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Date: 13th April 2021
Your ref: 15/00314/AOP

Sent to: devcontrol.av@buckinghamshire.gov.uk

Dear Sirs,

Re: South West Milton Keynes, Updated Transport Assessment
Location: Land South Of The A421 West Of Far Bletchley North Of The East West Rail Link And East Of Whaddon Road Newton Longville
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; 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.

Thank you for your letter dated the 8th July 2020 in which you requested comment for the above application.

The planning application was originally submitted in 2015 and was supported by a Transport Assessment undertaken by Pell Frischmann on behalf of the South West Milton Keynes Consortium, dated January 2015. Buckinghamshire County Council raised several concerns with the Consortium regarding the methodology of the assessment, including the appropriateness of Milton Keynes Traffic Model (MKTM) to assess the traffic impact within Buckinghamshire and the scope of the study area within Buckinghamshire.

Mouchel transport consultancy were appointed by the Consortium to agree a methodology for progressing transport and highway matters resulting in a revised Transport Assessment, submitted in September 2016. The revised Transport Assessment supersedes the original Transport Assessment and had been compiled following extensive discussions with Highways England, Milton Keynes Council and Buckinghamshire County Council.

Highway Authority comments were provided on the 28th April 2017 and the application initially considered at the Strategic Development Management Committee (SDMC) on 7th June 2017. Members, at their meeting resolved that the application be deferred and delegated to officers for approval subject to the completion of a legal agreement and appropriate conditions. Following the resolution to grant permission taken at the Committee meeting, Officers engaged in ongoing negotiations in relation to the S106. The application was subsequently reported back to SDMC on 24th April 2019 to update members on the latest position on the S106. The update Committee report set out that the Council were satisfied that sufficient justification had now been provided to secure the contribution towards secondary health care at MK University Hospital. The report also set out that the changes in circumstances since the application was considered by Committee could not justifiably alter the conclusion that the proposals constitute a sustainable and acceptable development.

Since the resolution was taken at the Committee meeting in April, the applicants have submitted a package of updated documents and associated plans proposing amendments to the scheme. This is

included a revised Transport Assessment and Framework Travel Plan (May 2020), the scope of the revised TA was discussed and agreed between the Applicants and representatives of both Buckinghamshire Council (BC) and Milton Keynes Council (MC) with Buckinghamshire Council providing final agreement on 20th February 2020. Two Technical Notes were further submitted ahead of submission of the revised TA for Trip Generation and Trip Distribution. The Trip Generation Note was accepted by BC on 26th March 2020 and MKC confirmed acceptance on 7th April 2020 in email sent by their representative Nigel Weeks Stirling Transport. The Trip Distribution Note was submitted for review on 26th March 2020 and MKC emailed acceptance of the methodology on 7th April 2020 by Nigel Weeks. BC raised several comments in a series of emails on review of the revised TA it was noted that some of these comments had not been addressed and were subject to further discussion. Initial Highway comments were provided on 29th July which in turn led to a further Technical Note (TRN1) submitted in September 2020. Further comments were provided on the TRN1 on 2nd October 2020 with a further Technical Note TRN2 submitted in December 2020 and TRN3 in January 2021 with further clarification letters provided by the Applicant. The following comments are based on the revised May 2020 submission along with TRNs 1 to 3:

1. Trip Generation

The trip generation methodology used has been to identify person trip rates for each land use and apply appropriate mode shares. The agreed Trip Generation is detailed in TRN2 and incorporated comments received from Buckinghamshire Council in relation to trip diagram discrepancies and the use of higher employment trip rates to ensure a robust assessment.

(i) Residential Trips

The residential land use will consist of up to 1,855 dwellings including up to 60 extra care units. The TRICS trip generation database was interrogated to identify trip rates with the category 'Private Houses' selected to reflect the likely mix of dwellings proposed on the Site. Buckinghamshire Council requested further details of the trip rates for the care units to ensure that the 'Private Houses' trip rates were suitable for this alternative dwelling type. TRN1 provided additional data and confirmed that care unit homes have a lower trip rate, and therefore the use of the 'Private Houses' rate for all dwellings provides a robust assessment. Comparison of the TRICS categories are provided below.

Trip Type	AM Peak (08:00- 09:00)	PM Peak (17:00-18:00)
Care Home Person Trip Rate	0.287	0.312
Residential Trip Rate (from updated TA)	0.994	0.878
Difference	0.707	0.566

The AM and PM peak trip rates (per dwelling) were extracted from TRICS and applied to the dwellings to derive the resultant trips shown in the table below.

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

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. This methodology utilised National Travel Survey (NTS 0502) data which identified journey purpose by time of day.

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.

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.

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

The trip generation for each mode share were calculated and then combined to provide the overall external to development residential land use trip generation.

The residential trip generation uses the industry standard TRCIS rates for the proposed land uses. The disaggregation of trips to journey purpose and reduction for internal trips is an acceptable method and provides a robust and representative methodology for determining trips for a development of this size and its location.

(ii) Employment Trips

For employment trips 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, which is the most representative land use. The trip rates were extracted, and the resultant generation determined by the predicted number of jobs.

Buckinghamshire Council raised an issue with the projected number of jobs within the development (895 in the May 2020 TA), as this was a change in the number of jobs from those previously agreed as part of the scoping process which resulted in significant reduction of employment trips. Buckinghamshire Council requested that the number of jobs assumed in the highway network assessment increased to 1021 on the basis of 929 jobs plus a 10% buffer, which accounts for the smallest floorspace area per employee ratio rather than a median point within the floorspace range within the Employment Assessment, and would provide a robust assessment. The new employment trips were included in the revised assessment as detailed in TRN1.

