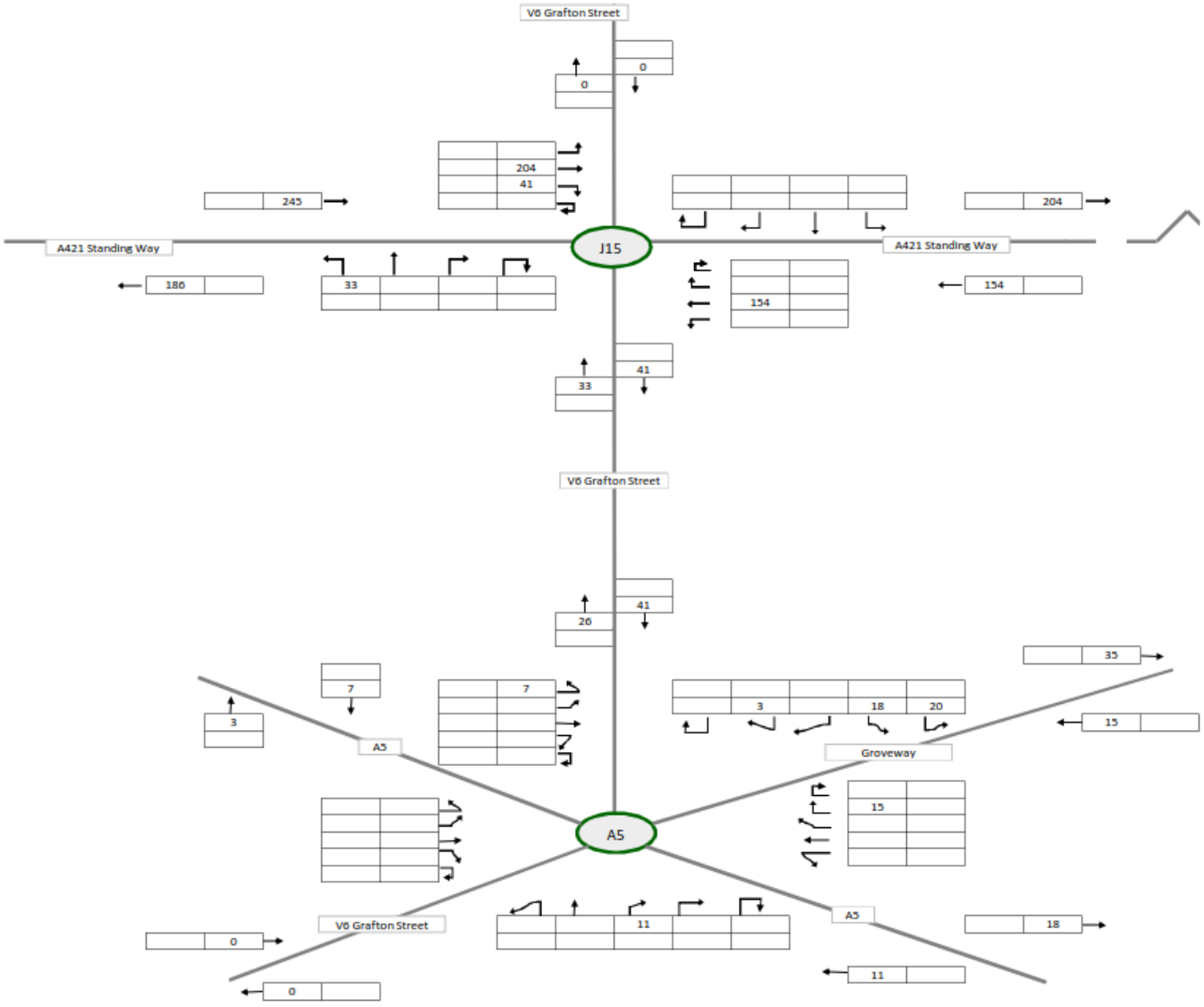
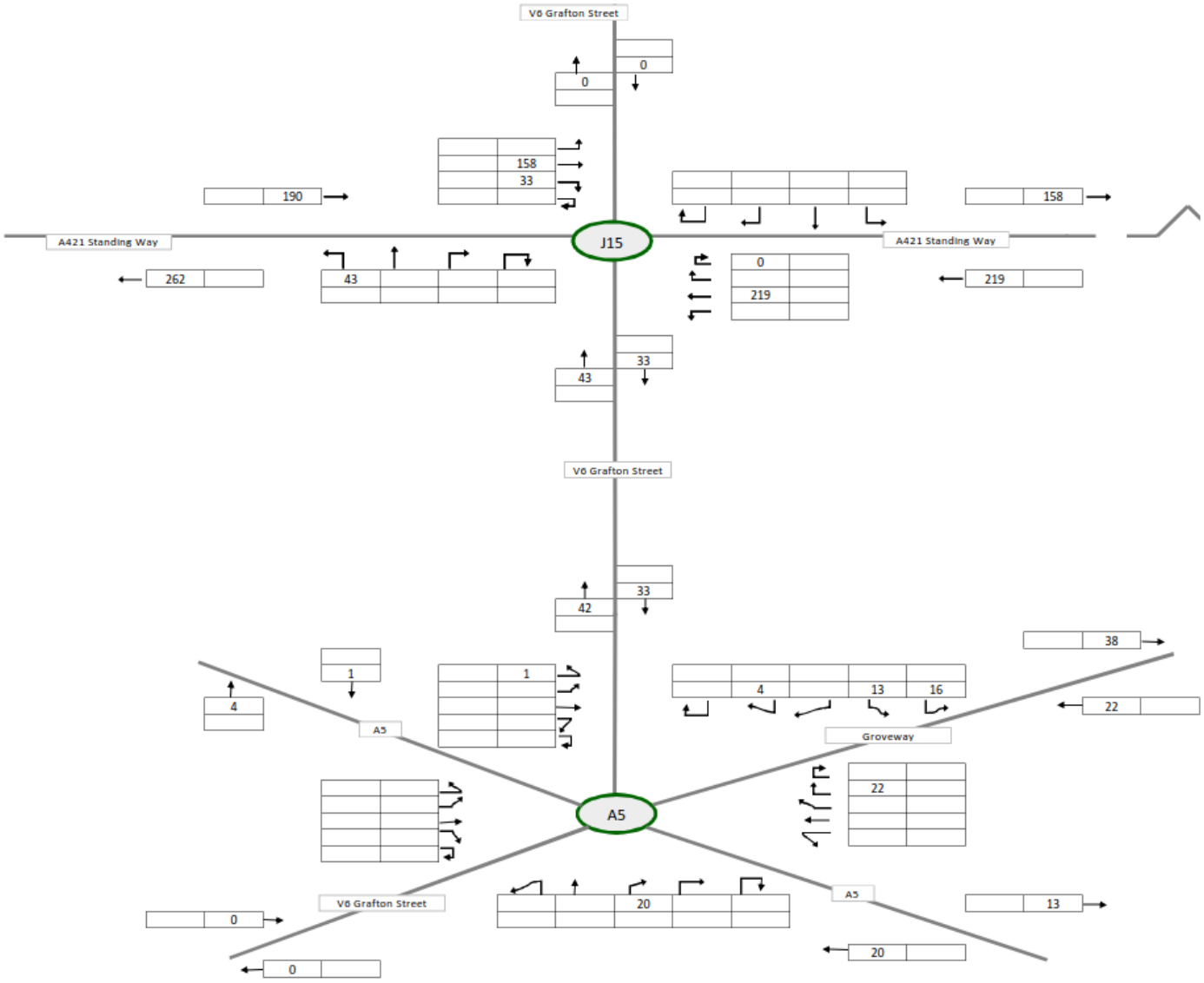


Figure 7.22 - PM Proposed Development Impact On Strategic Road Network



7.5.2. **Figure 7.21** and **Figure 7.22** shows that during the AM and PM peak hours, the maximum increase in turning movements on any one arm of the Redmoor Roundabout as it intersects with A5 will be 20 vehicles. This means that fewer than one vehicle every three minutes will enter or leave A5. This volume of increase is considered to be negligible and therefore does not require further consideration. The outcome of this assessment aligns with the 2016 TA and previous confirmation from Highways England that the impacts of the Proposed Development on the SRN are not severe.

7.6 IMPACTS ON HIGHWAY SAFETY

7.6.1. The computer programme COBALT (Cost and Benefit to Accidents – Light Touch) developed by the Department of Transport (DfT) has been used to undertake analysis of the impact of the Proposed Development on highway safety. COBALT is a computer program developed to undertake the analysis of the impact of a transport scheme on collisions as part of the economic appraisal of road schemes. The assessment is based on a comparison of collisions by severity and associated costs

across an identified network in 'Without-Scheme/Development' and 'With-Scheme/Development' forecasts, using details of link and junction characteristics, relevant collision rates and costs and forecast traffic volumes by link and junction.

7.6.2. COBALT analysis provides a summary of the likely impact on collisions across a defined study area. Each link has been coded by the degree to which the Proposed Development will provide benefits in terms of collisions. As the Proposed Development will result in an increase in traffic, the impact will always show negative values. However, the extent to which a negative value is derived will be dependent upon the volume of additional traffic that the Proposed Development would generate. **Figure 7.23** shows that the majority of links across the study area will see very small changes in 'negative benefits' (as they are described in COBALT). The only links showing more than a very small change are B4034 Buckingham Road,A421 Standing Way to the east of the Site and to a lesser degree V1 Snelshall Street.

Figure 7.23 - COBALT Benefits

7.6.3. The main findings from the COBALT analysis show an increase of 132 collisions with 190 casualties over the 60-year appraisal period as a result of the Proposed Development, meaning on average there would be an additional 2.2 collisions with 3.2 casualties per year.

7.6.4. The increase in collisions by severity is shown in **Table 7.29**.

Table 7.29 - COBALT Collisions - Casualty Prediction Over 60 years

	Slight	Serious	Fatal	Total Casualties
Without Proposed Development	2,857.1	355.5	47.5	3,260.1
With Proposed Development	3,024.8	375.2	50.3	3,450.3
Difference (60 years)	+167.6	+19.6	+2.8	+190
Difference (average per year)	+2.8	+0.03	+0.05	+3.2

7.6.5. To place these findings into context, the number of collisions per year on the local highway network assessed in the 2033 Base scenario would be 37.4, increasing to 39.6 with the Proposed Development. The increase in collisions with fatal or serious casualties is predicted to increase by 0.08 per year as a result of the Proposed Development and therefore, would not represent an unacceptable impact on highway safety.

7.6.6. It should be noted that these negative impacts do not consider any appropriate mitigation which may be required to address the impact of the Proposed Development and any safety issues that may arise. Mitigation measures are considered in the Section 8 of this TA.

7.7 IMPACTS ON PUBLIC TRANSPORT

7.7.1. The Proposed Development is forecast to generate an additional 213 bus trips in the AM peak and 104 trips in the PM peak. The public transport strategy proposes a completely new high frequency service between the Site, CMK, the railway station and key social infrastructure. Ideally, the target would be to provide a journey time between the Site and Central Milton Keynes of circa 20 minutes, although this would be subject to further discussion and agreement with MKC, BC and the preferred operator.

7.7.2. The proposed bus service between the Proposed Development and CMK would commence no later than the occupation of the 100th dwelling, although the exact timing will be dependent upon the overall phased 'build out' period. As dwellings become occupied, the route into the development will be extended further and the service frequency increased as previously indicated.

7.7.3. This high frequency service will be able to accommodate the forecasted trips produced by the Proposed Development along with providing spare capacity to benefit the wider community. As such, a positive impact on public transport is anticipated due to the wider benefit to the community through the provision of new/enhanced services.

7.8 IMPACTS ON WALKING AND CYCLING

7.8.1. The Proposed Development is anticipated to generate an additional 175 pedestrian movements in the AM peak and 96 in the PM peak. Similarly, an additional 36 cycling trips in the AM peak and 37 in the PM are anticipated to be generated by the Proposed Development. The Site is surrounded by high quality pedestrian and cycle infrastructure including the Redway network and National Cycle Routes. Controlled crossing points are proposed on both Whaddon Road and Buckingham Road with existing subways available under A421 Buckingham Road/Standing Way to connect the Site with existing Redway network.

7.8.2. Across the Site itself generous footways and cycleways will be provided to knit together the various land uses and connect with routes off-Site. The existing infrastructure, as identified in Section 3, is of a good standard and new routes across the Site will provide a benefit to the wider community by providing public access where it did not exist before and enhancing existing routes such as the National Cycle Route, PRoW routes and the Milton Keynes Boundary Walk. Further information on the routes across the Site are provided within the Design & Access Statement.

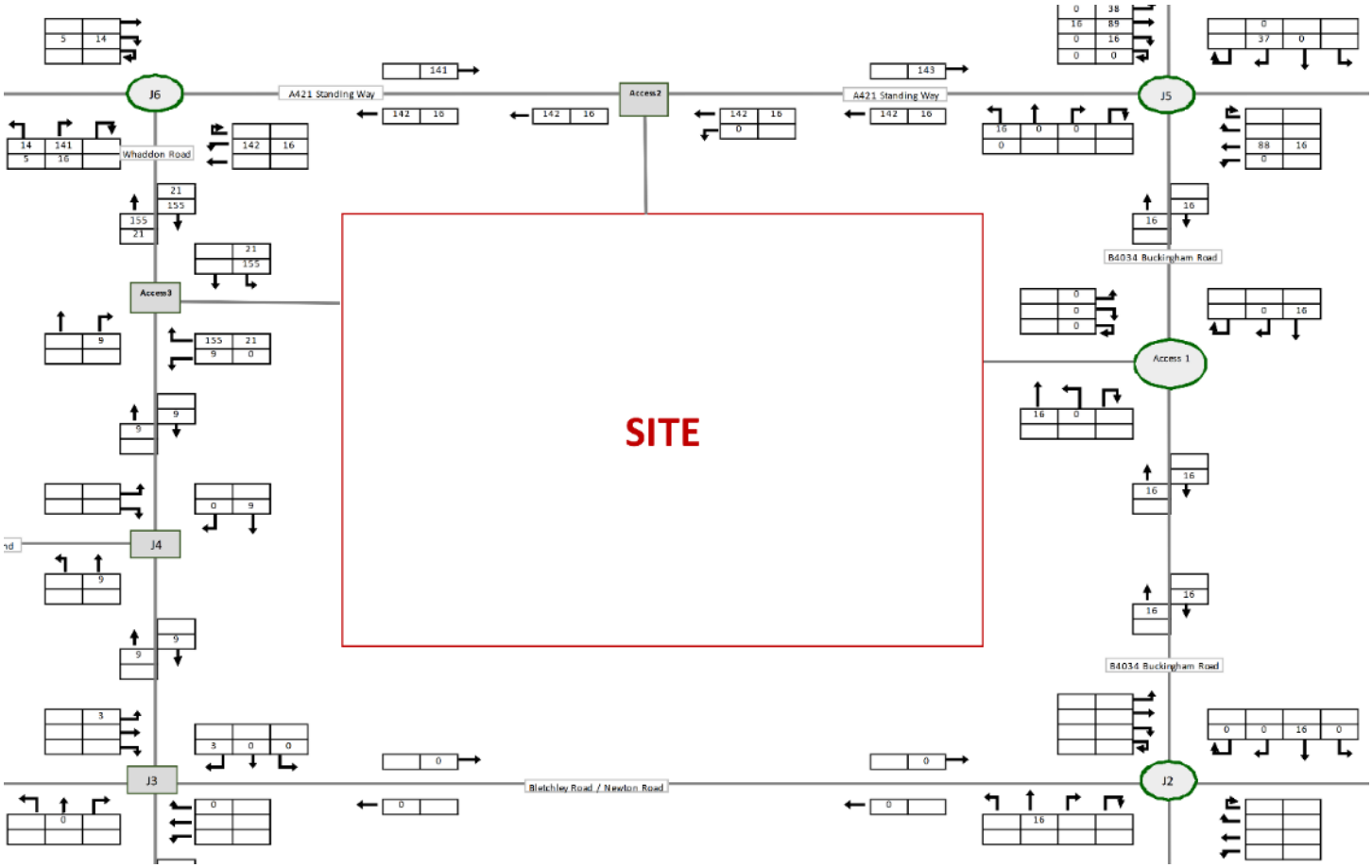
7.8.3. Impacts on pedestrians and cyclists are therefore considered to be positive with benefits for the health and well-being of both new residents at the Proposed Development and the wider community.