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. 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.

The employment trip generation uses the industry standard TRCIS rates for the proposed land uses. The disaggregation of trips to journey purpose and reduction for internal trips is an acceptable method and provides a robust and representative methodology for a development of this size and its location.

(iii) Education Trips

The assumptions around education trips are the same as those agreed for the 2016 TA, which were derived following discussions with then Buckinghamshire County Council's education department. The results of which were that the primary education trips are likely to be predominantly internal trips within the site and would therefore not impact on the external road network.

The secondary school trip generation was derived using the previously agreed external vehicular trip generation from the August 2016 TA, as shown below in the table below.

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

The Secondary School vehicular trip generation was then factored up to represent an all mode trip generation. The staff all mode trip generation was then based 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.

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. For staff trips, 20% were then assumed to be internalised and 50% of the student trips were internalised. The resultant combined external staff and pupil external all mode trip generation for the secondary school is presented below.

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

The resultant external school trips are based on previous agreements and detailed discussions and are still considered an appropriate methodology to provide a robust trip generation value.

(iv) Neighbourhood Centre Trips

The neighbourhood centre is proposed to serve the needs of the Proposed Development and as such will not have an external trip generation, other than servicing trips.

(v) 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, which was agreed as part of the scoping study. This was considered an appropriate methodology to determine Service trio rates.

(vi) Total Development Trips

The Proposed Development total trip generation is a combination of all the proposed land uses which includes external residential, employment and secondary education trips. This provided the total development trips as outlined in the table below, which includes the increase in employment trips as requested by Buckinghamshire Council. On review of TRN1 discrepancies were noted in the traffic flow diagrams between the number of trips as detailed in the table below and within the flow diagrams, these were updated and the discrepancies resolved in TRN2 and TRN3.

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	161	53	215	66	41	106
Taxi	6	9	15	10	8	18
Motorcycle	6	9	15	10	8	18
Car Driver reduced to account for servicing trips	530	729	1257	806	576	1382
Car Passenger	134	63	198	77	55	132
Cycle	19	18	37	22	16	38
Pedestrian	135	45	180	53	47	100
Servicing	19	15	34	9	9	18
Total – Person Trips	1010	940	1950	1053	759	1812
Vehicular Total – (sum of Taxi, Motorcycle and Car Driver and servicing)	563	763	1325	838	602	1440

All the trip generation has been derived using industry standard TRICS database or on previously agreed assumptions that are still considered valid. The overall trip generation methodology is considered to be appropriate and thereby provides a robust assessment for the development.

(vii) Construction Traffic:

The impact of the trips generated by construction traffic during the build out of the development have been calculated within the Environment Statement. The Applicant has provided a number of assumptions in relation to construction activity that have been used to develop a profile of the likely construction traffic trip generation with a summary detailed in the table below.

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

It is considered that the flows provided for construction traffic are acceptable and developed in line with best practice and would provide the basis for a robust assessment.

2. Trip Distribution

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

- residential trip distribution
- employment trip distribution

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 process for deriving the two trip distributions is provided below.

(i) Residential Distribution

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. 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.

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. 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.

(ii) Employment Distribution

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).