7.9 IMPACTS OF CONSTRUCTION TRAFFIC

7.9.1. The impacts of construction traffic have been considered with reference to the number of additional vehicle trips likely to be generated by the Proposed Development on the routes surrounding the Site. In the absence of an industry-wide data source for the estimation of construction traffic volumes, information was based upon the Applicant's experience from other large scale construction sites. In addition to the traffic volume information as detailed in Section 5.9, the following assumptions regarding construction traffic routing were made:

- Construction traffic would be routed to and from the Site on the basis that all construction traffic would use the Whaddon Road access. This is the preferred strategy for segregating residential and construction traffic based upon the phasing of the Site;
- Heavy Goods Vehicles are assumed to utilise A421 to and from the Site as the closest Principal Road to the Site. Based upon the location of Site, to the west of Milton Keynes and the SRN (A5 and M1), 75% of HGVs were assumed to arrive from/depart to the east and 25% to/from the west; and
- Construction workers are assumed to utilise the employment trip distribution based upon them originating from the local labour market.

Figure 7.24 – Construction Traffic Generation AADT



7.9.2. **Figure 7.24 (Appendix X)** indicates that the link likely to witness the greatest volume increase in traffic is Whaddon Road between the Bottle Dump Roundabout and the Whaddon Road Site access, which is to be used for construction. In this location a daily increase of 352 vehicles is anticipated. The 2020 AADT in this location was recorded by the ATC data as approximately 5183. The construction traffic therefore represents an increase of 6.8% in daily traffic flow at the busiest location.

7.9.3. **Table 7.30** presents a worst case estimate of the increase in traffic as a result of construction of the Proposed Development.

Table 7.30 - Impacts of Construction Traffic

	2020 Base		2020 Base + Construction Traffic		% increase (All Vehicles)	% increase (HGVs)
	AADT (All Vehicles)	AADT (HGVs)	AADT (All Vehicles)	AADT (HGVs)		
Whaddon Road (between Bottle Dump Roundabout and Site access	5183	531	5535	573	6.8%	7.9%
A421 (between Whaddon Crossroads and Bottle Dump Roundabouts)	25024	2396	25062	2406	0.15%	0.4%
A421 Standing Way (between Bottle Dump and Tattenhoe Roundabouts)	25392	2130	25708	2162	1.2%	1.5%
Whaddon Road through Newton Longville	5183	531	5201	531	0.3%	0%
B4034 Buckingham Road	8015	724	8047	724	0.4%	0%

7.9.4. **Table 7.30** shows that the link with the highest anticipated increase in construction traffic volume (Whaddon Road) will not trigger the 10% threshold outlined in the GEART to represent a discernible change in traffic volume given day to day fluctuations in traffic. As such, construction traffic impacts are not considered to be significant.

7.9.5. To ensure that the impacts of construction are effectively managed and mitigated, a Construction Environmental Management Plan (CEMP) will be secured by a planning condition to outline the measures and initiatives that will be employed to manage the impacts of construction. A preliminary CEMP is included with the updated planning application and includes the production of a Construction Traffic Management Plan (CTMP) to provide details regarding the management of construction traffic. The CEMP and the CTMP will be agreed with both BC and MKC prior to the commencement of construction.

7.10 SUMMARY

7.10.1. This section has presented the results of a transport network assessment for the Proposed Development. The development proposals have been assessed within a future year of 2033 representing the end of VALP period, when the Proposed Development is anticipated to be completed and fully occupied.

7.10.2. The results of the highway network assessment identified a number of locations where the 2033 base year models (Do Nothing) were shown to be operating at/above capacity (RFC of 1.0). With the addition of the Proposed Development (Do Something 1) junction performance worsens. At the majority of the junctions, similar results were found in the travel planning (Do Something 2) and Shenley Park (Do Something 3) sensitivity tests.

7.10.3. **Table 7.31** provides a summary of the highway modelling and where the identified impact would require further consideration. Where mitigation is considered necessary, or has previously been

agreed with BC/MKC, this is identified in the Table below and considered further in Section 8 of this TA.

Table 7.31 – Junction Capacity Assessment Summary

Junction Number	Junction Name	Authority Area	To be assesses for mitigation in Section 8 of this TA
J1	B4034 Buckingham Road/Sherwood Drive/Water Eaton Road	MKC	Yes
J2	B4034 Buckingham Road/Shenley Road/Newton Road	MKC	No
J3	Bletchley Road/Stoke Road/Drayton Road/Whaddon Road	BC	Yes
J4	Whaddon Road/Westbrook End	BC	No
J5	A421 Tattenhoe Roundabout	MKC	Yes
J6	A421 Bottle Dump Roundabout	MKC	Yes
J7	A421 Whaddon Crossroads	BC	Yes
J8	A421 Buckingham Road/Warren Road	BC	Yes
J9	A421 Buckingham Road/Shucklow Hill/Little Horwood Road	BC	Yes
J10	A421 Buckingham Road/Nash Road/Winslow Road	BC	Yes
J11	Coddimoor Lane/Shenley Road/Stock Lane	BC	No
J12	Kingsmead Roundabout	MKC	No
J13	Westcroft Roundabout	MKC	No
J14	Furzton Roundabout	MKC	No
J15	A421 Bleak Hall Roundabout	MKC	Yes
J16	A421 Elfield Park Roundabout	MKC	Yes
J17	A421 Emerson Roundabout	MKC	Yes
J18	A421 Windmill Hill Roundabout	MKC	Yes

8

MITIGATION PACKAGE

8 MITIGATION PACKAGE

8.1 INTRODUCTION

8.1.1. This section details the package of mitigation proposed to accommodate the Proposed Development on the transport network.

8.1.2. When considering the appropriateness of providing mitigation due regard has been given to the NPPF and Local Plan policies. In particular, the NPPF paragraphs 54-56 require planning obligations to be sought where they meet the three tests under the Regulation 122 of the Community Infrastructure Levy (CIL) Regulations 2010[25]. In addition, paragraph 108(c) of the NPPF requires that any significant impacts in terms of capacity and congestion or highway safety can be cost effectively mitigated to an acceptable degree. This is reflected in local Policy CT2 of Plan:MK which states that development proposals will be permitted that:

> *'Integrate into our existing sustainable transport networks and do not have an inappropriate impact on the operation, safety or accessibility to the local or strategic highway networks.'*

8.1.3. In this regard, it is important to recognise that the evidence base that supports Plan:MK and the Draft VALP acknowledges the potential congestion issues that would arise on the local road network predicated on unconstrained growth continuing to 2033. This prospect is clearly unsustainable and is reflected by MKC's aims and objectives to achieve a significant modal shift as identified by their LTP4 Mobility Strategy 2036. The following review is therefore a robust approach to the mitigation that may be required, assuming the level of traffic demand continues in accordance with current TEMPro trip end forecasts and the demand on the local highway network itself remains unconstrained.

8.1.4. This Section of the TA considers:

- Whether mitigation is required in the context of the Do Something Scenario 1. This scenario was used to consider the potential impacts of the mitigation proposed at the request of BC and MKC but does not include the travel planning measures outlined in the separately prepared FTP (as shown by the results for Do Something 2) and therefore represents an unrealistic position and approach to mitigation;
- What specific, proportionate and cost effective measures and/or planning obligations might be appropriate to mitigate the impact of the Proposed Development to an acceptable degree, as required by paragraph 108(c) of the NPPF;
- If mitigation is required, that planning obligations are sought and agreed in compliance with the tests under the CIL Regulations and in accordance with the NPPF; and
- The proportionate nature of any mitigation and the form it could take, either as physical highway improvements secured under section 278 of the Highways Act 1980, or by way of an appropriate

[25] The tests as set in Regulation 122(2) of the Community Infrastructure Levy Regulations 2010

financial contribution towards a range of sustainable transport measures aligned to delivering Local Plan policies and the LTP4 for both MKC and BC.

8.1.5. The level of future year impact assessed by this TA determines a 'worst case' based on static modelling of a number of junctions which assumes that queues would continue to build irrespective of congestion and delays and takes no account of any dynamic reassignment of traffic as previously indicated. By contrast, both Plan:MK and the Draft VALP are underpinned by strategic models, which do account for the reassignment of traffic over a wider modelled area and consider the benefits of major transport interventions that would be implemented over the course of the next 10-13 years including inter alia, East-West Rail (EWR), widening of the A421 west of M1 and various other improvements[26].

8.1.6. The MKMMM Reference Case (i.e. this includes the Site) and various Plan:MK scenarios[27] identify increasing congestion on the local road network during the morning and evening peak travel periods through to 2031[28] at specific junctions along the corridor of A421 approaching Milton Keynes from the west.

8.1.7. In addition, the transport evidence that supports the Draft VALP[29] also indicates that there would be general increases in congestion on routes including the corridor of A421. Notwithstanding, the mitigation scenario results from the impact analysis contained within this TA largely correlate with the Local Plan evidence that supports both Plan:MK and the Draft VALP, but disproportionately identify the cumulative impact at specific junctions in 2033 due to the nature of the adopted static modelling methodology, which makes no allowance for the redistributive effect that would be derived from a more strategic modelling tool.

8.1.8. Both BC and MKC recognise[30] that without significant investment in the transport system, there is a risk that the areas identified for growth in Milton Keynes will be stifled by increased congestion at significant junctions, presenting risks to the local economy. In recognising the opportunity for future growth, the Inspector presiding over the Draft VALP Examination in Public (EiP) reported that Aylesbury Vale District Council (now Buckinghamshire Council) was required to increase allocations

[26] Milton Keynes Multi Modal Model Update, Highway Model Traffic Forecasting report, November 2017, Table 8; Aecom

[27] Milton Keynes Multi Modal Model – Impacts of Plan:MK, Aecom, November 2017

[28] Milton Keynes Multi Modal Model Update, Highway Model Traffic Forecasting Report, November 2017, Figures 29 - 33; Aecom

[29] Countywide Local Plan Modelling, Phase 3 Technical Note, 16 August 2017, Table 6-B; Jacobs and VALP Modelling, North East Bucks Local Plan Tests – Technical Report, TN02/2, 30 May 2019, Section 6.3; Jacobs

[30] MKC, Strategy for First Last Mile Travel

for housing in close proximity to Milton Keynes, which would in part reduce commuting flows to and from Milton Keynes from the Aylesbury Vale District[31].

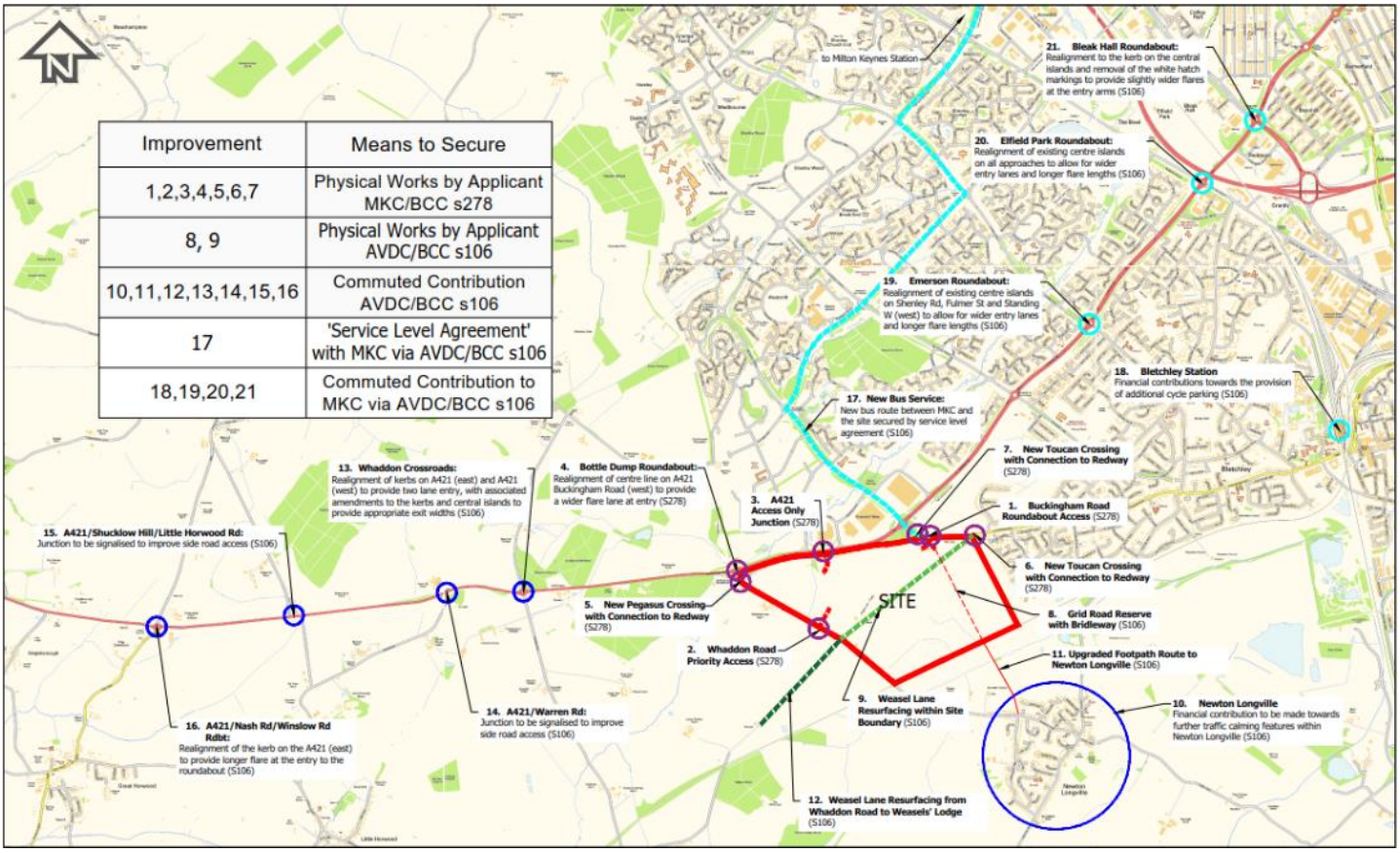
8.1.9. Following the request from the EiP Inspector, AVDC included a Main Modification to the VALP to allocate further development on the edge of Milton Keynes and along the corridor of A421 through an additional draft allocation at Shenley Park, given the Inspector's suggestion that the location was appropriate for further development.

8.1.10. This Section of the TA reviews the previous extent of the mitigation as agreed by BCC and MKC in June 2017[32] and how, in light of the above comments, that agree mitigation may need to be either modified or enhanced to take account of MKC's planned growth and BC's allocations in the Draft VALP.

8.2 PREVIOUS HIGHWAY MITIGATION PACKAGE

8.2.1. The previous highway mitigation package for the Site that was agreed with officers of both MKC and BC is outlined in **Figure 8.1**.

Figure 8.1 – Highway Improvements Masterplan



[31] Paragraph 37, VALP 2013-2022 Examination – Interim Findings 29 August 2018, Inspector PW Clark

[32] AVDC Report to Planning Committee, June 2017

8.2.2. The Highway Improvements Masterplan contained in **Figure 8.1** is summarised in relation to junction improvements in **Table 8.1**.

Table 8.1 – Highway Improvements Masterplan – Junctions (2016 TA)

Junction Number	Junction Name	Authority Area	Previously identified mitigation
J3	Bletchley Road/Stoke Road/Drayton Road/Whaddon Road	BC	S106 contribution towards traffic calming through Newton Longville
J6	A421 Bottle Dump Roundabout	MKC	S278 works to provide wider flare lane at entry on A421 western arm
J7	A421 Whaddon Crossroads	BC	S106 contribution for realignment of kerbs on A421[33]
J8	A421 Buckingham Road/Warren Road	BC	S106 contribution to signalise junction
J9	A421 Buckingham Road/Shucklow Hill/Little Horwood Road	BC	S106 contribution to signalise junction
J10	A421 Buckingham Road/Nash Road/Winslow Road	BC	S106 contribution for realignment of kerbs on A421
J15	A421 Bleak Hall Roundabout	MKC	S106 contribution for realignment of kerbs to provide wider flares on entry
J16	A421 Elfield Park Roundabout	MKC	S106 contribution for realignment of kerbs to allow for wider entry lanes and longer flare lengths
J17	A421 Emerson Roundabout	MKC	S106 contribution for realignment of kerbs to allow for wider entry lanes and longer flare lengths

8.2.3. It was agreed with BCC previously that the S106 contributions towards junction improvements at junctions 8 9 and 10 would be commuted to a wider corridor improvement along A421 within Buckinghamshire. Similarly, it was agreed with MKC previously that the S106 contributions towards improvements at junctions 15, 16 and 17 would also be commuted to a wider corridor improvement along A421 within Milton Keynes.

[33] Subsequently agreed to be completed by S278 Agreement

8.2.4. The previously proposed mitigation has been the starting point for consideration of mitigation within the highway network assessment in this TA. This Section provides a review of junction capacity in the context of the previously proposed mitigation and any new mitigation that might be considered necessary to address any additional impacts identified in this TA.