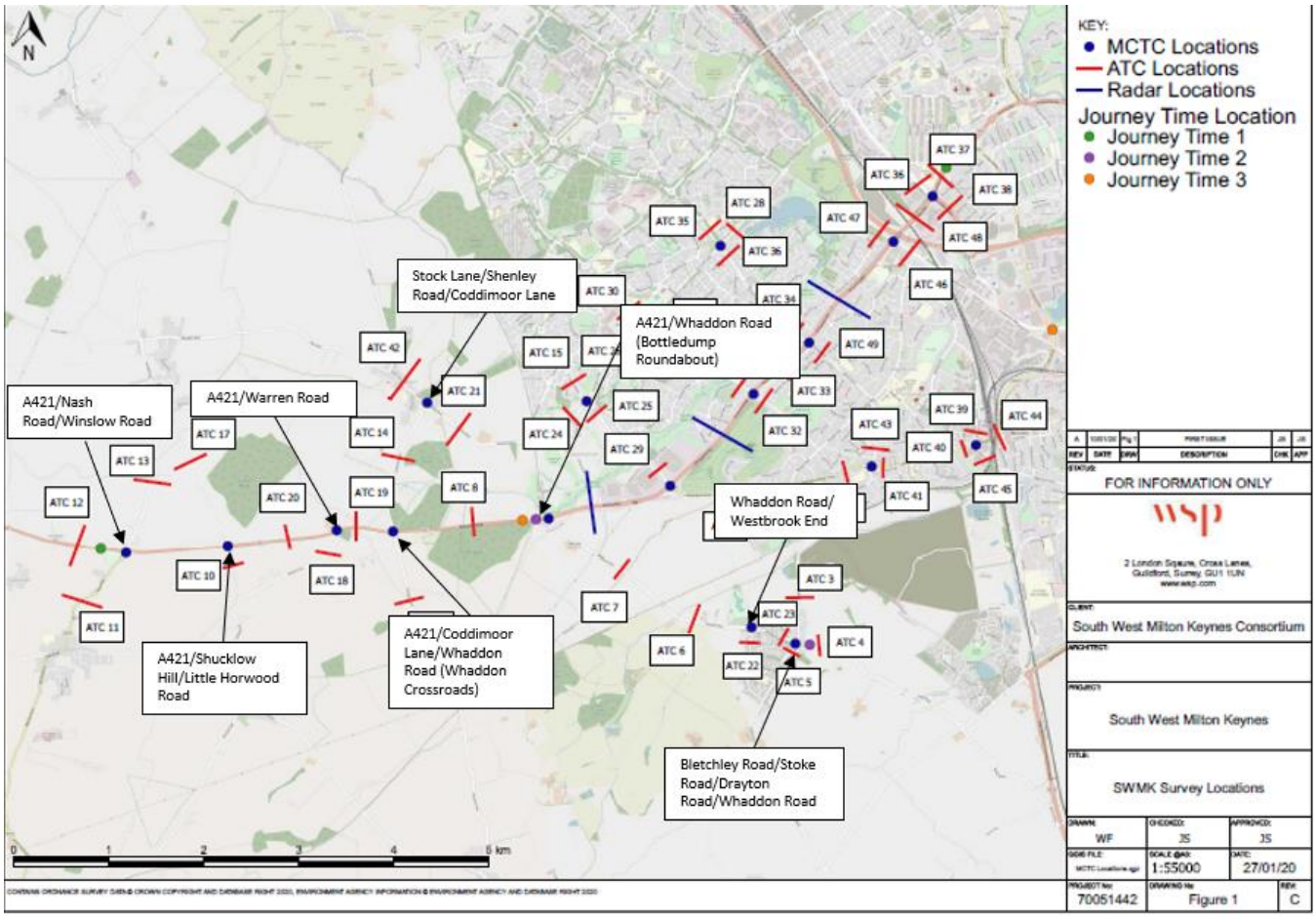
(iii) Study Area

Traffic flow diagrams were created that represented the study area for the TA. This study area included 18 off-Site junction locations, eight of which are fully or partially within Buckinghamshire border, where it had been agreed as part of the scoping process that capacity assessments would be required. 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. 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.

Buckinghamshire Council requested a change in both employment and residential trip generation to that shown in the May 2020 TA, to better reflect potential trips within Buckinghamshire. This was addressed in TRN1 with a revised distribution assigned to the network. The use of census data to determine travel patterns from the adjacent areas to determine likely movements to and from the development, along with the use of an online journey planner to determine likely routes is considered and appropriate methodology for determining distribution and provides a robust assessment.

3. Traffic Surveys

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 at the sites shown in the image below:



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.

The scope and location of the surveys were agreed with Buckinghamshire Council and MKC prior to being commissioned. Whilst concerns have been raised by objectors regarding the validity of the surveys, including that the surveys were not conducted within neutral months, the Highway Authority is satisfied that surveys have been carried out in accordance with best practice and the 2020 base data is robust. To this end further analysis was conducted of the survey performed in February 2020 and the permanent traffic counter on the A421 to the west of the Bottledump roundabout and one of the new survey ATC sites.

The average two-way flow on A421 Standing Way was reviewed for the period from 0800 - 0900 by month for 2017 to 2019 period and this was compared to an average neutral month across the period. The average two-way traffic flow on the A421 between 08:00 and 09:00 across the neutral months (March to November, excluding August) is 2,404 vehicles. In February, the average flow is 2,372, 32 vehicles less than the average for the neutral month. The same exercise has been undertaken for the 17:00-18:00 hour period, this showed that the average two-way traffic flow on the A421 between 17:00 and 18:00 across the neutral months is 2,501 vehicles. In February, the average flow is 2,394, 89 vehicles less than the average for the neutral month. This indicates that traffic through the month of February is comparable to neutral months.

4. Forecast Year

A future forecast year of 2033 was agreed between Buckinghamshire Council, Milton Keynes Council, and the Applicant as this should coincide with the full occupation and the end of the current VALP assessment period. To assess the impact within Buckinghamshire and Milton Keynes and establish a forecast year, use has been made of the Trip End Model Presentation Programme (TEMPro). The is an industry standard tool used to estimate traffic growth. The NTM dataset AF09 was used to establish an NTM adjusted local traffic growth factor, between the base year 2020 and the forecast year of 2033.

For the purposes of this assessment, the geographic area of Milton Keynes was selected and growth factors for car driver trips selected and agreed with Buckinghamshire Council. The use of Milton Keynes growth factor was considered appropriate to provide a consistent value across the combined authority network, furthermore the growth values are higher than the geographical area of 'rural (Aylesbury Vale)' and provides a robust assessment. Adjustments have been made to take account of local planning assumptions, which were agreed with the Highway Authority.

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

The high growth rate, adjusted for local planning factors, is assumed to accommodate the future developments in the local area over the assessed period. The planning factors have been reviewed and the Highway Authority is satisfied that this adequately captures minor developments in the area.

5. Scenario Testing

To determine the impact of the Proposed Development on the highway network, the roads and junctions in the vicinity of the site were tested against three development scenarios. The purpose of scenario testing is to determine the level of impact considering external factors including background growth on the highway network and other committed developments in the surrounding area.

Buckinghamshire Council requested 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 Framework Travel Plan are established through a separate sensitivity test. In addition, at the request of Buckinghamshire Council, the neighbouring draft allocation site at Shenley Park was also considered within a separate sensitivity test. This resulted in the following scenarios being used for assessment purposes:

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

These scenarios were agreed with Buckinghamshire Council and Milton Keynes Council. The exclusion of travel planning measures in the Do Something 1 results in a robust worst-case scenario and Buckinghamshire Council are satisfied that this scenarios tested provide a robust assessment of the impact on the surrounding network.