8.3 HIGHWAY MITIGATION MODELLING

8.3.1. The results of the junction capacity assessments presented in Section 7 indicated that two junctions (Junction 4 and Junction 11) operated with satisfactory performance with an RFC of less than 0.85 and a DoS of less than 90% in all scenarios assessed and therefore no consideration of mitigation was required. This Section therefore provides a review of the junctions where mitigation should be considered further to determine whether it is required.

8.3.2. A further four junctions (Junction 2, Junction 12, Junction 13, Junction 14) were identified as not experiencing a residual cumulative impact that was severe and therefore no mitigation was required. This Section therefore provides a review of the 12 junctions where mitigation is proposed, with the 2033 Do Nothing and 2033 Do Something 1 pre-mitigation results repeated for comparative purposes. Mitigation drawings are contained in **Appendix Y** and mitigation modelling outputs in **Appendix Z**.

BUCKINGHAMSHIRE

Junction 3 Bletchley Road/Stoke Road/Drayton Road/Whaddon Road

8.3.3. The priority crossroads in Newton Longville is shown to operate at/above capacity (RFC of 1) in the future year of 2033 (Do Nothing), with an increase in queueing and delay as a result of the addition of the development traffic in the Do Something 1 scenario.

8.3.4. The previous agreed mitigation scheme to provide a mini-roundabout was disregarded by BC in favour of provision of a S106 contribution towards traffic calming through Newton Longville. It was considered more beneficial to reduce the attractiveness of the route through Newton Longville by introducing additional delay through the use of design features, thereby negating the need for a capacity improvement at the junction but also improving highway safety due to the reduced speed of traffic on Whaddon Road.

8.3.5. Notwithstanding, the previous mini-roundabout mitigation has been tested to demonstrate that the impacts of the development on junction capacity can be mitigated in this location. The traffic calming measures (shown in **Appendix AA**) remain proposed as part of the overall mitigation strategy.

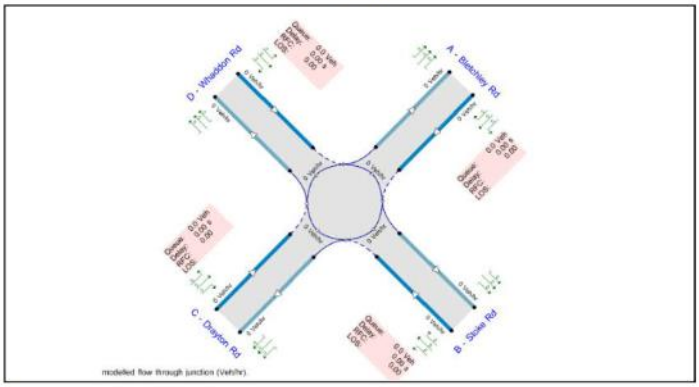
8.3.6. **Figure 8.2** provides details of the mini-roundabout layout previously proposed and **Table 8.2** provides the results of the mitigation scheme modelling.

Figure 8.2 – Junction 3 - Bletchley Road/Stoke Road/Drayton Road/Whaddon Road Mitigation Scheme

Junction 3 : Bletchley Road Stoke Road Drayton Road Whaddon Road

CAD

Junction 9 Model



Measurements

Junction No.	Name	Arm	V - Approach road half-width (m)	Minimum approach road half-width (m)	E - Entry width (m)	l - Effective flare length (m)	A-Distance to next arm (m)	k-Entry corner kerb line distance (m)
3	Bletchley Road Stoke Road Drayton Road Whaddon Road	A-Bletchley Rd	3.5	3.5	3.5	0	9.3	3.6
		B-Stoke Rd	3	3	3.3	3.3	9.1	3.2
		C-Drayton Rd	3.1	3.1	4	5.5	13.4	9.06
		D-Whaddon Rd	3.5	3.5	3.5	0	9.9	3.6

Table 8.2 – Junction 3 – Bletchley Road/Stoke Road/Drayton Road/Whaddon Road Mitigation Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Nothing (Pre-mitigation)						
A- Bletchley Road	0.1	7.14	0.07	0.1	7.31	0.13
B-Stoke Road	41.5	308.75	1.16	23.1	179.77	1.06
C-Drayton Road	0.1	7.12	0.06	0	6.96	0.03
D-Whaddon Road*	1.4	22.43	0.59	1.1	19.03	0.53
2033 Do Something 1 (Post-Mitigation)						
A - Bletchley Rd	0.6	8.51	0.39	0.6	8.01	0.37
B - Stoke Rd	2.2	16.18	0.69	2.2	16.51	0.69
C - Drayton Rd	0.4	7.59	0.3	0.3	6.84	0.21
D - Whaddon Rd	1.3	11.03	0.57	1	9.21	0.51
2033 Do Something 2 (Post-Mitigation)						
A - Bletchley Rd	0.6	8.44	0.39	0.6	7.97	0.37
B - Stoke Rd	2.2	16.03	0.69	2.1	16.11	0.68
C - Drayton Rd	0.4	7.55	0.3	0.3	6.78	0.21
D - Whaddon Rd	1.3	10.85	0.56	1	9.12	0.51
2033 Do Something 3 (Post-Mitigation)						
A - Bletchley Rd	0.6	8.73	0.39	0.6	8.08	0.37
B - Stoke Rd	2.3	16.72	0.7	2.3	17.51	0.71
C - Drayton Rd	0.4	7.68	0.31	0.3	6.96	0.22
D - Whaddon Rd	1.4	11.67	0.59	1.1	9.37	0.52

8.3.7. The results of the mitigation modelling indicate that the junction would operate with satisfactory performance (RFC below 0.85) in all scenarios assessed. As such the provision of a mini roundabout would be appropriate to mitigate the impacts of the development, if BC were minded to accept a physical improvement in this location.

8.3.8. However, as previously agreed, it is proposed that a contribution towards traffic calming through Newton Longville is provided, in place of the mitigation scheme. This would be secured as a S106 planning obligation.

Junction 7 Whaddon Crossroads

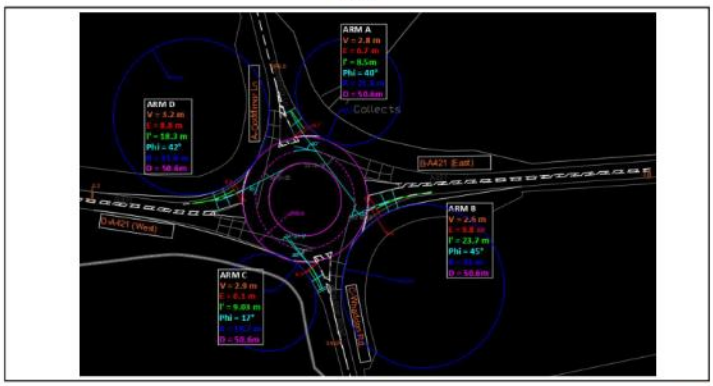
8.3.9. The Whaddon Crossroads roundabout is shown to operate at/above capacity (RFC of 1) in the future year of 2033 (Do Nothing), with an increase in queueing and delay as a result of the addition of the development traffic in the Do Something 1 scenario. The impact is however, not considered to be unacceptable in the context of the NPPF.

8.3.10. Notwithstanding this, a mitigation scheme to provide minor kerb amendments to increase lane entry widths was previously agreed to be implemented as part of a S278 Agreement at this location. That mitigation has been assessed with **Figure 8.3** providing the proposals for the junction whilst **Table 8.3** provides the results of the mitigation scheme modelling.

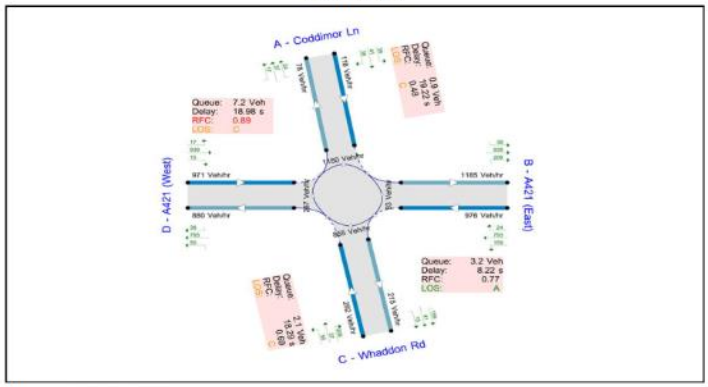
Figure 8.3 – Junction 7 – Whaddon Crossroads Mitigation Scheme

Junction 7 : Whaddon Crossroads

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
7	Whaddon Crossroads	A-Coddimor Ln	2.8	6.7	8.5	21.5	50.6	40
		B-A421 (East)	2.6	9.8	23.7	33	50.6	45
		C-Whaddon Rd.	2.9	6.1	9	19.7	50.6	17
		D-A421 (West)	3.2	8.8	18.3	31.6	50.6	42

Table 8.3 – Junction 7 - Whaddon Crossroads Mitigation Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Nothing (Pre-mitigation)						
A - Coddimoor Ln	0.9	18.14	0.47	0.7	14.43	0.43
B - A421 (East)	18.3	47.26	0.97	43.9	94.03	1.03
C - Whaddon Rd	2.2	18.77	0.7	1.3	14.31	0.58
D - A421 (West)	26.5	66.42	1	10.2	28.15	0.92
2033 Do Something 1 (Post-Mitigation)						
A - Coddimoor Ln	1.1	22.82	0.53	0.9	17.7	0.48
B - A421 (East)	4.4	10.6	0.82	5.7	13.12	0.86
C - Whaddon Rd	2.9	24.64	0.76	2.2	21.6	0.7
D - A421 (West)	9.7	25.14	0.92	6	15.79	0.87
2033 Do Something 2 (Post-Mitigation)						
A - Coddimoor Ln	1	22.3	0.52	0.9	17.1	0.47
B - A421 (East)	4.2	10.26	0.81	5.5	12.69	0.85
C - Whaddon Rd	2.8	23.68	0.75	2.1	20.58	0.68
D - A421 (West)	9.3	24.18	0.91	5.7	15.04	0.86
2033 Base + CD + D – ST – Do Something 3 (Post-Mitigation)						
A - Coddimoor Ln	1.1	24.22	0.54	1	18.9	0.5
B - A421 (East)	5	11.77	0.84	6	13.74	0.86
C - Whaddon Rd	3.3	27.98	0.78	2.4	23.45	0.72
D - A421 (West)	10.8	27.79	0.93	6.7	17.28	0.88

8.3.11. With the agreed mitigation measures in place the junction is shown to operate within capacity (with an RFC of less than 1) in the Do Something 1 scenario. The agreed mitigation package therefore provides an improvement at the junction which achieves a *nil detriment* capacity solution and is considered suitable to accommodate the impact of the Proposed Development on the highway network.

8.3.12. Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.

Junction 8 and Junction 9 Warren Road/A421 and A421/Shucklow Hill/Little Horwood Road

8.3.13. The priority junctions on A421 at Warren Road and Shucklow Hill/Little Horwood Road are shown to operate above capacity (RFC of 1) in the future year of 2033 (Do Nothing). Essentially, the traffic on the minor roads is unable to join A421 as a result of the volume of traffic on the main road, causing considerable queueing and delay. With the addition of the traffic associated with the Proposed Development (Do Something 1)the performance of the junctions deteriorates further however the impact of the Proposed Development is negligible.

8.3.14. Notwithstanding, a mitigation scheme to provide traffic signal controlled junctions at both priority junctions was previously agreed to provide suitable mitigation, with the cost of the improvements to be commuted as a S106 contribution towards a wider corridor improvement for A421 within Buckinghamshire. That previously agreed mitigation has been assessed as part of this TA. **Figure 8.4** provides the proposals for the junction whilst **Table 8.4** provides the results of the mitigation scheme modelling.

Figure 8.4 – Junction 8 And 9 - Warren Road/A421 And A421/Shucklow Hill/Little Horwood Road Mitigation Scheme

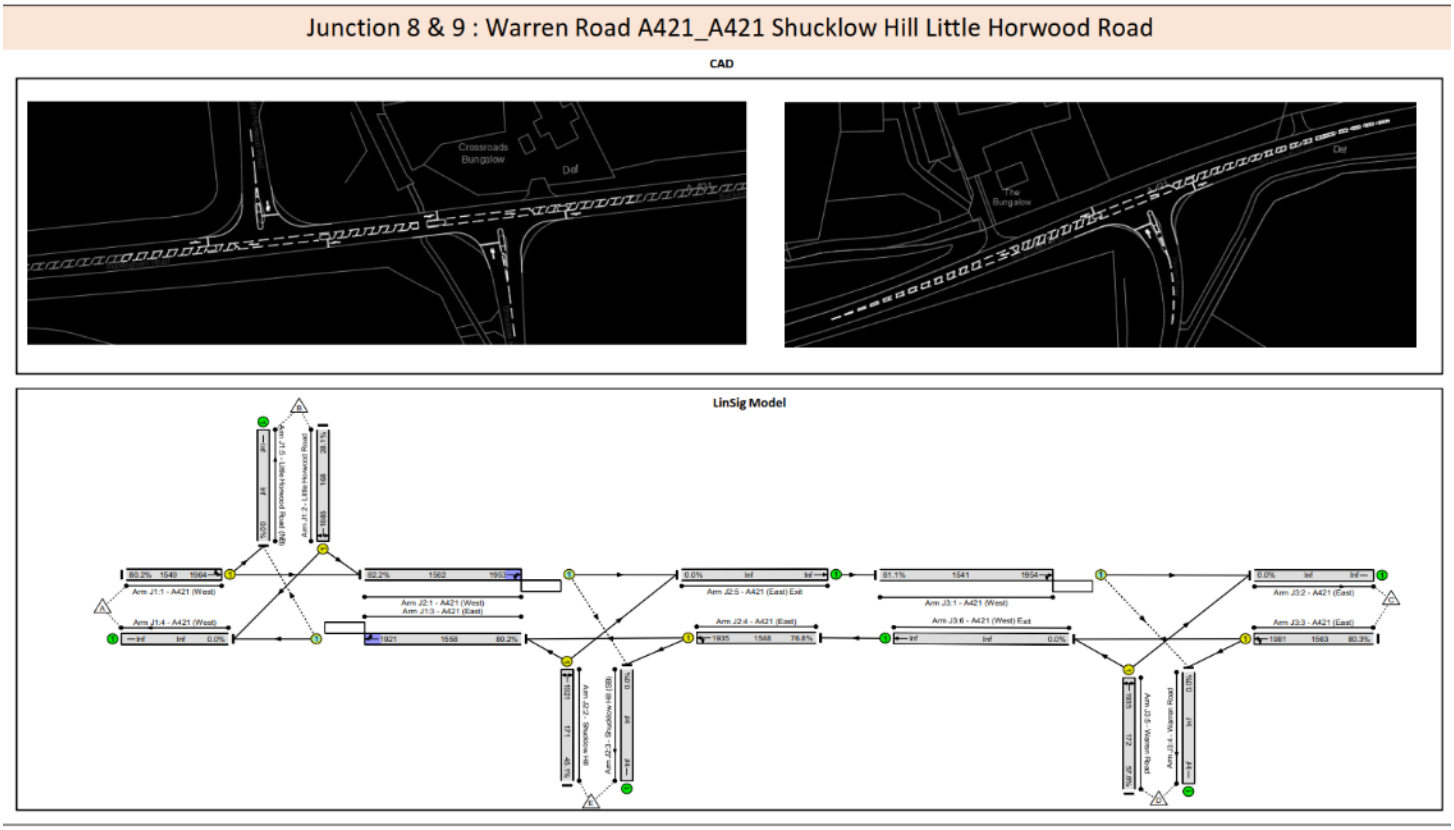


Table 8.4 – Junctions 8 And 9 - Warren Road/A421 And A421/Shucklow Hill/Little Horwood Road Mitigation Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Nothing (Pre-Mitigation)						
8 B - Warren Road	38.4	2753.04	2.87	2.4	270.29	0.83
8 C - A421 (West)	0	10	0.01	0	10.87	0
9 A - A421 (East)	0.3	12.13	0.25	0.2	11.49	0.16
9 B – Shucklow Hill*	7.7	1547.11	>3	6.5	1479.91	>3
9 C - A421 (West)	0.3	11.69	0.22	0.1	11.88	0.11
9 D - Little Horwood Road*	24.1	1414.27	>3	0.2	16.77	0.18