6. Committed Developments

It was agreed with the Applicant 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 and are included in the future year scenarios

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 for this development assessment.

- Both Tattenhoe Park and Kingsmead South are currently under construction with a proportion of each development already completed and occupied. The data collection exercise completed in February 2020 is therefore likely to include some existing development traffic and therefore it was agreed that it would not be appropriate to add the full development quantum associated with the developments 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. 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.
- Relevant trip rates were applied to the outstanding dwellings and distributed across the highway network study area using the same distribution as that derived for the residential land

Buckinghamshire Council are satisfied that this approach adequately captures the major committed developments in the area.

7. Access Strategy

There are three points of access from the development onto the local highway network at the following locations:

- Whaddon Road
- Buckingham Road
- A421 Standing Way

The access onto Whaddon Road falls within the jurisdiction of Buckinghamshire highway authority, whilst the A421 Standing way access point joins the highway network controlled by Milton Keynes Council. The Buckingham Road access joins the existing public highway controlled by Milton Keynes Council, but the majority of the new layout is located within Buckinghamshire.

Three access points were selected to distribute traffic onto the local highway network and provide route choice options for new residents of the proposed development. The internal road layout will however need to be designed to discourage through trips (rat running through the development). This will need to be addressed, using principles from Manual for Streets, as part of any future reserved matters application.

(i) Buckingham Road Access:

The original Transport Assessment proposed a signalised gyratory arrangement. Both Milton Keynes Council and at the time Buckinghamshire County Council raised concerns regarding introducing traffic signals in this area as well as the complex arrangement, which could be confusing for drivers.

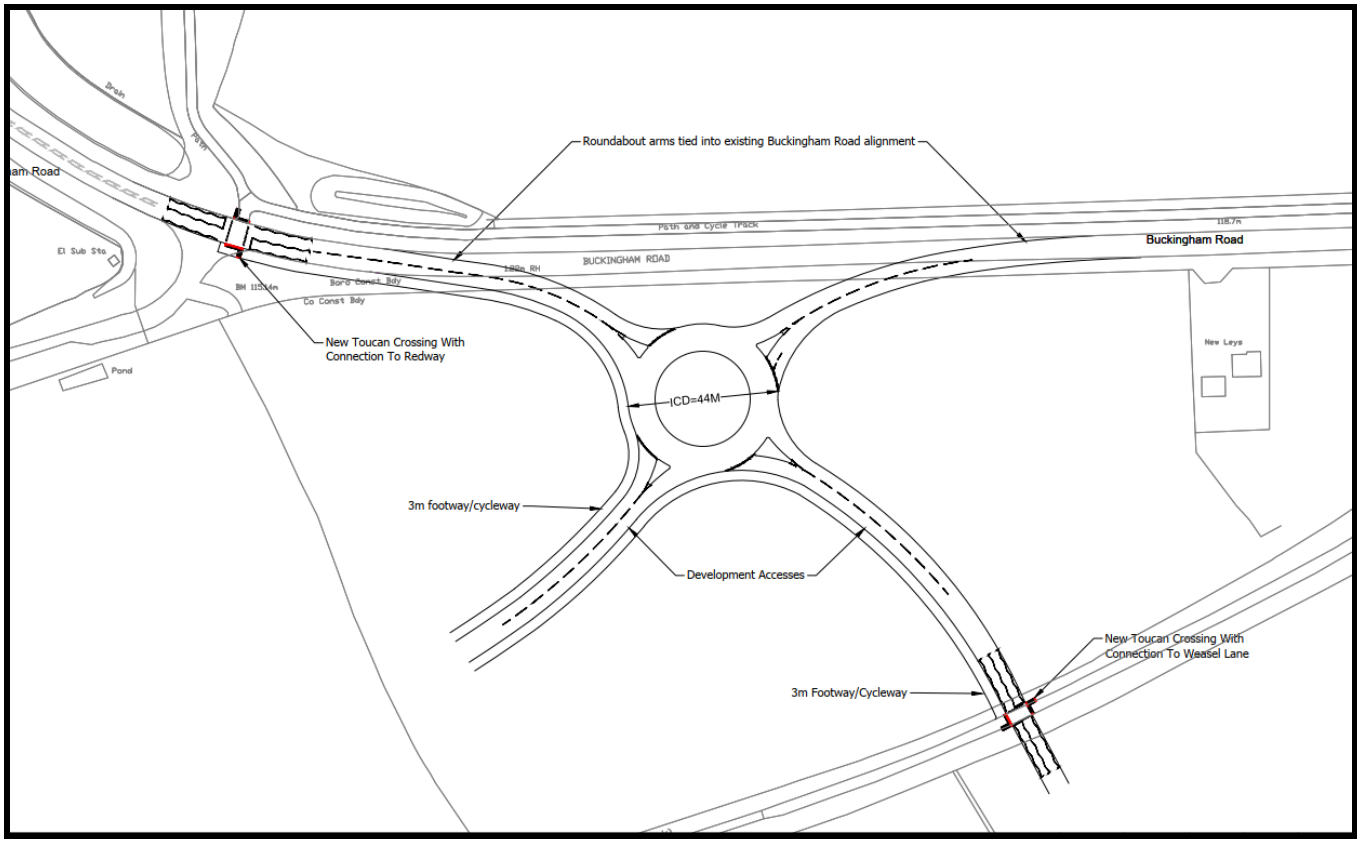
A new four arm roundabout junction has been proposed, encompassing two new site roads. The existing Redway on the northern side of Buckingham Road is to remain and a 3m shared footway is proposed on the southern arms of the junction into the site. Toucan crossings are proposed on the western arm between the new roundabout and Tattenhoe Roundabout and where the new road crosses Weasel Lane, providing safe crossing facilities to the wider pedestrian and cycle network.

During the planning application determination period, and subsequent to agreement of the layout with BC (Buckinghamshire Council) and MKC, revisions were undertaken at the request of BC to provide minor lane marking improvements. These revisions were shown on Drawing 0017D and it is this revision that BC recommend being taken forward.

The Buckingham Road access junction has been modelled using industry standard software Junctions 9 (ARCADY), as set out in TRN2. The results of the assessment show that the junction operates within capacity in both the AM and PM peaks in the 2033 Do Something 1 and 2033 Do Something 3 scenarios, in particular the current free flowing sections of Buckingham Road are predicted to have at maximum 11 seconds of delay.

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Something 1						
Buckingham Road S	0.7	4.2	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	7.66	0.5	0.7	6.45	0.4
Buckingham Road N	1.3	6.54	0.56	2.4	9.91	0.72
2033 Do Something 2						
Buckingham Road S	0.7	4.1	0.4	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	0.4	0.4	5.62	0.31
Buckingham Road N	1.2	6.18	0.54	2	8.43	0.67
2033 Do Something 3						
Buckingham Road S	0.7	4.28	0.43	1.5	6.64	0.6
Access SW	0.2	4.54	0.15	0.2	5.75	0.15
Access NW	1	7.9	0.51	0.7	6.85	0.41
Buckingham Road N	1.6	7.35	0.61	2.8	10.68	0.74

Furthermore, the design of the junction does not impede the ability of either Council to deliver the Grid Road if required in the future. Whilst the modelling demonstrates that there is junction capacity available in its current form to accommodate changes to the network, additional land which can be secured by S106 Agreement, as part of the Grid Road reserve, to ensure that amendments to this junction can be carried out in the future.



An independent Stage 1 Road Safety Audit has been undertaken and Buckinghamshire Council is satisfied that the problems identified can be resolved during detailed design. The current design as shown in the May 2020 TA shows wide single lane entry approaches on Buckingham Road East, Buckingham Road West and the eastern Site Access. For these arms of the roundabout to work effectively, as modelled, they should be widened to two lane approaches capable of accommodating 2-3 cars. Furthermore, to improve circulation of the roundabout the diameter of the central island should be reduced. This is achievable within the limits of the highway and land within the applicant's control and can be secured by way of a condition revisions were undertaken at the request of BC to provide

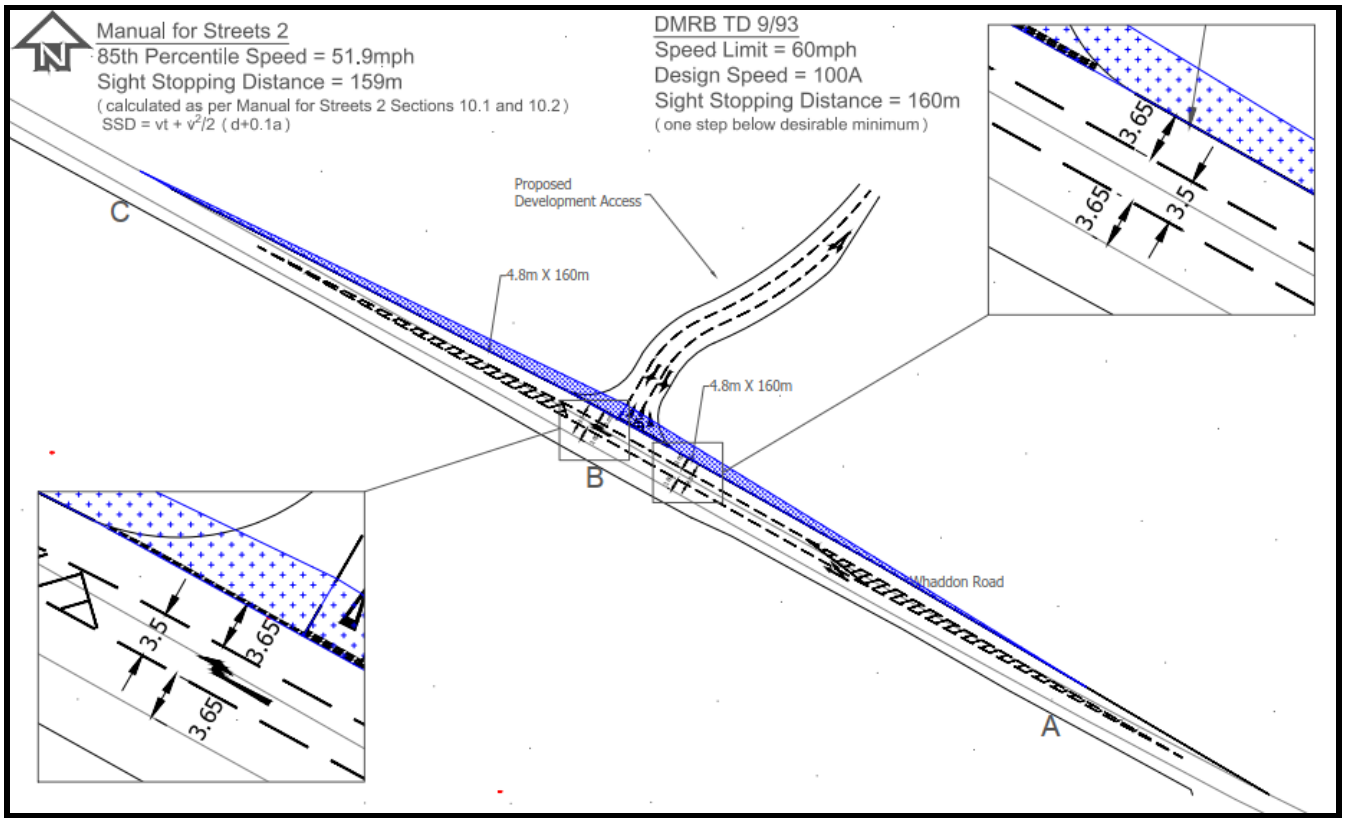
minor lane marking improvements, as shown on Drawing 0017D. This version would be required to be taken forward to detailed design.