Junction	Arm	Lane Description	AM			PM		
			Mean Max Queue (PCU)	Delay (s/PCU)	Deg Sat (%)	Mean Max Queue (PCU)	Delay (s/PCU)	Deg Sat (%)
J8 - Warren Road/ A421	**2033 Do Something 1 (Post-Mitigation)**							
	1	A421 (West) Ahead Right	16.6	11.4	86.1%	17.1	12.3	87.5%
	2	A421 (East) Left Ahead	24.3	13.8	85.3%	28.9	17.4	89.6%
	3	Warren Road Right Left	3.3	65.8	61.0%	0.8	50.7	17.4%
J9 - A421/ Shucklow Hill/ Little Horwood	1	A421 (West) Ahead Left	23.7	13.7	85.1%	24.3	14.0	85.6%
	2	Little Horwood Road Left Right	1.4	53.7	29.8%	1.2	52.9	26.9%
	3	A421 (East) Ahead Right	7.8	11.3	85.1%	6.3	10.3	85.1%
	4	A421 (West) Right Ahead	7.7	12.4	87.3%	8.2	12.2	87.6%
	5	Shucklow Hill Left Right	2.4	59.1	48.0%	1.4	53.3	29.3%
	6	A421 (East) Ahead Left	13.0	8.7	81.6%	14.4	9.6	83.8%

Junction	Arm	Lane Description	AM			PM		
			Mean Max Queue (PCU)	Delay (s/PCU)	Deg Sat (%)	Mean Max Queue (PCU)	Delay (s/PCU)	Deg Sat (%)
J8 - Warren Road/ A421	2033 Do Something 2 (Post-Mitigation)							
	1	A421 (West) Ahead Right	16.0	11.2	85.7%	16.4	11.9	86.9%
	2	A421 (East) Left Ahead	23.7	13.5	84.8%	28.2	16.9	89.1%
	3	Warren Road Right Left	3.3	65.8	61.0%	0.8	50.7	17.4%
J9 - A421/ Shucklow Hill/ Little Horwood	1	A421 (West) Ahead Left	23.5	13.5	84.7%	23.6	13.7	85.0%
	2	Little Horwood Road Left Right	1.4	53.7	29.8%	1.2	52.9	26.9%
	3	A421 (East) Ahead Right	7.6	10.9	84.6%	6.4	10.1	84.7%
	4	A421 (West) Right Ahead	7.7	12.3	86.9%	7.7	11.6	87.0%
	5	Shucklow Hill Left Right	2.4	59.1	48.0%	1.4	53.3	29.3%
	6	A421 (East) Ahead Left	12.9	8.5	81.0%	14.4	9.4	83.4%
J8 - Warren Road/ A421	2033 Do Something 3 (Post-Mitigation)							
	1	A421 (West) Ahead Right	16.9	12.0	86.9%	17.9	13.1	88.4%
	2	A421 (East) Left Ahead	25.8	14.8	86.8%	29.7	18.0	90.1%
	3	Warren Road Right Left	3.3	65.8	61.0%	0.8	50.7	17.4%
J9 - A421/ Shucklow Hill/ Little Horwood	1	A421 (West) Ahead Left	24.8	14.3	86.0%	25.1	14.7	86.6%
	2	Little Horwood Road Left Right	1.4	53.7	29.8%	1.2	52.9	26.9%
	3	A421 (East) Ahead Right	8.2	12.0	86.6%	6.7	10.6	85.6%
	4	A421 (West) Right Ahead	8.0	12.9	88.1%	8.2	12.7	88.5%
	5	Shucklow Hill Left Right	2.4	59.1	48.0%	1.4	53.3	29.3%
	6	A421 (East) Ahead Left	14.3	9.3	83.1%	15.1	9.9	84.3%

8.3.15. With the agreed mitigation measures in place the junction is shown to operate within capacity (with a DoS of less than 100%) in all scenarios considered. The agreed mitigation package therefore provides an improvement at the junction which achieves a *nil detriment* capacity solution and is considered suitable to accommodate the impact of the Proposed Development on the highway network.

8.3.16. Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.

Junction 10 A421/Nash Road/Winslow Road

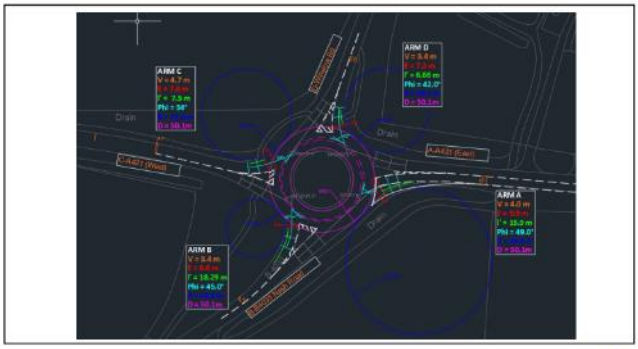
8.3.17. The roundabout junction of A421/Nash Road/Winslow Road is shown to operate above capacity (RFC of 1) in the future year of 2033 (Do Nothing). With the addition of the development traffic in the Do Something 1 scenario, the performance of the junction deteriorates slightly however the impact of the Proposed Development is negligible.

8.3.18. Notwithstanding this, a mitigation scheme was previously agreed to provide widened entry lanes through kerb amendments was previously agreed to provide suitable mitigation, with the cost of the improvements to be commuted as a S106 contribution towards a wider corridor improvement for A421 within Buckinghamshire. That previously agreed mitigation has been assessed as part of this TA. **Figure 8.5** provides the updated proposals for the junction whilst **Table 8.5** provides the results of the mitigation scheme modelling.

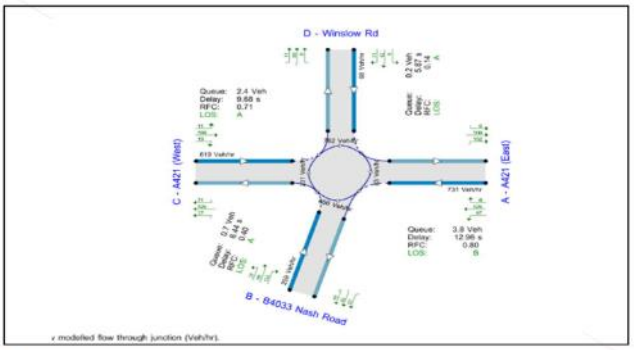
Figure 8.5 – Junction 10 – A421/Nash Road/Winslow Road Mitigation Scheme

Junction 10 : A421 Nash Rd Windslow

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
10	A421 Nash Rd Windslow	A - A421 (East)	4	9.9	15.9	34.8	50.1	49
		B - B4033 Nash Road	3.4	6.6	18.3	13.9	50.1	45
		C - A421 (West)	4.7	7.8	7.5	21.6	50.1	34
		D - Winslow Rd	3.4	7.2	6.7	20.1	50.1	42

Table 8.5 – Junction 10 - A421/Nash Road/Winslow Road Mitigation Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Nothing (Pre-mitigation)						
A - A421 (East)	10.9	33.38	0.93	16.2	45.65	0.96
B - B4033 Nash Road	1	8.67	0.51	0.6	6.59	0.36
C - A421 (West)	34.3	111.87	1.04	40.7	117.5	1.05
D - Winslow Rd	0.2	6.75	0.18	0.2	6.6	0.18
2033 Do Something 1 (Post-Mitigation)						
A - A421 (East)	2.9	8.18	0.75	3.2	8.49	0.77
B - B4033 Nash Road	1.2	9.45	0.54	0.6	7.01	0.38
C - A421 (West)	7	24.89	0.89	8.5	26.97	0.91
D - Winslow Rd	0.2	7.39	0.19	0.2	7.41	0.2
2033 Do Something 2 (Post-Mitigation)						
A - A421 (East)	2.8	8.04	0.74	3.2	8.36	0.76
B - B4033 Nash Road	1.1	9.34	0.54	0.6	6.95	0.38
C - A421 (West)	6.8	24.12	0.88	8.1	25.57	0.9
D - Winslow Rd	0.2	7.35	0.19	0.2	7.34	0.2
2033 Do Something 3 (Post-Mitigation)						
A - A421 (East)	3.1	8.65	0.76	3.3	8.67	0.77
B - B4033 Nash Road	1.2	9.83	0.55	0.6	7.09	0.39
C - A421 (West)	7.7	27	0.9	9.5	29.84	0.92
D - Winslow Rd	0.2	7.5	0.19	0.3	7.54	0.2

8.3.19. With the mitigation measures in place the junction is shown to operate within capacity (with an RFC of less than 1) in all scenarios considered. The agreed mitigation package therefore provides an improvement at the junction which achieves a *nil detriment* capacity solution and is considered suitable to accommodate the impact of the Proposed Development on the highway network.

8.3.20. Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.

MILTON KEYNES

Junction 1 Sherwood Drive / Water Eaton Road / B4034 Buckingham Road

8.3.21. The roundabout at Sherwood Drive / Water Eaton Road / B4034 Buckingham Road is shown to operate at/above capacity (LoS of E/F) in the future year of 2033. With the addition of the traffic associated with the Proposed Development the performance of the junction deteriorates further.

8.3.22. A review of the Plan:MK highway modelling evidence base indicates that this junction is expected to experience some queueing in the AM peak in 2031. However, there is no specific mitigation scheme proposed by MKC to account for the growth associated with Plan:MK.

8.3.23. A review of the existing roundabout indicates that there are limited options for layout improvement and therefore a traffic signal layout has been prepared for consideration as shown in **Figure 8.6**. **Table 8.6** provides the results of the mitigation scheme modelling.

Figure 8.6 – Junction 1 – Sherwood Drive/Water Eaton Road/B4034 Buckingham Road Mitigation Scheme

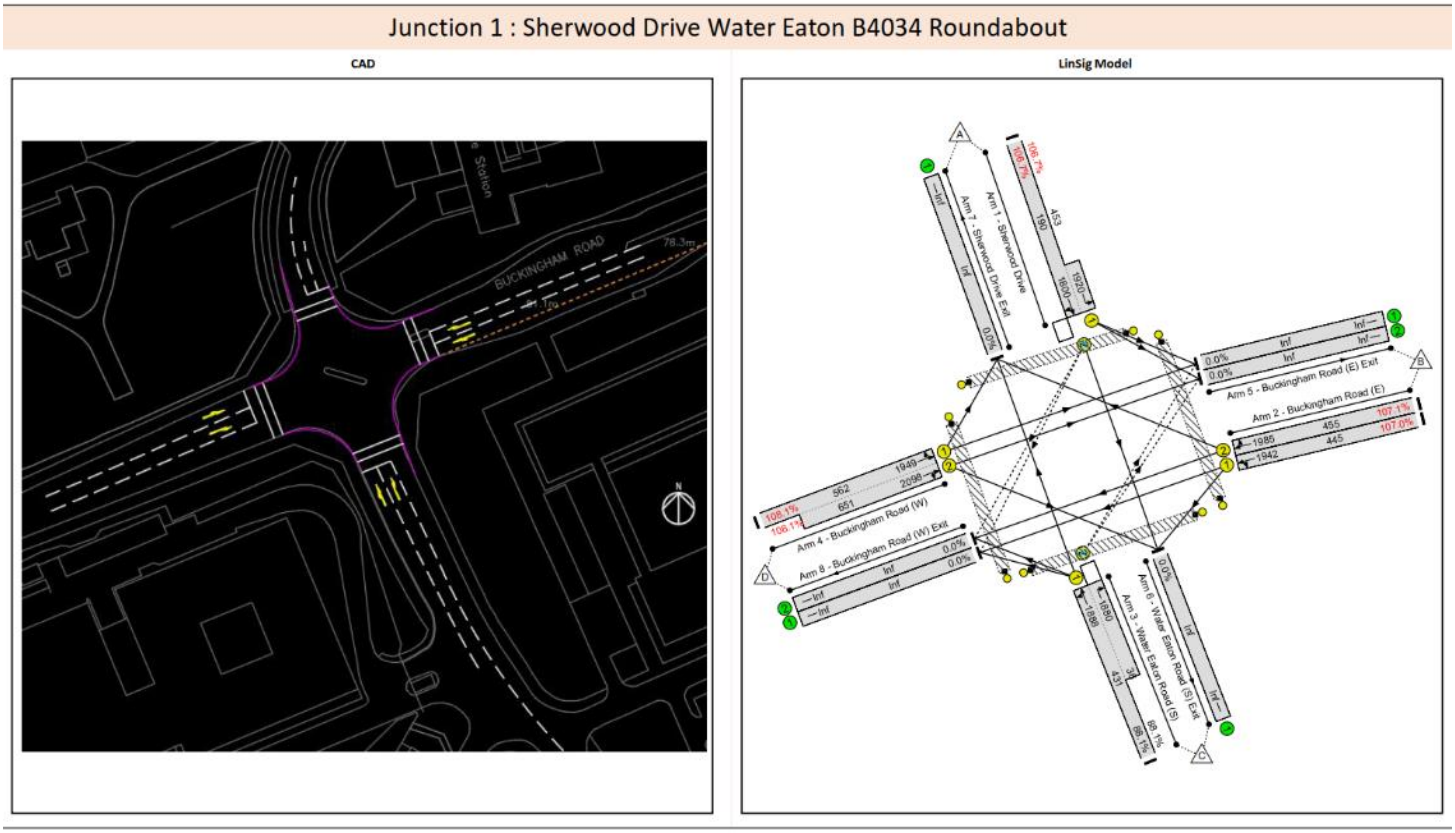


Table 8.6 – Junction 1 – Sherwood Drive/Water Eaton Road/B4034 Buckingham Road Mitigation Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	LOS	Queue (Veh)	Delay (s)	LOS
2033 Do Nothing (Pre-mitigation)						
A - Sherwood Drive	24.8	106.24	F	6.9	29.47	D
B - B4034	3	10.43	B	93.3	218.48	F
C - Water Eaton Road	2	15.12	C	12.9	90.06	F
D - B4034 Buckingham Road	109.3	320.54	F	4.1	15.57	C
2033 Do Something 1 (Pre-mitigation)						
A - Sherwood Drive	24.4	105.45	F	9.5	38.56	E
B - B4034	3.6	11.64	B	177.7	456.49	F
C - Water Eaton Road	2.6	17.95	C	19.5	123.51	F
D - B4034 Buckingham Road	197.6	589.31	F	6.4	22.94	C
Arm Description	**AM**			**PM**		
	Mean Max Queue (PCU)	**Delay (s/PCU)**	**Deg Sat (%)**	**Mean Max Queue (PCU)**	**Delay (s/PCU)**	**Deg Sat (%)**
2033 Do Something 1 (Post-Mitigation)						
Sherwood Drive Left Ahead Right	75.4	284.8	111.8%	113.7	462.2	122.4%
B4034 (E) Left Ahead	59.7	337.4	113.5%	128.4	505.7	124.6%
B4034 (E) Right	61.3	338.8	113.7%	130.7	503.7	124.5%
Water Eaton Road (S) Right Ahead Left	19.2	74	88.9%	14.0	51	77.7%
Buckingham Road (W) Ahead Right Left	140.7	322.6	113.5%	137.9	537.3	125.0%
2033 Do Something 2 (Post-Mitigation)						
Sherwood Drive Left Ahead Right	62.4	226.9	107.9%	100.9	403.2	118.7%
B4034 (E) Left Ahead	55.0	298.3	111.1%	122.9	485.6	123.2%
B4034 (E) Right	56.1	297.2	111.0%	125.4	484.9	123.1%
Water Eaton Road (S) Right Ahead Left	18.5	74.4	88.3%	14.2	50.9	77.6%
Buckingham Road (W) Ahead Right Left	134.4	311.6	112.5%	128.3	504.9	123.3%

Arm Description	AM			PM		
	Mean Max Queue (PCU)	Delay (s/PCU)	Deg Sat (%)	Mean Max Queue (PCU)	Delay (s/PCU)	Deg Sat (%)
2033 Do Something 3 (Post-Mitigation)						
Sherwood Drive Left Ahead Right	86.3	339.6	114.7%	135.3	556.1	128.9%
B4034 (E) Left Ahead	71.9	407.8	117.9%	140.4	542.1	127.4%
B4034 (E) Right	73.5	407.5	117.9%	143.6	541.8	127.4%
Water Eaton Road (S) Right Ahead Left	18.5	71.9	88.0%	14.1	51.2	78.1%
Buckingham Road (W) Ahead Right Left	184.3	413.6	118.7%	154.1	586.4	128.5%

8.3.24. The results of the mitigation modelling indicate that whilst the junction is still anticipated to operate at/above capacity (LoS of E/F) in the future year scenarios, conversion to traffic signals will provide mitigation which would be further improved with the addition of MOVA signal control.

8.3.25. In particular, within the 2033 Do Nothing scenario, Buckingham Road in the AM peak operates with a queue of 109 vehicles and 320 second delay. With the traffic associated with the Proposed Development (Do Something 1), the queue increases to 198 vehicles with a 590 second delay on the Buckingham Road (W). In the PM peak in the 2033 Do Nothing scenario,B4034 operates with a queue of 93 vehicles and a delay of 218 seconds. This increases to a queue of 177 vehicles and a delay of 456 seconds in the Do Something 1 scenario. This level of queueing and delay is unlikely to be accepted by motorists who will either re-route or re-time their journey. Therefore, the junction modelling results are an over-estimation of the impact of the Proposed Development in this location.

8.3.26. With the mitigation in place, queueing and delay is reduced when compared to the pre-mitigation scenario and therefore provides a betterment that could be further enhanced with the addition of MOVA signal control. No mitigation is proposed by MKC to account for the growth to 2033 as a result of Plan:MK and therefore the mitigation proposed is considered to be appropriate and cost effective.

8.3.27. The following additional benefits could also be realised:

- Incorporation of the junction within a town wide UTMC system for more effective management on a macro scale;
- bus priority;
- corridor management along Buckingham Road; and
- enhanced pedestrian and cycle facilities.

8.3.28. Alternatively, provision of a contribution towards further improving sustainable travel in the local area (potentially to improve access to Bletchley Station), rather than creating additional highway capacity would accord with the Milton Keynes Mobility Strategy 2036 and the declaration by MKC of a Climate Emergency/aim to be carbon neutral by 2030.

8.3.29. Therefore, it is suggested that mitigation at this location takes the form of either:

- a traffic signal junction; or
- a proportionate, cost effective contribution commuted towards MKC's Mobility Strategy 2036 to improve access to Bletchley Station and commercial area.

Junction 5 Tattenhoe Roundabout

8.3.30. This roundabout junction was shown to operate at/above capacity (RFC of 1) in the future year of 2033 (Do Nothing). With the addition of the development traffic (Do Something 1) the performance of the junction reduces further.

8.3.31. A review of the Plan:MK highway modelling evidence base indicates that the approaches to this junction are approaching capacity (V/C over 85%) in both the AM and PM peaks in 2031. However, there is no specific mitigation scheme proposed by MKC to account for the growth associated with Plan:MK despite this known issue.

8.3.32. A review of the existing roundabout indicates that there are limited options for improvement of the existing layout on V1 Snelshall Street due to the presence of the Redway underpass bridge structure immediately north of the roundabout. On B4034 Buckingham Road highway land is available for widening. Consideration of widening alone does not have a significant impact on junction capacity and therefore part-time, peak hour signalisation of A421 (W) was considered to allow gaps in the traffic flow for vehicles to exit V1 Snelshall Street. **Figure 8.7** provides details of the traffic signal layout considered and **Table 8.7** provides the results of the mitigation scheme modelling.

Figure 8.7 – Junction 5 – Tattenhoe Roundabout Mitigation Scheme

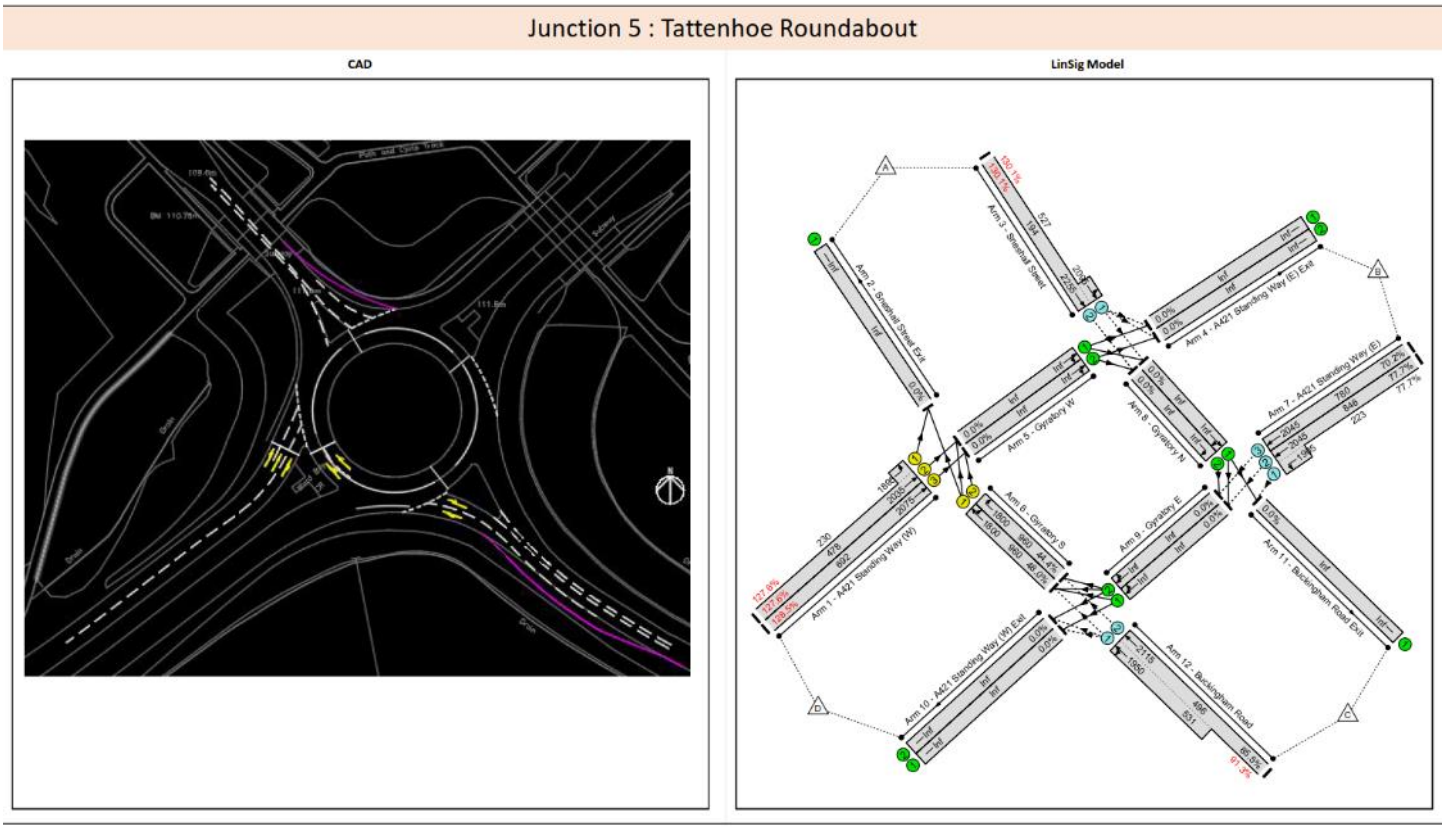


Table 8.7 – Junction 5 - Tattenhoe Roundabout Mitigation Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Nothing (Pre-mitigation)						
A – V1 Snelshall Street	130.2	493.42	1.36	9.2	42.68	0.92
B - A421 Standing Way (E)	1.2	3.85	0.55	1.6	4.57	0.61
C – B4034 Buckingham Road	1.3	8.89	0.57	2.2	13.36	0.69
D - A421 Standing Way (W)	5.1	10.2	0.84	2.9	6.3	0.74
2033 Do Something 1 (Pre-mitigation)						
A – V1 Snelshall Street	390.8	1923.96	2.07	109	412.5	1.27
B - A421 Standing Way (E)	2	4.98	0.67	5	10.74	0.84
C – B4034 Buckingham Road	103	343.72	1.23	137.1	524.54	1.36
D - A421 Standing Way (W)	29.1	53.36	1	4.7	9.91	0.83

Arm	Lane Description	AM			PM		
		Mean Max Queue (PCU)	Delay (s/PCU)	Deg Sat (%)	Mean Max Queue (PCU)	Delay (s/PCU)	Deg Sat (%)
2033 Do Something 1 (Post-Mitigation)							
1	A421 Standing Way (W) Left Ahead	144.5	517.9	134.8%	89.9	348.4	120.0%
	A421 Standing Way (W) Ahead	147.9	536.1	136.50%	77.5	325.7	118.10%
2	V1 Snelshall Street Left Ahead	176.5	510.7	134.6%	99.6	321.4	118.6%
3	A421 Standing Way (E) Ahead Left	2.1	8.6	80.8%	4.2	12.2	87.8%
	A421 Standing Way (E) Ahead	1.6	9.2	75.10%	2.6	12.5	81.30%
4	B4034 Buckingham Road Ahead Left	16.1	31	99.8%	69.9	180.9	113.0%

Arm	Lane Description	AM			PM		
		Mean Max Queue (PCU)	Delay (s/PCU)	Deg Sat (%)	Mean Max Queue (PCU)	Delay (s/PCU)	Deg Sat (%)
2033 Do Something 2 (Post-Mitigation)							
1	A421 Standing Way (W) Left Ahead	139.4	503.3	133.4%	54	196.4	108.9%
	A421 Standing Way (W) Ahead	143.2	522.1	135.20%	42.6	161.2	106.20%
2	V1 Snelshall Street Left Ahead	165.4	481.5	131.9%	73.5	212.2	110.6%
3	A421 Standing Way (E) Ahead Left	1.9	8.1	79.2%	3.5	10.7	85.7%
	A421 Standing Way (E) Ahead	1.3	8.5	73.10%	2	10.7	77.70%
4	B4034 Buckingham Road Ahead Left	7.6	12.9	94.0%	48.3	120.7	107.3%
2033 Do Something 3 (Post-Mitigation)							
1	A421 Standing Way (W) Left Ahead	129.6	466.5	130.0%	55.5	220	110.4%
	A421 Standing Way (W) Ahead	134	477.3	130.90%	49	197.6	108.70%
2	V1 Snelshall Street Left Ahead	138.8	436.4	127.7%	69.5	231.3	111.8%
3	A421 Standing Way (E) Ahead Left	2.2	9.2	81.9%	4.3	12.4	88.1%
	A421 Standing Way (E) Ahead	1.8	9.6	76.40%	2.7	12.6	81.80%
4	B4034 Buckingham Road Ahead Left	28.6	32	100.6%	80.3	205.1	115.1%

8.3.33. The modelling highlights significant queueing and delay on V1 Snelshall Street with queues increasing from 130 vehicles to 390 vehicles and delay from 493 seconds to 1,923 seconds in the Do Something 1 scenario prior to mitigation. In reality, motorists would not accept this level of queueing and delay and would instead re-route or re-time their journey to avoid this level of congestion.

8.3.34. As acknowledged by MKC, the grid road network in Milton Keynes increases the potential for re-routing The level of queueing and delay identified in this TA is therefore unlikely to materialise and the results presented are an over-estimation of the impacts of the Proposed Development at this junction.

8.3.35. Notwithstanding, the results of the mitigation modelling indicate that whilst the junction is anticipated to still operate above capacity (DoS 100%) in the future year scenarios, the partial signalisation of the junction would provide mitigation and would likely further improve with on-site calibration. This is evidenced by the pre-mitigation modelling that shows the 1,921 seconds delay on the V1 Snelshall

Street arm in the AM peak in Do Something 1. With the partial signalisation mitigation scheme, this reduces to a delay of 510 seconds, compared to a Do Nothing delay of 493 seconds.

8.3.36. The following additional benefits could also be realised as a result of a partial signalisation scheme:

- Incorporation of the junction within a town wide UTMC system for more effective management on a macro scale;
- bus priority;
- corridor management along B4034 Buckingham Road; and
- enhanced pedestrian and cycle facilities.

8.3.37. Alternatively, provision of a contribution towards further improving sustainable travel in the local area rather than creating additional highway capacity would accord with the Milton Keynes Mobility Strategy 2036 and the declaration by MKC of a Climate Emergency/aim to be carbon neutral by 2030.

8.3.38. Therefore, it is suggested that mitigation at this location takes the form of either:

- a partial signalisation of the junction; or
- a proportionate, cost effective contribution commuted towards MKC's Mobility Strategy 2036 to improve access to Central Milton Keynes.

Junction 6 Bottle Dump Roundabout

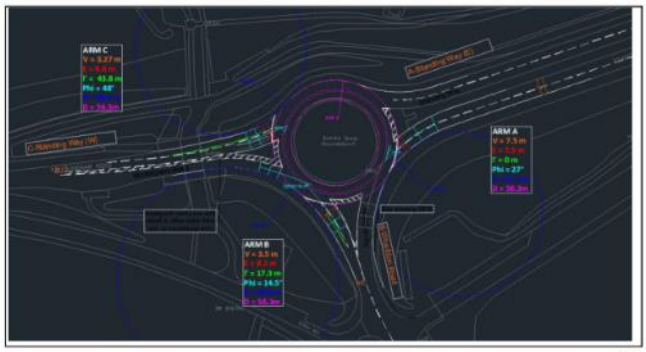
8.3.39. The Bottle Dump Roundabout is shown to operate at/over capacity in the future year of 2033 (Do Nothing) with a LoS of E/F. With the addition of the development traffic the performance of the junction reduces slightly in the Do Something 1 scenario however the impact is not however considered to be severe.

8.3.40. Notwithstanding this, a mitigation scheme to provide widened entry lane widths was previously agreed to provide suitable mitigation, with the works to be completed as part of a S278 Agreement. That previously agreed mitigation has been assessed as part of this TA. **Figure 8.8** provides the proposals for the junction whilst **Table 8.8** provides the results of the mitigation scheme modelling.

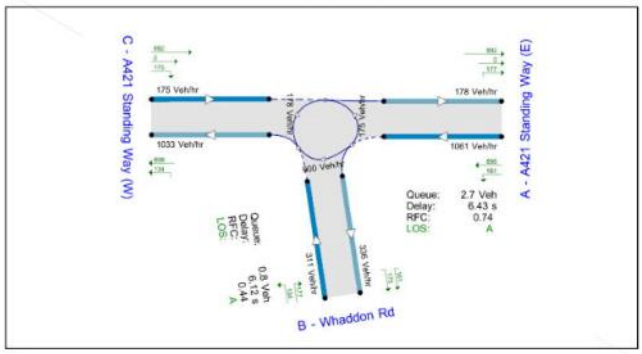
Figure 8.8 – Junction 6 – Bottle Dump Roundabout Mitigation Scheme

Junction 6 : Bottledump Roundabout

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
6	Bottledump Roundabout	A-Standing Way (E)	7.5	7.5	0	37.2	56.3	27
		B-Whaddon Road	3.5	8.2	17.3	50	56.3	14.5
		C-Standing Way (W)	3.27	9.6	43.8	38.6	56.3	48

Table 8.8 – Junction 6 - Bottle Dump Roundabout Mitigation Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	LOS	Queue (Veh)	Delay (s)	LOS
2033 Nothing (Pre-mitigation)						
A – A421 Standing Way	10	25.43	D	52.9	99.69	F
B - Whaddon Road	1	7.51	A	0.7	7.42	A
C – A421 Buckingham Road	12.9	24.86	C	4.9	10.76	B
2033 Do Something 1 (Pre-mitigation)						
A – A421 Standing Way	15.6	33.86	D	68	129.94	F
B - Whaddon Road	1.7	8.97	A	1.1	7.89	A
C – A421 Buckingham Road	24.4	44.54	E	6.9	15.17	C
2033 Do Something 1 (Post-Mitigation)						
A – A421 Standing Way	13.6	34.47	D	68.8	129.28	F
B - Whaddon Road	2.2	10.47	B	1.2	8.73	A
C – A421 Buckingham Road	20.7	38.69	E	6.6	14.19	B
2033 Do Something 2 (Post-Mitigation)						
A – A421 Standing Way	13.8	32.55	D	62.3	117.70	F
B - Whaddon Road	1.9	10.57	B	1.2	8.62	A
C – A421 Buckingham Road	17.5	33.9	D	5.6	12.33	B
2033 Do Something 3 (Post-Mitigation)						
A – A421 Standing Way	9.4	23.44	C	38.6	78.62	F
B - Whaddon Road	2.0	10.24	B	1.3	8.88	A
C – A421 Buckingham Road	24.6	41.15	E	4.6	10.73	B

8.3.41. With the agreed mitigation measures in place the junction is shown to operate at/over capacity (LoS of E/F) in the majority of scenarios considered. The agreed mitigation package provides some improvement to queueing at the junction in the Do Something 1 scenario, however the impact at Bottle Dump Roundabout is not considered to be severe in the context of the NPPF.

8.3.42. Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.

Junction 15 Bleak Hall Roundabout

8.3.43. The Bleak Hall Roundabout junction is shown to operate above capacity (RFC of 1) in the future year of 2033 (Do Nothing). With the addition of the traffic associated with the Proposed Development the performance of the junction deteriorates further in the Do Something 1 scenario.