(ii) Whaddon Road Access:

The proposed access at Whaddon Road is a ghosted right turn priority junction. Speed surveys were completed on Whaddon Road in June 2015 and the design of the junction ensures that appropriate visibility in both the horizontal and vertical planes can be achieved based on requirements set out in Manual for Streets 2 and DMRB.

An independent Stage 1 Road Safety Audit was carried out on the Whaddon Road access and the design has been amended to address the problems raised, including the extension and provision of a longer flare length (within the site) to accommodate peak hour demand for vehicles leaving the site.

The Stage 1 Road Safety Audit did raise concerns regarding the conspicuity of the junction to approaching road users. Whilst the Applicant has demonstrated that the required visibility splays can be achieved both in the horizontal and vertical planes, the Highway Authority is of the view that further design features are necessary including but not limited to, signs, lines and coloured surfacing. A review of the collision record along Whaddon Road has shown that the majority occur within the hours of darkness, as such the provision of lighting on approach and at the junction should be considered. Furthermore, a speed limit reduction on Whaddon Road should be investigated, given the recorded 85th percentile speeds and the change in character that would result from the development. The Highway Authority is content that these can be secured by way of a condition.



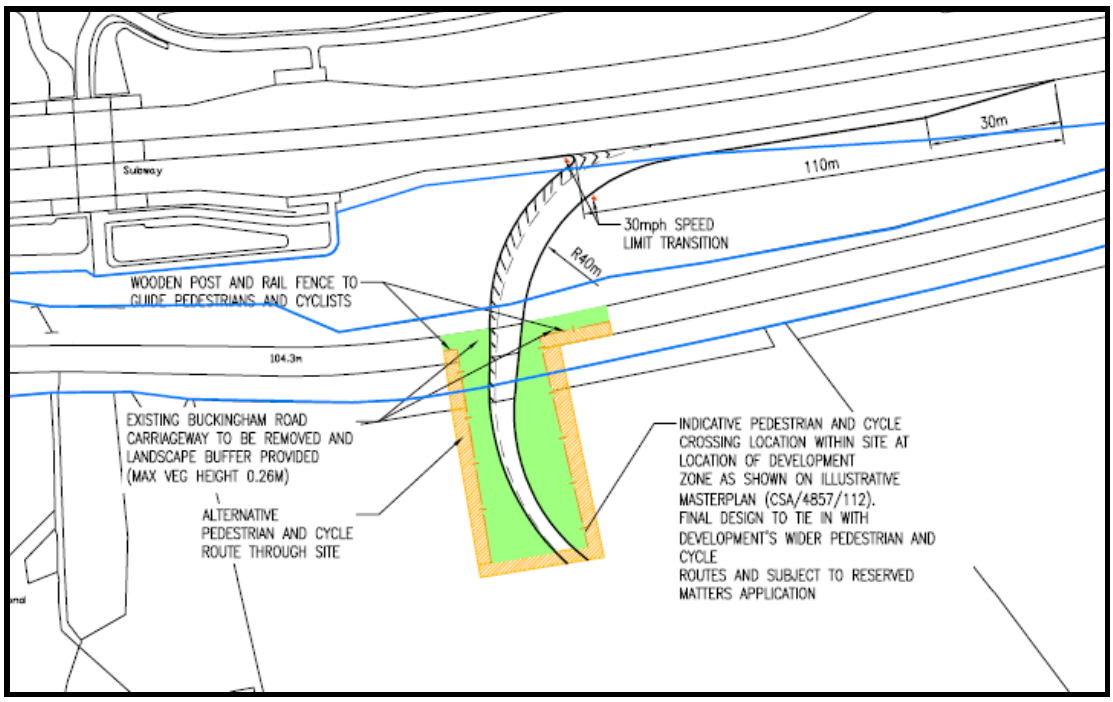
The Whaddon Road access junction has been modelled using industry standard software Junctions 9 (PICADY), as set out in TRN2. The results of the assessment show that the junction operates within capacity in both the AM and PM peaks for all the modelled scenarios with minimal queuing and delay expected, significant spare capacity is present to cater for possible increases in flow.