8.3.44. A review of the Plan:MK highway modelling evidence base indicates that this junction is expected to operate above capacity (RFC of 1) in the AM and PM peak scenarios considered to 2031. However,

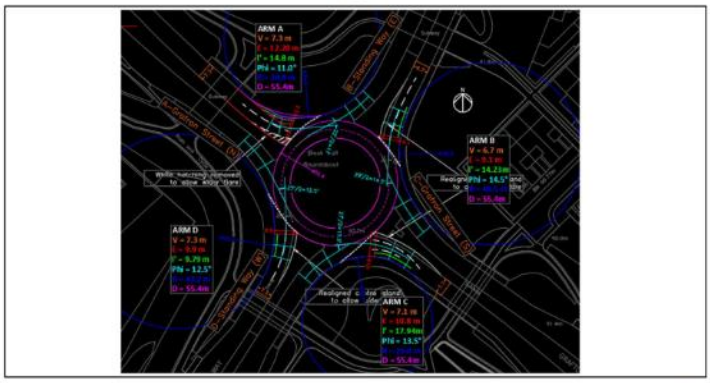
there is no specific mitigation scheme proposed by MKC to account for the growth associated with Plan:MK despite this known issue.

8.3.45. A mitigation scheme to provide widened entry lane widths was previously agreed to provide suitable mitigation at the Bleak Hall Roundabout, with the with the cost of the improvements to be commuted as a S106 contribution towards a wider corridor improvement for A421 within Milton Keynes. That previously agreed mitigation has been reviewed and an enhanced mitigation scheme developed which is shown in **Figure 8.9**. **Table 8.9** provides the results of the mitigation scheme modelling.

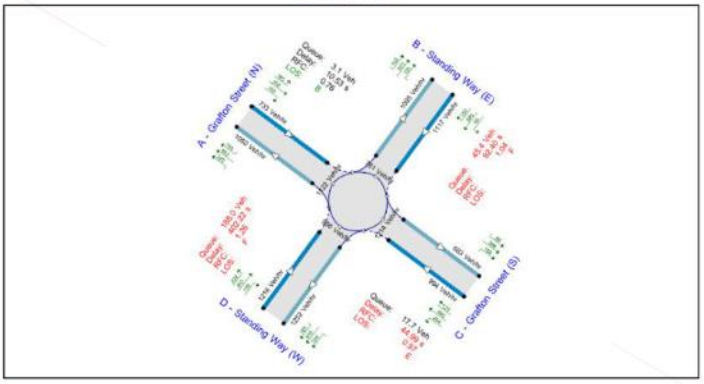
Figure 8.9 – Junction 15 – Bleak Hall Roundabout Mitigation Scheme

Junction 15 : Bleak Hall Roundabout

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
15	Bleak Hall Roundabout	A - Grafton Street (N)	7.30	12.20	14.8	34.8	55.4	11.0
		B - Standing Way (E)	6.70	9.10	14.2	40.5	55.4	14.5
		C - Grafton Street (S)	7.10	10.80	17.9	29.0	55.4	13.5
		D - Standing Way (W)	7.30	9.90	9.8	43.2	55.4	12.5

Table 8.9 – Junction 15 - Bleak Hall Roundabout Mitigation Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Nothing (Pre-mitigation)						
A – V6 Grafton Street (N)	5.7	19.75	0.86	84.4	283.99	1.15
B – A421 Standing Way (E)	104.6	214.52	1.14	49.6	115.05	1.05
C – V6 Grafton Street (S)	86.2	209.61	1.11	3.5	10.92	0.78
D – A421 Standing Way (W)	128.2	346.09	1.19	78.2	137.41	1.08
2033 Do Something 1 (Pre-mitigation)						
A – V6 Grafton Street (N)	7.5	25.13	0.9	178	625.25	1.27
B – A421 Standing Way (E)	204.8	491.57	1.29	188.6	498.36	1.25
C – V6 Grafton Street (S)	117.6	319.09	1.16	5.7	17.47	0.86
D – A421 Standing Way (W)	389.2	1030.46	1.44	210	403.39	1.23
2033 Do Something 1 (Post-Mitigation)						
A – V6 Grafton Street (N)	3.8	12.27	0.8	124.4	387.61	1.21
B – A421 Standing Way (E)	101.4	186.72	1.12	100.6	205.34	1.12
C – V6 Grafton Street (S)	38.6	84.61	1.03	2.9	8.68	0.75
D – A421 Standing Way (W)	279.1	635.03	1.35	96.6	146.08	1.09
2033 Do Something 2 (Post-Mitigation)						
A – V6 Grafton Street (N)	3.7	12	0.8	106.1	321.44	1.19
B – A421 Standing Way (E)	87.6	163.25	1.1	79.2	157.09	1.09
C – V6 Grafton Street (S)	35.3	78.34	1.02	2.7	8.22	0.74
D – A421 Standing Way (W)	234.4	548.16	1.31	75.9	118.5	1.07
2033 Do Something 3 (Post-Mitigation)						
A – V6 Grafton Street (N)	3.9	12.54	0.8	126.5	395.32	1.21
B – A421 Standing Way (E)	109.8	202.86	1.13	103.9	216.23	1.13
C – V6 Grafton Street (S)	40.3	87.12	1.03	3.1	9.11	0.76
D – A421 Standing Way (W)	305.7	687.12	1.37	102.6	154.11	1.1

8.3.46. The modelling highlights significant queueing and delay, particularly on the A421 Standing Way western arm with queues increasing from 128 vehicles to 329 vehicles and delay from 346 seconds to 1,030 seconds in the Do Something 1 pre-mitigation scenario. In reality, motorists would not

accept this level of queueing and delay and would instead re-route or re-time their journey to avoid congestion. As acknowledged by MKC, the grid road network in Milton Keynes increases the potential for re-routing. The level of queueing and delay identified is therefore unlikely to materialise and the results presented in this TA are an over-estimation of the impacts of the Proposed Development.

8.3.47. Notwithstanding, the results of the mitigation modelling indicate that whilst the junction is still anticipated to operate at/above capacity (RFC of 1) in the future year scenarios assessed, the previously agreed improvement measure would provide mitigation. The maximum queueing and delay in Do Something 1 pre-mitigation is on A421 Standing Way (W) arm in the AM peak where a queue of 389 vehicles and delay of 1,030 seconds is evident. This impact reduces to a delay of 635 seconds and a queue of 279 with the mitigation in the Do Something 1 scenario compared with a queue of 128 vehicles and a delay of 346 seconds in the Do Nothing scenario.

8.3.48. Alternatively, provision of a contribution towards further improving sustainable travel in the local area rather than creating additional highway capacity would accord with the Milton Keynes Mobility Strategy 2036 and the declaration by MKC of a Climate Emergency/aim to be carbon neutral by 2030.

8.3.49. Therefore, it is suggested that mitigation at this location takes the form of either:

- Amendments to kerbs to widen entry lanes; or
- a proportionate, cost effective contribution commuted towards MKC's Mobility Strategy 2036 to improve access to Central Milton Keynes.

Junction 16 Elfield Park Roundabout

8.3.50. The Elfield Park Roundabout is shown to operate at/above capacity (RFC of 1) in the future year of 2033 (Do Nothing) scenario. With the addition of the traffic associated with the Proposed Development the performance of the junction deteriorates further in the Do Something 1 scenario.

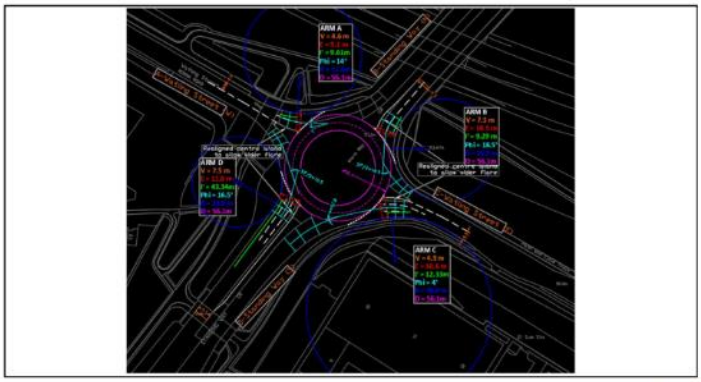
8.3.51. A review of the Plan:MK highway modelling evidence base indicates that this junction is expected to operate approaching capacity (RFC of 1) in the AM and PM peak scenarios considered to 2031. However, there is no specific mitigation scheme proposed by MKC to account for the growth associated with Plan:MK despite this known issue.

8.3.52. A mitigation scheme to provide widened entry lane widths was previously agreed to provide suitable mitigation at the Elfield Park Roundabout, with the cost of the improvements to be commuted as a S106 contribution towards a wider corridor improvement for A421 within Milton Keynes. That previously agreed mitigation has been reviewed and an enhanced mitigation scheme developed which is shown in **Figure 8.10**. **Table 8.10** provides the results of the mitigation scheme modelling.

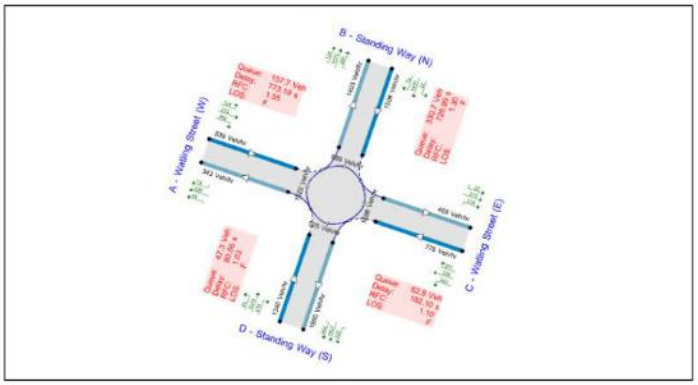
Figure 8.10 – Junction 16 – Elfield Park Roundabout Mitigation Scheme

Junction 16 : Elfield Park Roundabout

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
16	Elfield Park Roundabout	A - Watling Street (W)	4.60	9.10	9.6	31.0	56.1	14.0
		B - Standing Way (N)	7.30	10.50	9.3	26.9	56.1	18.5
		C - Watling Street (E)	4.90	10.60	12.3	48.9	56.1	4.0
		D - Standing Way (S)	7.50	11.00	43.3	23.8	56.1	16.5

Table 8.10 – Junction 16 - Elfield Park Roundabout Mitigation Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Nothing (pre-mitigation)						
A – V4 Watling Street (W)	3.8	26.1	0.8	119.9	499.27	1.39
B – A421 Standing Way (N)	56	112.65	1.06	116.9	249.3	1.13
C – Watling Street (E)	111.4	286.79	1.17	78.8	235.9	1.13
D – A421 Standing Way (S)	121.2	253.66	1.14	10.7	23.25	0.93
2033 Do Something 1 (pre-mitigation)						
A – V4 Watling Street (W)	4.7	32.46	0.84	220.2	1217.19	1.66
B – A421 Standing Way (N)	147.1	295.44	1.17	381.8	839.44	1.33
C – Watling Street (E)	148.6	450.68	1.22	98.2	321.93	1.16
D – A421 Standing Way (S)	374.4	790.48	1.35	72.7	115.07	1.06
2033 Do Something 1 (Post-Mitigation)						
A – V4 Watling Street (W)	40.1	242.95	1.16	151	649.29	1.53
B – A421 Standing Way (N)	73	126.38	1.07	244.5	480.78	1.21
C – Watling Street (E)	207.7	596.28	1.33	192.8	717.57	1.33
D – A421 Standing Way (S)	58.4	88.53	1.04	4.5	8.21	0.82
2033 Do Something 2 (Post-Mitigation)						
A – V4 Watling Street (W)	33.3	197.79	1.13	134.8	563.92	1.45
B – A421 Standing Way (N)	63.3	112.63	1.06	199.8	403.8	1.19
C – Watling Street (E)	198.7	563.27	1.31	184	682.39	1.32
D – A421 Standing Way (S)	39.2	64.63	1.01	4	7.47	0.81
2033 Something 3 (Post-Mitigation)						
A – V4 Watling Street (W)	48.2	296.31	1.2	156.4	673.44	1.56
B – A421 Standing Way (N)	76	130.24	1.07	261.2	510.19	1.22
C – Watling Street (E)	213.6	615.92	1.33	195.4	728.2	1.33
D – A421 Standing Way (S)	66.4	98.63	1.05	4.7	8.48	0.83

8.3.53. The modelling highlights significant queueing and delay, particularly on the V4 Watling Street (W) arm with queues increasing from 119 vehicles in the Do Nothing scenario to 220 vehicles in the Do Something scenario, and delay from 499 seconds to 1217 seconds prior to mitigation. In reality, motorists would not accept this level of queueing and delay and would instead re-route or re-time their journey to avoid congestion.

8.3.54. As acknowledged by MKC, the grid road network in Milton Keynes increases the potential for re-routing. The level of queueing and delay identified is therefore unlikely to materialise and the results presented in this TA are an over-estimation of the impacts of the Proposed Development.

8.3.55. Notwithstanding, the results of the mitigation modelling indicate that whilst the junction is anticipated to still operate above capacity (RFC of 1) in the future year scenarios assessed, the previously agreed improvement measure would provide mitigation. The maximum queueing and delay pre-mitigation are on V4 Watling Street (W) arm in the PM peak where a queue of 220 vehicles and delay of 1,217 seconds is evident. This impact reduces to a queue of 151 vehicles and a delay of 649 seconds and with the mitigation in the Do Something 1 scenario compared with a queue of 120 vehicles and a delay of 500 seconds in the Do Nothing scenario.

8.3.56. Alternatively, provision of a contribution towards further improving sustainable travel in the local area rather than creating additional highway capacity would accord with the Milton Keynes Mobility Strategy 2036 and the declaration by MKC of a Climate Emergency/aim to be carbon neutral by 2030.

8.3.57. Therefore, it is suggested that mitigation at this location takes the form of either:

- Amendments to kerbs to widen entry lanes; or
- a proportionate, cost effective contribution commuted towards MKC's Mobility Strategy 2036 to improve access to Central Milton Keynes.

Junction 17 Emerson Roundabout

8.3.58. The Emerson Roundabout is shown to operate at/above capacity (RFC of 1) in the future year of 2033 (Do Nothing) scenario. With the addition of the traffic associated with the Proposed Development the performance of the junction deteriorates further in the Do Something 1 scenario.

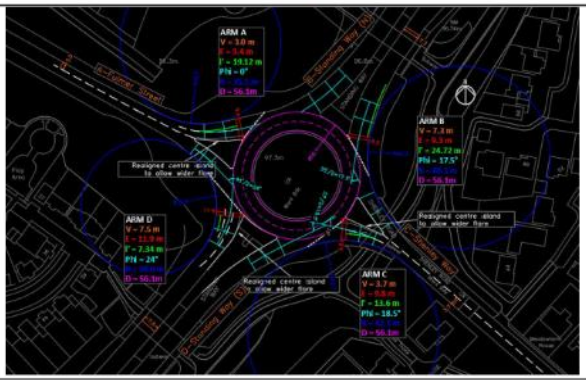
8.3.59. A review of the Plan:MK highway modelling evidence base indicates that this junction is expected to operate approaching capacity (RFC of 1) in the AM and PM peak scenarios considered to 2031. However, there is no specific mitigation scheme proposed by MKC to account for the growth associated with Plan:MK despite this known issue.

8.3.60. A mitigation scheme to provide widened entry lane widths was previously agreed to provide suitable mitigation at the Emerson Roundabout, with the cost of the improvements to be commuted as a S106 contribution towards a wider corridor improvement for A421 within Milton Keynes. That previously agreed mitigation has been reviewed and an enhanced mitigation scheme developed which is shown in **Figure 8.11**. **Table 8.11** provides the results of the mitigation scheme modelling.

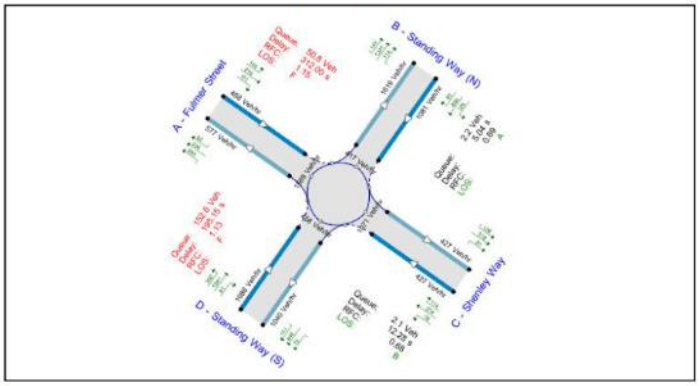
Figure 8.11 – Junction 17 – Emerson Roundabout Mitigation Scheme

Junction 17 : Emerson Roundabout

CAD



Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
17	Emerson Roundabout	A - Fulmer Street	3.00	9.40	19.1	35.5	56.1	0.0
		B - Standing Way (N)	7.30	9.30	24.7	40.3	56.1	17.5
		C - Shenley Way	3.70	9.80	13.6	42.1	56.1	18.5
		D - Standing Way (S)	7.50	11.90	7.3	30.0	56.1	24.0

Table 8.11 – Junction 17 - Emerson Roundabout Mitigation Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Nothing (Pre-mitigation)						
A – V3 Fulmer Street	69.5	325.48	1.24	6.8	36.57	0.89
B – A421 Standing Way (N)	1.6	4.06	0.62	7.2	13.12	0.89
C - Shenley Way	2.5	13.87	0.72	24.8	139.37	1.05
D – A421 Standing Way (S)	53.2	79.92	1.03	2.5	5.94	0.72
2033 Do Something 1 (Pre-mitigation)						
A – V3 Fulmer Street	132.9	976.02	1.36	40.8	184.62	1.1
B – A421 Standing Way (N)	2.5	5.42	0.72	83.9	106.86	1.06
C - Shenley Way	6.7	38.64	0.89	142.7	1049.61	1.61
D – A421 Standing Way (S)	249.9	386.92	1.22	4.2	8.23	0.81
2033 Do Something 1 (Post-Mitigation)						
A – V3 Fulmer Street	71.9	446.77	1.2	17.9	89.23	1
B – A421 Standing Way (N)	2.6	5.76	0.73	95.5	120.19	1.07
C - Shenley Way	3.1	17.54	0.77	57.5	377.99	1.21
D – A421 Standing Way (S)	236.4	352.74	1.21	4.7	9.27	0.83
2033 Do Something 2 (Post-Mitigation)						
A – V3 Fulmer Street	65.7	408.36	1.18	11.8	62.08	0.95
B – A421 Standing Way (N)	2.4	5.46	0.71	65.5	87.16	1.04
C - Shenley Way	2.8	15.5	0.74	49.3	268.13	1.18
D – A421 Standing Way (S)	202.2	288.63	1.18	4.1	8.4	0.81
2033 Do Something 3 (Post-Mitigation)						
A – V3 Fulmer Street	76.1	471.28	1.21	19.1	94.01	1.01
B – A421 Standing Way (N)	2.7	5.87	0.73	101.4	126.72	1.08
C - Shenley Way	3.3	18.35	0.78	62.2	403.74	1.23
D – A421 Standing Way (S)	249.1	376.61	1.22	4.8	9.4	0.83

8.3.61. The modelling highlights significant queueing and delay, particularly on the Shenley Way arm with queues increasing from 24 vehicles in the Do Nothing scenario to 142 vehicles in the Do Something 1 scenario, and delay from 139 seconds to 1,049 seconds prior to mitigation. In reality, motorists

would not accept this level of queueing and delay and would instead re-route or re-time their journey to avoid congestion.

8.3.62. As acknowledged by MKC, the grid road network in Milton Keynes increases the potential for re-routing, h The level of queueing and delay identified is therefore unlikely to materialise and the results presented in this TA are an over-estimation of the impacts of the Proposed Development

8.3.63. Notwithstanding, the results of the mitigation modelling indicate that whilst the junction is still anticipated to operate above capacity (RFC of 1) in the future year scenarios assessed, the previously agreed improvement would provide mitigation. On A421 Standing Way (S) in the AM peak, an increase in queueing of 183 vehicles and a delay of 273 seconds is anticipated in the Do Something 1 scenario following mitigation.

8.3.64. Alternatively, provision of a contribution towards further improving sustainable travel in the local area rather than creating additional highway capacity would accord with the Milton Keynes Mobility Strategy 2036 and the declaration by MKC of a Climate Emergency/aim to be carbon neutral by 2030.

8.3.65. Therefore, it is suggested that mitigation at this location takes the form of either:

- Amendments to kerbs to widen entry lanes; or
- a proportionate, cost effective contribution commuted towards MKC's Mobility Strategy 2036 to improve access to Central Milton Keynes.

Junction 18 Windmill Hill Roundabout

8.3.66. The Windmill Hill Roundabout is shown to operate approaching/above capacity (RFC of 1) in the future year of 2033 (Do Nothing) scenario. With the addition of the traffic associated with the Proposed Development the performance of the junction deteriorates further in the Do Something 1 scenario.

8.3.67. A review of the Plan:MK highway modelling evidence base indicates that this junction is expected to operate with satisfactory performance (RFC below 0.85) in the AM and PM peak scenarios considered to 2031.

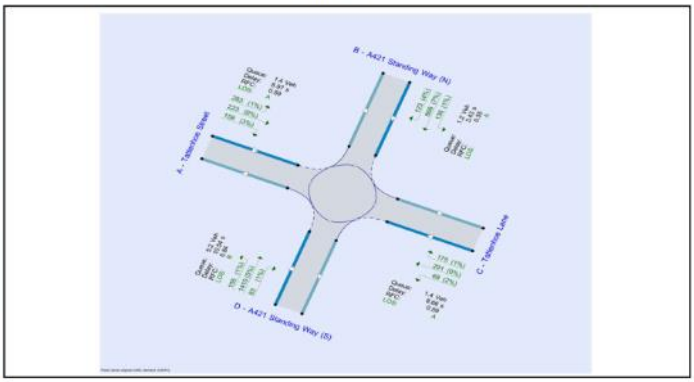
8.3.68. A mitigation scheme has been developed for this junction which includes kerb amendments to provide additional entry lane width, as shown in **Figure 8.12**. **Table 8.12** provides the results of the mitigation scheme modelling.

Figure 8.12 – Junction 17 – Windmill Hill Roundabout Mitigation Scheme

Junction 18 : Windmill Hill Roundabout

CAD

Junction 9 Model



Measurements

Junction No.	Name	Arms	V - Approach road half-width (m)	E - Entry width (m)	I - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)
18	Windmill Hill Roundabout	A-Tattenhoe Street	3.30	9.80	73.3	45.4	55.8	8.0
		B-A421 Standing Way (N)	7.40	9.10	25.4	32.5	55.8	13.0
		C-Tattenhoe Lane	4.30	7.60	12.5	24.2	55.8	34.0
		D-A421 Standing Way (S)	7.30	9.10	17.3	43.4	55.8	19.0

Table 8.12 – Junction 18 - Windmill Hill Roundabout Mitigation Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Nothing – (Pre-mitigation)						
A – V2 Tattenhoe Street	133.7	641.38	1.52	7.1	35.23	0.89
B - A421 Standing Way (N)	1.1	3.13	0.52	2.2	4.8	0.68
C - Tattenhoe Lane	5	32.18	0.85	6.1	51.69	0.88
D - A421 Standing Way (S)	5.2	10.68	0.84	1.4	3.87	0.58
2033 Do Something 1 – (Pre-mitigation)						
A – V2 Tattenhoe Street	332.9	2509	2.56	49.3	205.6	1.12
B - A421 Standing Way (N)	1.6	3.8	0.62	6.3	11.36	0.87
C - Tattenhoe Lane	34.7	189.08	1.09	99.1	797.88	1.72
D - A421 Standing Way (S)	52.5	77.47	1.03	2.2	4.96	0.69
2033 Do Something 1 (Post-Mitigation)						
A – V2 Tattenhoe Street	3.5	16.81	0.79	1.1	5.11	0.53
B - A421 Standing Way (N)	2	4.81	0.67	7.3	13.15	0.89
C - Tattenhoe Lane	2.9	17.6	0.75	4.7	39.19	0.85
D - A421 Standing Way (S)	67.4	96.76	1.05	2.7	6.01	0.73
2033 Do Something 2 (Post-Mitigation)						
A – V2 Tattenhoe Street	3.2	15.64	0.77	1	4.78	0.51
B - A421 Standing Way (N)	1.9	4.56	0.65	5.5	10.18	0.85
C - Tattenhoe Lane	2.5	15.33	0.72	3.2	25.99	0.77
D - A421 Standing Way (S)	42	66.09	1.02	2.3	5.5	0.7
2033 Do Something 3 (Post-Mitigation)						
A – V2 Tattenhoe Street	3.6	17.23	0.79	1.1	5.16	0.53
B - A421 Standing Way (N)	2.1	4.91	0.68	7.8	13.98	0.89
C - Tattenhoe Lane	3.1	18.84	0.77	5.2	43.43	0.86
D - A421 Standing Way (S)	79.3	110.97	1.06	2.7	6.1	0.73

8.3.69. The results of the mitigation modelling indicate that whilst the junction is still anticipated to operate at/above capacity (RFC of 1) in the future year AM peak scenarios assessed, the proposed

improvement will significantly reduce queueing and delay and will therefore sufficiently mitigate the impact of the Proposed Development on the local highway network.

8.3.70. Alternatively, provision of a contribution towards further improving sustainable travel in the local area rather than creating additional highway capacity would accord with the Milton Keynes Mobility Strategy 2036 and the declaration by MKC of a Climate Emergency/aim to be carbon neutral by 2030.

8.3.71. Therefore, it is suggested that mitigation at this location takes the form of either:

- Amendments to kerbs to widen entry lanes; or
- a proportionate, cost effective contribution commuted towards MKC's Mobility Strategy 2036 to improve access to Bletchley Station and commercial area.

HIGHWAY MITIGATION SUMMARY

8.3.72. **Table 8.13** provides a summary of the analysis and appropriate mitigation measures considered in this Section of the TA based on robust assumptions for traffic distribution and assignment in the future year of 2033.

Table 8.13 – Modelling Results And Proposed Mitigation Summary

Junction Number and Name		Having interpreted the results and the Local Plan evidence[34], is mitigation required to accommodate the residual cumulative impact of Proposed Development	Preferred Mitigation to comply with the NPPF, MKC's/BC's LTP4 and Local Plan policies
J1	B4034 Buckingham Road/Sherwood Drive/ Water Eaton Road	Yes. The modelling results show disproportionate effects when the RFC is greater than 1.0. The local plan evidence suggests some queueing during the peak AM period. There is no specific scheme being promoted by MKC to accommodate Plan:MK 2031. The development should not be required to address problems created by local plan growth.	Either peak hour traffic signals or a proportionate, cost effective contribution commuted towards MKC's Mobility Strategy 2036 to improve access to Bletchley Station and commercial area
J2	B4034 Buckingham Road/ Shenley Road/Newton Road	No mitigation required as the junction operates within capacity (RFC of 1).	
J3	Bletchley Road/Stoke Road/ Drayton Road/ Whaddon Road	Mitigation previously agreed.	Traffic calming scheme to reduce attractiveness of route and to reduce vehicle speeds
J4	Whaddon Road/ Westbrook End	No mitigation required as the junction operates within capacity (RFC of 1).	
J5	A421 Tattenhoe Roundabout	Yes. The modelling results show disproportionate effects when the RFC is greater than 1.0, as in the base scenario 2033. The Local Plan evidence highlights the junction is approaching capacity with DoS southbound 91% AM, eastbound 86% AM and northbound >85% PM over capacity with Local Plan development. There is no specific mitigation scheme proposed by MKC to account for Plan:MK 2031. The development should not be addressing problems created by Local Plan growth.	Either peak hour traffic signals or a proportionate, cost effective contribution commuted towards MKC's Mobility Strategy 2036 to improve access to Central MK

[34] MKMMM Impacts of Plan:MK, November 2017, MKC

Junction Number and Name		Having interpreted the results and the Local Plan evidence[34], is mitigation required to accommodate the residual cumulative impact of Proposed Development	Preferred Mitigation to comply with the NPPF, MKC's/BC's LTP4 and Local Plan policies
J6	A421 Bottle Dump Roundabout	No mitigation required as increase in RFC, queueing and delay is negligible	Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.
J7	A421 Whaddon Crossroads	No mitigation required as increase in RFC, queueing and delay is negligible	Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.
J8	A421 Buckingham Road/Warren Road	No mitigation required as increase in RFC, queueing and delay is negligible	Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.
J9	A421 Buckingham Road/ Shucklow Hill/Little Horwood Road	No mitigation required as increase in RFC, queueing and delay is negligible	Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.

Junction Number and Name		Having interpreted the results and the Local Plan evidence[34], is mitigation required to accommodate the residual cumulative impact of Proposed Development	Preferred Mitigation to comply with the NPPF, MKC's/BC's LTP4 and Local Plan policies
J10	A421 Buckingham Road/ Nash Road/Winslow Road	No mitigation required as increase in RFC, queueing and delay is negligible	Should BC or MKC establish that the previously agreed mitigation at this junction is still an appropriate and justified approach to address the impact of the Proposed Development, the Applicants would be willing to agree a suitable planning obligation to secure its delivery.
J11	Coddimoor Lane/Shenley Road/Stock Lane	No mitigation required as the there is no impact of development	
J12	Kingsmead Roundabout	No mitigation required as increase in RFC, queueing and delay is negligible	
J13	Westcroft Roundabout	No mitigation required as impact of the development is not material	
J14	Furzton Roundabout	No mitigation required as impact of the development is not material	
J15	A421 Bleak Hall Roundabout	Mitigation previously agreed. Potential further mitigation may be appropriate however the modelling results show disproportionate effects when the RFC is greater than 1.0. The Local Plan evidence highlights a problem at this junction with DoS on the approaches of northbound 104% AM, eastbound 104% AM, westbound 111% PM, and southbound 103% PM. The junction is over capacity in the base and with Local Plan development. No mitigation is proposed at the junction to account for Local Plan growth. The development should not be addressing problems created by Local Plan growth.	Lane width amendments as previous scheme or a proportionate, cost effective contribution towards MKC's Mobility Strategy 2036 to improve access to Central MK
J16	A421 Elfield Park Roundabout	Mitigation previously agreed. Potential further mitigation may be appropriate however the modelling results show disproportionate effects when the RFC is greater than 1.0. The Local Plan evidence highlights a problem at this junction in the base and with Local Plan development. No mitigation is proposed at the junction to account for Local Plan growth. The development should not be addressing problems created by Local Plan growth.	Minor kerb amendments to previous scheme or a proportionate, cost effective contribution towards MKC's Mobility Strategy 2036 to improve access to Central MK

Junction Number and Name		Having interpreted the results and the Local Plan evidence[34], is mitigation required to accommodate the residual cumulative impact of Proposed Development	Preferred Mitigation to comply with the NPPF, MKC's/BC's LTP4 and Local Plan policies
J17	A421 Emerson Roundabout	Mitigation previously agreed.	Minor kerb amendments to previous scheme or a proportionate, cost effective contribution towards MKC's Mobility Strategy 2036 to improve access to Central MK
J18	A421 Windmill Hill Roundabout	Yes	Minor kerb amendments or a proportionate, cost effective contribution towards MKC's Mobility Strategy 2036 to improve access to Central MK

8.4 TRAVEL PLAN

8.4.1. The Applicant is fully committed to the implementation of the Movement Strategy for the Proposed Development. At the heart of the strategy is the implementation, maintenance and monitoring of Travel Plans for all significant generators of traffic on Site, which are aimed at reducing traffic generated by the Proposed Development and increasing the use of sustainable travel modes.

8.4.2. The FTP submitted as part of the planning application includes details of the initial targets that will be set with regard to modal shift and details of the measures that will be put into place to achieve this modal shift. MKC, BCC and Highways England agreed to the contents of the FTP following the submission with the 2016 revision package.

8.4.3. An updated FTP is submitted with the updated planning submission to BC.

8.5 HIGHWAY SAFETY MITIGATION

8.5.1. Section 8.3 has proposed a package of mitigation at junctions across the study area to either increase capacity which will in turn reduce queueing and delay, or to improve sustainable travel options. The COBALT analysis in Section 7.6 has identified that the Proposed Development is likely to have a minor impact on collisions on the A421 Standing Way, B4034 Buckingham Road adjacent to the Site and V1 Snelshall Street.

8.5.2. It is proposed to reduce the speed limit on Whaddon Road in the vicinity of the Site access given the changing nature of the area upon completion of the Proposed Development. The reduction in speed limit should positively impact on the collision rate along the road and on the severity of injury.

8.5.3. The traffic calming scheme proposed for Whaddon Road and Newton Longville will not only act as a deterrent to traffic travelling through the village but will have the benefit of reducing the speed of traffic, which will reduce the risk of collisions. The broad detail of the traffic calming scheme proposed is included on the drawings contained in **Appendix AA**.

8.5.4. With the addition of the mitigation package it is considered that queueing and delay can be reduced, which will have a positive effect on the anticipated impacts on highway safety.