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	5.89	0.1	0.1	5.82	0.08
Site Access to Whaddon Road (N)	0.5	10.71	0.33	0.2	9.05	0.19
Whaddon Road (S) to Site Access	0.1	6.34	0.09	0.1	6.95	0.12
2033 Do Something 2						
Site Access to Whaddon Road (S)	0.1	5.74	0.08	0.1	5.61	0.07
Site Access to Whaddon Road (N)	0.4	9.88	0.28	0.2	8.42	0.15
Whaddon Road (S) to Site Access	0.1	6.28	0.08	0.1	6.48	0.1
2033 Do Something 3						
Site Access to Whaddon Road (S)	0.1	5.97	0.1	0.1	5.76	0.08
Site Access to Whaddon Road (N)	0.5	11.05	0.34	0.2	8.97	0.19
Whaddon Road (S) to Site Access	0.1	6.41	0.09	0.1	6.64	0.11

(iii) A421 Standing Way

The design of the access from A421 Standing Way is in the form of a left in only junction and falls within Milton Keynes Council's jurisdiction. It should however be noted that Buckinghamshire Council does not have any objections in principle to the proposed access arrangement, noting that the junction has been designed in accordance with relevant design standards. Buckinghamshire Council did raise concern over how the access will interact with the Old Buckingham Road alignment, which is used by pedestrian and cyclists, and potentially the same user groups from the development will also make use of the route. It was considered that measures would be needed to ensure safe crossing movements for non-motorised user with potential high vehicle speeds (relative) on exiting the bend of the new access and restricted intervisibility.

In TRN1 the applicant provided an arrangement to manage the potential interaction with Old Buckingham Road, replicated below. The arrangement would enable pedestrians and cyclists to divert further into the Site and to cross the proposed road access safely. Whilst this design provides a less direct route, it does in principle provide a safer crossing location with lower vehicle speeds. The set-back crossing also reduces the potential environmental impact of tree removal to ensure adequate intervisibility for an in-line crossing, the design of which would be finalised as part of reversed matters.



Based on the new information provided, Buckinghamshire Council does not have any objections in principle to the proposed access arrangement, subject to detailed design and entering into relevant Highways Agreements. This can be secured via means of a S106 obligation.

8. Network Impact:

The following junctions were identified, in conjunction with the applicant, for assessment within Buckinghamshire:

1. Junction 3: Bletchley Road/Stoke Road/Drayton Road/Whaddon Road (Newton Longville)
2. Junction 4: Whaddon Road/Westbrook End (Newton Longville)
3. Junction 7: A421/Coddimoor Lane/Whaddon Road (Whaddon Crossroads)
4. Junction 8: A421/Warren Road
5. Junction 9: A421/Shucklow Hill/Little Horwood Road
6. Junction 10: A421/Nash Road/Winslow Road
7. Junction 11: Stock Lane/Shenley Road/Coddimoor Lane (Whaddon)

The following junctions were identified, in conjunction with the applicant, for assessment within Milton Keynes:

1. Junction 1: Sherwood Drive/Water Eaton Road/B4034 Buckingham Road
2. Junction 2: Shenley Road/Newton Road/B4034 Buckingham Road
3. Junction 5: Tattenhoe Roundabout
4. Junction 6: Bottle Dump Roundabout
5. Junction 12: Kingsmead Roundabout
6. Junction 13: Westcroft Roundabout
7. Junction 14: Furzton Roundabout
8. Junction 15: Bleak Hall Roundabout
9. Junction 16: Elfield Park Roundabout
10. Junction 17: Emerson Roundabout
11. Junction 18: Windmill Hill Roundabout

For the purposes of Buckinghamshire Council review the Do Something 1 scenario (which does not include the reduction for travel planning) is considered the main scenario for future year modelling results. The Shenley Park sensitivity test (which includes the projected traffic for the draft allocation site and new link) was also requested as part of the assessment process.

It was agreed at the scoping stage with both Buckinghamshire Council and Milton Keynes Council 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. Buckinghamshire Council raised some concern over the use of updated Milton Keynes Multi-modal Model (MKMMM). On review of the model documentation at the time there were several potential issues that could impact the use of the model to provide a single, unified, assessment methodology, these issues being:

- The key use of the model is identified as to assess the impacts of Plan:MK on the strategic road network and to inform the Local Transport Plan 4 and as a tool to support future transport infrastructure bids. Aecom, on behalf of MKC, indicate that depending on the scheme specific circumstances, including the scale, size and location of the scheme, the model may need to be updated further (particularly on the demand side and in the vicinity of the scheme) to support the economic case for such schemes. This would highlight further enhancement may be needed for the assessment of more local schemes and developments. The MKMMM report states that “It is important to note that the model was not designed for use in a scheme specific economic assessment for which it is recommended the model would be recalibrated with additional and more recent data and targeted to reflect a more specific geographical focus of resources and modelling effort”.
- The origin / destination flow data is 7 years old (collected in 2009) for the base model calibration (2016). There was concern that the Origin and Destination data would not be representative of current 2020 travel patterns.
- The Model simulation area has been extended in all directions, but no new data seems to have been collected to further calibrate flows/journey times with the Buckinghamshire area adjacent to Milton Keynes.

In addition to the MKMMM the Buckinghamshire Countrywide Strategic Model was also considered, but like MKMMM this would not cover all the network within MKC that would need to be modelled to ascertain the impact on the development. |s such a manual spreadsheet-based approach to assessment was requested to ensure a consistent assessment process was applied across the study area. This was discussed at the scoping meeting and agreed by all parties.

It is acknowledged that the use of a manual spreadsheet-based approach is unable to account for the benefits of any dynamic reassignment that would arise in a congested urban network. However, the methodology assumes that traffic volumes at a junction would continue to increase even when queues and delay predicted by the model would likely result in drivers seeking alternative routes as they would unlikely to be willing to accept a certain level of queueing and delay. Nor does the methodology consider potential modal choice which may occur on a congested network. As such BC highways consider the manual-spreadsheet based methodology provides a robust ‘worst case’ assessment of the development impacts on the junction assessed with impact determined when comparing the future year scenarios of with or without development traffic. The extent of the impacts it identifies are unlikely to occur to the same extent and would provide a more robust assessment process.