8.5.5. Overall, it is considered that following the implementation of the mitigation measures, the development proposals will not have a material impact on highway safety.

8.6 PUBLIC TRANSPORT MITIGATION

8.6.1. A comprehensive Public Transport Strategy has been developed that will provide either a new high frequency bus service or to enhance an existing bus service to serve the Site. The Strategy will be secured via a service level agreement through a S106 planning obligation and will more than accommodate demand for bus based public transport resulting from the Proposed Development and will also benefit the wider community as a whole.

8.7 WALKING AND CYCLING MITIGATION

8.7.1. The Proposed Development includes a package of measures to improve pedestrian and cycle infrastructure in the vicinity of the Site. These measures are outlined in **Figure 8.1** and include:

- A Grid Road Reserve;
- Resurfacing of Weasel Lane within the Site boundary;

- A contribution towards resurfacing of Weasel Lane from Whaddon Road to Weasel's Lodge;
- Resurfacing of Footpath NLO/19 within the site boundary;
- A contribution towards resurfacing of Footpath NLO/19 from the site boundary to Newton Longville;
- A new Toucan crossing on Buckingham Road to connect Weasel Lane with the Redway network;
- A new Toucan Crossing on Buckingham Road to connect the development Site with the Redway network at Tattenhoe Roundabout; and
- A new Pegasus crossing on Whaddon Road to connect the development with the Redway network at Bottle Dump Roundabout.

8.7.2. These improvements will provide significant pedestrian and cycle connectivity and safety enhancements to the local area that will accommodate the demand from the Proposed Development as well as benefitting the wider community.

8.8 CONSTRUCTION MITIGATION

8.8.1. A Construction Environmental Management Plan (CEMP) has been prepared to accompany the planning application. This outlines the measures and initiatives that will be considered to minimise the impacts of the construction phase on the environment including the transport network. Through the use of the CEMP it is considered that any impacts arising from the construction phase can be adequately managed and mitigated.

8.9 SUMMARY

8.9.1. This section has provided a summary of the mitigation package proposed to accommodate the Proposed Development on the transport network. A comprehensive package of measures is included across the various modes.

8.9.2. The likely residual cumulative effects of the Proposed Development following consideration of this mitigation package is considered in Section 9 of this TA.

9

RESIDUAL CUMULATIVE IMPACTS

9 RESIDUAL CUMULATIVE IMPACTS

9.1 INTRODUCTION

9.1.1. This Section of the TA considers the likely residual cumulative impacts of the Proposed Development on the highway network in the context of the requirements in the NPPF. NPPF states at paragraph 108(c) that any significant impacts from development on the transport network should be cost-effectively mitigated to an acceptable degree and paragraph 109 says that:

> *'Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.'*

9.1.2. In addition, Policy CT2 of Plan:MK states that development proposals will be permitted that:

> *'Integrate into our existing sustainable transport networks and do not have an inappropriate impact on the operation, safety or accessibility to the local or strategic highway networks.'*

9.1.3. This section focuses on highway impacts and does not consider impacts on other modes as these have been dealt with through the previous sections of the TA.

9.2 HIGHWAY SAFETY

9.2.1. The review of the existing collision record in the vicinity of the Site presented in Section 3 did not highlight any existing patterns or trends that could be exacerbated by the Proposed Development. A COBALT analysis was undertaken to identify any link across the study area where a significant impact on collisions and therefore safety would be likely to occur.

9.2.2. The COBALT analysis identified that the majority of the links across the study area would only see a negligible impact on collisions as a result of the Proposed Development. The links that showed a minor impact were:

- B4034 Buckingham Road (adjacent to the Site access);
- V1 Snelshall Street (north of the Tattenhoe Roundabout); and
- A421 Standing Way (between Tattenhoe Roundabout and Bleak Hall Roundabout).

9.2.3. A package of highway improvements is proposed at the junctions along these links that will increase capacity which will in turn reduce queueing and delay. Managing the demand of peak hour traffic will assist in minimising the likelihood of collisions and as such, the impact on highway safety in the future year 2033 would be not present any unacceptable impacts.

9.3 HIGHWAY CAPACITY

9.3.1. A highway capacity analysis has been undertaken at 18 off-Site junctions and two site access points across the study area agreed with BC and MKC. This analysis identified that the Site access points will both operate with satisfactory performance (RFC below 0.85) in the future assessment year considered. A further two junctions (Junctions 4 and 11) were found to operate with satisfactory

performance (RFC of less than 0.85) in all scenarios tested. At these four locations no material impacts were identified that require further consideration.

9.3.2. At the remaining 16 junctions careful consideration has been given to the requirement for mitigation in the context of paragraphs 54-56 and 108 of the NPPF, Plan:MK policies CT1 and CT2 and draft VALP policy T4, and whether, following inclusion of any mitigation, the residual cumulative impacts of the Proposed Development would be severe.

9.3.3. **Table 9.1** provides a summary of the likely residual cumulative impacts of the Proposed Development once consideration has been given to mitigation package proposed.

Table 9.1 – Highway Capacity Residual Cumulative Impact Review

Junction Number	Junction Name	Authority	Summary	Method of securing mitigation
J1	B4034 Buckingham Road/Sherwood Drive/Water Eaton Road	MKC	A package of mitigation in this location that includes traffic signals has been identified that would provide some improvement. Plan:MK identifies capacity concerns at this location but does not provide any mitigation solutions. A combined package of mitigation is therefore required in this location to address not just the impacts of the Proposed Development but other planned growth in the area. In combination with other planned growth across Milton Keynes and beyond, the residual cumulative impacts of the Proposed Development are not considered to be severe.	S106
J2	B4034 Buckingham Road/Shenley Road/Newton Road	MKC	The impact of the development in this location is negligible and the provision of any mitigation would be disproportionate to the impacts identified.	N/A
J3	Bletchley Road/Stoke Road/Drayton Road/Whaddon Road	BC	The provision of the previously agreed s106 obligation to secure a traffic calming scheme within Newton Longville is considered appropriate to mitigate the residual cumulative impacts of the development in this location.	S106
J4	Whaddon Road/Westbrook End	BC	The impact of the development in this location is negligible and the provision of any mitigation would be disproportionate to the impacts identified.	N/A
J5	A421 Tattenhoe Roundabout	MKC	A package of mitigation in this location that includes peak hour traffic signals and widening on the Snelshall Street and Buckingham Road arms has been identified that would provide some improvement. Plan:MK identifies capacity concerns at this location but does not provide any mitigation solutions. A combined package of mitigation is therefore required in this location to address not just the impacts of the Proposed Development but other planned growth in the area. In combination with other planned growth across Milton Keynes and beyond, the residual cumulative impacts of	S106

Junction Number	Junction Name	Authority	Summary	Method of securing mitigation
			the Proposed Development are not considered to be severe.	
J6	A421 Bottle Dump Roundabout	MKC	The provision of the previously agreed kerb amendments is not considered necessary to mitigate the residual cumulative impacts of the development in this location; however, the Applicant would agree to a planning obligation if BC/MKC establish that this is appropriate.	S278
J7	A421 Whaddon Crossroads	BC	The provision of the previously agreed kerb amendments with appropriate refinements as identified in this TA is considered appropriate to mitigate the residual cumulative impacts of the development in this location.	S278
J8	A421 Buckingham Road/Warren Road	BC	The provision of the previously traffic signals are not considered necessary to mitigate the residual cumulative impacts of the development in this location, however the Applicant would agree to a planning obligation if BC/MKC establish that this is appropriate.	S106
J9	A421 Buckingham Road/Shucklow Hill/Little Horwood Road	BC	The provision of the previously agreed traffic signals are not considered necessary to mitigate the residual cumulative impacts of the development in this location, however the Applicant would agree to a planning obligation if BC/MKC establish that this is appropriate.	S106
J10	A421 Buckingham Road/Nash Road/Winslow Road	BC	The provision of the previously agreed kerb amendments is not considered necessary to mitigate the residual cumulative impacts of the development in this location; however, the Applicant would agree to a planning obligation if BC/MKC establish that this is appropriate.	S106
J12	Kingsmead Roundabout	MKC	The impact of the development in this location is negligible and the provision of any mitigation would be disproportionate to the impacts identified.	N/A
J13	Westcroft Roundabout	MKC	The impact of the development in this location is negligible and the provision of any mitigation would be disproportionate to the impacts identified.	N/A
J14	Furzton Roundabout	MKC	The impact of the development in this location is negligible and the provision of any mitigation would be disproportionate to the impacts identified.	N/A
J15	A421 Bleak Hall Roundabout	MKC	A package of mitigation in this location that includes the previously agreed kerb amendments with appropriate refinements has been identified that would provide some improvement. Plan:MK identifies capacity concerns at this location but does not provide any	S106

Junction Number	Junction Name	Authority	Summary	Method of securing mitigation
			mitigation solutions. A combined package of mitigation is therefore required in this location to address not just the impacts of the Proposed Development but other planned growth in the area. In combination with other planned growth across Milton Keynes and beyond, the residual cumulative impacts of the Proposed Development are not considered to be severe.	
J16	A421 Elfield Park Roundabout	MKC	A package of mitigation in this location that includes the previously agreed kerb amendments with appropriate refinements has been identified that would provide some improvement. Plan:MK identifies capacity concerns at this location but does not provide any mitigation solutions. A combined package of mitigation is therefore required in this location to address not just the impacts of the Proposed Development but other planned growth in the area. In combination with other planned growth across Milton Keynes and beyond, the residual cumulative impacts of the Proposed Development are not considered to be severe.	S106
J17	A421 Emerson Roundabout	MKC	The provision of the previously agreed kerb amendments with appropriate refinements as identified in this TA is considered appropriate to mitigate the residual cumulative impacts of the development in this location.	S106
J18	A421 Windmill Hill Roundabout	MKC	The provision of kerb amendments as identified in this TA is considered appropriate to mitigate the residual cumulative impacts of the development in this location.	S106

9.3.4. **Table 9.1** identifies that with the inclusion of the mitigation measures proposed, the residual cumulative impacts of the development are not considered to be severe. At junctions 1, 5, 15 and 16 it is considered that an appropriate package of mitigation that addresses the impacts of wider growth across the area is required and therefore the Proposed Development could either provide the package of measures suggested or provide a proportionate, cost effective contribution commuted towards MKC's Mobility Strategy 2036 to improve accessibility to Central Milton Keynes, Bletchley and the railway stations.

9.4 SUMMARY

9.4.1. This Section has provided a summary of the mitigation package to accommodate the Proposed Development on the highway network and consideration of whether the residual cumulative impacts would be severe in the future year 2033.

9.4.2. Overall, it is considered that with the implementation of the proposed mitigation package which may include a proportionate, cost effective contribution commuted towards MKC's Mobility Strategy 2036 the residual cumulative impacts of the Proposed Development on the road network would not be severe.

10

SUMMARY AND CONCLUSION

10 SUMMARY AND CONCLUSION

10.1 SUMMARY

10.1.1. WSP has been appointed by the South West Milton Keynes Consortium (The Applicant) to provide transport advice for a residential led mixed-use development (the 'Proposed Development') on land referred to as South West Milton Keynes (the 'Site').

10.1.2. Planning permission for the Proposed Development was originally sought in 2015 from both Aylesbury Vale District Council (AVDC) (15/00314/AOP) and Milton Keynes Council (MKC) (15/00619/FUL). Since then discussions with both authorities continued and in July 2017 AVDC resolved to grant planning consent subject to the signing of the S106 Agreement. Negotiations have progressed well between all parties to finalise the S106 agreement, although the document has not yet been completed, it is in an advanced position. The duplicate planning application made to MKC was subsequently refused planning permission in November 2019. The single reason for refusal referred to the traffic impacts of the development, notwithstanding the recommendation by planning and highway officers that there were no highway grounds for refusing permission and that permission should be granted.

10.1.3. This TA has been prepared to update the transport evidence base associated with the planning applications prepared in 2015 and subsequently updated in August 2016.

10.1.4. Pre-application scoping discussions were held with Buckinghamshire Council (BC) and MKC and the scope of this TA accords with the methodology agreed with both parties.

10.1.5. A review of planning policy at a national, regional and local level relevant to this TA has been undertaken. This identifies that the development accords with a range of policies at the various levels of policy available and that this TA has been prepared in accordance with best practice guidance.

10.1.6. The Site is located adjacent to A421 providing strategic connections towards Milton Keynes and M1 in the east and Buckingham and M40 in the west. There is an existing network of footways, public rights of way and cycle routes that pass adjacent to and through the Site. Milton Keynes includes a range of facilities and amenities that are within reasonable walking and cycling distance of the Site. Overall the Site is well located to make best use of existing infrastructure provision.

10.1.7. A review of highway safety in the vicinity of the Site indicates that whilst a number of collisions have occurred across the study area, there are no particular patterns/trends that the Proposed Development will materially impact.

10.1.8. The Proposed Development includes the provision of up to 1,855 dwellings (including up to 60 extra care units), an employment area, neighbourhood centre, a primary school and a secondary school. Accompanying the Proposed Development are comprehensive public transport, walking and cycling strategies to create a sustainable development that encourages travel by non-car modes. A separately prepared Framework Travel Plan (FTP) includes further measures to encourage travel by non-car modes.

10.1.9. The access strategy proposed has been designed to ensure a permeable development that allows traffic to distribute across a variety of routes.

10.1.10. A multi-modal trip generation has been prepared for the Proposed Development based upon information from the industry standard TRICS database and a series of assumptions that have been agreed with BC and MKC.

10.1.11. A comprehensive data collection exercise was undertaken in February 2020 to inform this TA. The data collection exercise was completed prior to any travel restrictions being introduced by the UK government associated with the Covid-19 Pandemic. The dataset collected therefore represents a robust snapshot of traffic conditions at that time and forms the base from which the highway network assessment contained within this TA has been undertaken.

10.1.12. A worst case assessment of the transport network has been undertaken that considers the impacts of the development on all modes during both the construction and operational phases of the Proposed Development. Furthermore, due consideration has been given to impacts on surrounding villages, highway safety and the strategic road network.

10.1.13. The results of the highway network assessment based on 'static' modelling of 18 junctions remote from the Site and two Site access points, identified that the Proposed Development would potentially have an impact across the study area.

10.1.14. A package of off-Site highway measures has been developed to mitigate the impact of the Proposed Development on the local highway network. At some locations, where there is significant background traffic growth due to planned development in 2033, the benefit of the proposed mitigation is more limited. However, at these locations, the impacts of wider growth in the area must also be considered and an appropriate solution identified. A proportionate, cost effective contribution towards the MK Mobility Strategy 2036 in lieu of physical improvement works at junctions would therefore contribute towards a more holistic and sustainable transport solution to be implemented by MKC.

10.1.15. Overall, the residual cumulative impacts of the development are not considered to be severe and paragraph 109 of the NPPF therefore indicates that permission should not be refused on highway capacity grounds.

10.1.16. The transport evidence that supports the Draft VALP and Plan:MK indicates that there would be general increases in congestion on routes including the corridor of A421. Notwithstanding, the mitigation scenario results from the impact analysis contained within this TA largely correlate with the Local Plan evidence that supports both Plan:MK and the Draft VALP, but disproportionately identify the cumulative impact at specific junctions in 2033 due to the nature of the adopted static modelling methodology, which makes no allowance for the redistributive effect that would be derived from a more strategic modelling tool.

10.1.17. The Inspector presiding over the Draft VALP Examination in Public (EiP) reported that Aylesbury Vale District Council (now BC) was required to increase allocations for housing in close proximity to Milton Keynes. As a result, AVDC included a Main Modification to the VALP to allocate further development along the corridor of A421 at Shenley Park, given the Inspector's suggestion that the location was appropriate for further development.

10.1.18. A review of highway safety identified that the Proposed Development could have an impact on a small number of links surrounding the Site. However, once consideration had been given to the proposed mitigation measures, this impact was not considered to be material and would be acceptable in accordance with paragraphs 108 and 109 of the NPPF, policy CT2 of Plan:MK and policy T4 of the Draft VALP.

10.1.19. The impact on public transport, walking and cycling has been considered in this TA. In the context of the proposed strategies, that will also contribute towards delivering wider community benefits, there are no material impacts envisaged in the future year 2033.

10.2 CONCLUSION

10.2.1. Overall it is considered that the Proposed Development is compliant with a range of national and local policies including the NPPF, the draft allocation for the Site in the Vale of Aylesbury Local Plan and with policies CT1 and CT2 of Plan:MK. Subject to the implementation of a comprehensive package of mitigation measures, the residual cumulative impacts of the Proposed Development would not be severe and there would be no unacceptable impacts on highway safety and as such, there would be no impediments on transport grounds to the grant of planning permission.

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