The Transport Research Laboratory (TRL) Junctions 9 modelling software (ARCADY and PICADY modules) has been used for determining junction capacity. The geometric parameters and flows used in the static junction models were reviewed with final agreement with the applicant outlined in TRN2 and TRN3 which took on board previous formal comments and ongoing discussions with the applicant with regard to the model development. It is considered that the geometries and traffic flows used in the modelling is representative of current geometric layouts and current and future year traffic flows for the various scenarios and provides a robust assessment.

When assessing the impact of the development and its predicted traffic flows the main modelling output within Junctions 9 is RFC (Ratio of flow to capacity). This provides a basis for judging the acceptability

of junction operation and designs, typically an RFC of less than 0.85 is considered to indicate satisfactory performance and is referred to as 'practical capacity. An RFC of 1.0 or more indicates saturated conditions and is referred to as 'theoretical capacity, with arrivals on an arm greater than the capacity to discharge vehicles past the give way line. When an arm exceeds and RFC of 1.0 then queues will build exponentially and in these instances the queue and delay values should not be interpreted as absolute values, but an indication of poor performance.

For mitigation proposals that included the use of full or part-time signal operation the industry standard LinSig3 modelling software has been utilised. This provides a basis for judging the acceptability of junction operation and designs, typically an Degree of Saturation (DoS) of less than 90% is considered to be acceptable.

In the subsequent tables those arms who exceed the above RFC and DoS thresholds have been highlighted red for ease of reading. Red highlighted has been used where delay exceeds 1 minute and queues 20 vehicles, these are arbitrary values to aid in the assessment process.

To ensure the base models are representative of existing conditions the models were calibrated against known and established techniques. This included, shown in priority order below. The final calibration details were provided in TRN2 and TR3 after comments and discussion with the applicant:

- Where underlying conditions allowed, junctions were calibrated making use of the TRL recommended methodology as detailed in the software user guide.
- Employment of the Barbara Chard methodology at roundabouts where uneven lane usage was identified and validation against observed queue survey data.
- Calibration against queue length surveys. The queue results provided in the Junctions 9 software are typical maximum queues likely to be observed at set times within the modelled period. I.e. if you were to monitor a site over several days the results would represent the average longest queue observed at those set times. To establish observed typical queue lengths for validation purposes the applicant was tasked to obtain three days' worth of data. For site calibration purposes three days of data is considered appropriate to allow model calibration to replicate baseline site conditions.

The junction assessments and proposed mitigation schemes have been reviewed by the Council, as detailed below:

Buckinghamshire Junctions

1. Junction 3: Bletchley Road/Stoke Road/Drayton Road/Whaddon Road

The junction of Bletchley Road/Stoke Road/Drayton Road/Whaddon Road is a priority crossroads in Newton Longville and has been modelled as such. There has been some discussion as to whether the junction should be modelled as a staggered crossroads as the two minor roads do not directly align. Whilst this is the case, the actual straight-ahead movements from the minor roads of Stoke Road and Whaddon Road are not performed as two separate turn movements, as would be expected from a true staggered crossroads, rather site visits have shown these movements occur as a diagonal single movement. The junction layout does not conform to typical crossroad or staggered crossroad design and falls somewhere between the two, and as such the modelling results would likewise follow a similar pattern. To ensure that the crossroads model reflects 2020 observations the geometry of Whaddon Road was reduced to reflect current queues, with this geometry reduction carried through to the future year scenarios results, as shown below.

Junction 3: Bletchley Road/Stoke Road/Drayton Road/Whaddon Road – Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A- Bletchley Road	0.1	5.74	0.06	0.2	6.01	0.12
B-Stoke Road	12.9	113.5	0.99	6.1	60.99	0.89
C-Drayton Road	0.1	5.79	0.05	0	5.92	0.03

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
D-Whaddon Road	4.1	47.64	0.83	3.5	39.86	0.79
2033 Do Nothing						
A- Bletchley Road	0.1	5.69	0.08	0.2	6.05	0.14
B-Stoke Road	47	373.57	1.19	27.1	208.37	1.09
C-Drayton Road	0.1	5.79	0.06	0	5.93	0.03
D-Whaddon Road	16.1	147.23	1.02	9.9	98.01	0.96
2033 Do Something 1						
A- Bletchley Road	0.1	5.71	0.08	0.2	6.09	0.14
B-Stoke Road	72.5	614.15	1.3	52.9	437.38	1.22
C-Drayton Road	0.1	5.74	0.06	0	5.83	0.03
D-Whaddon Road	46	416.88	1.2	27.5	221.76	1.1
2033 Do Something 2						
A- Bletchley Road	0.1	5.71	0.08	0.2	6.08	0.14
B-Stoke Road	67.9	577.17	1.28	49	396.85	1.2
C-Drayton Road	0.1	5.75	0.06	0	5.84	0.03
D-Whaddon Road	41.4	366.06	1.18	24.1	199.11	1.08
2033 Do Something 3						
A- Bletchley Road	0.1	5.71	0.08	0.2	6.09	0.14
B-Stoke Road	79.7	672.66	1.32	60.1	507.85	1.25
C-Drayton Road	0.1	5.73	0.06	0	5.82	0.03
D-Whaddon Road	57.7	538.56	1.26	31.1	246.8	1.12

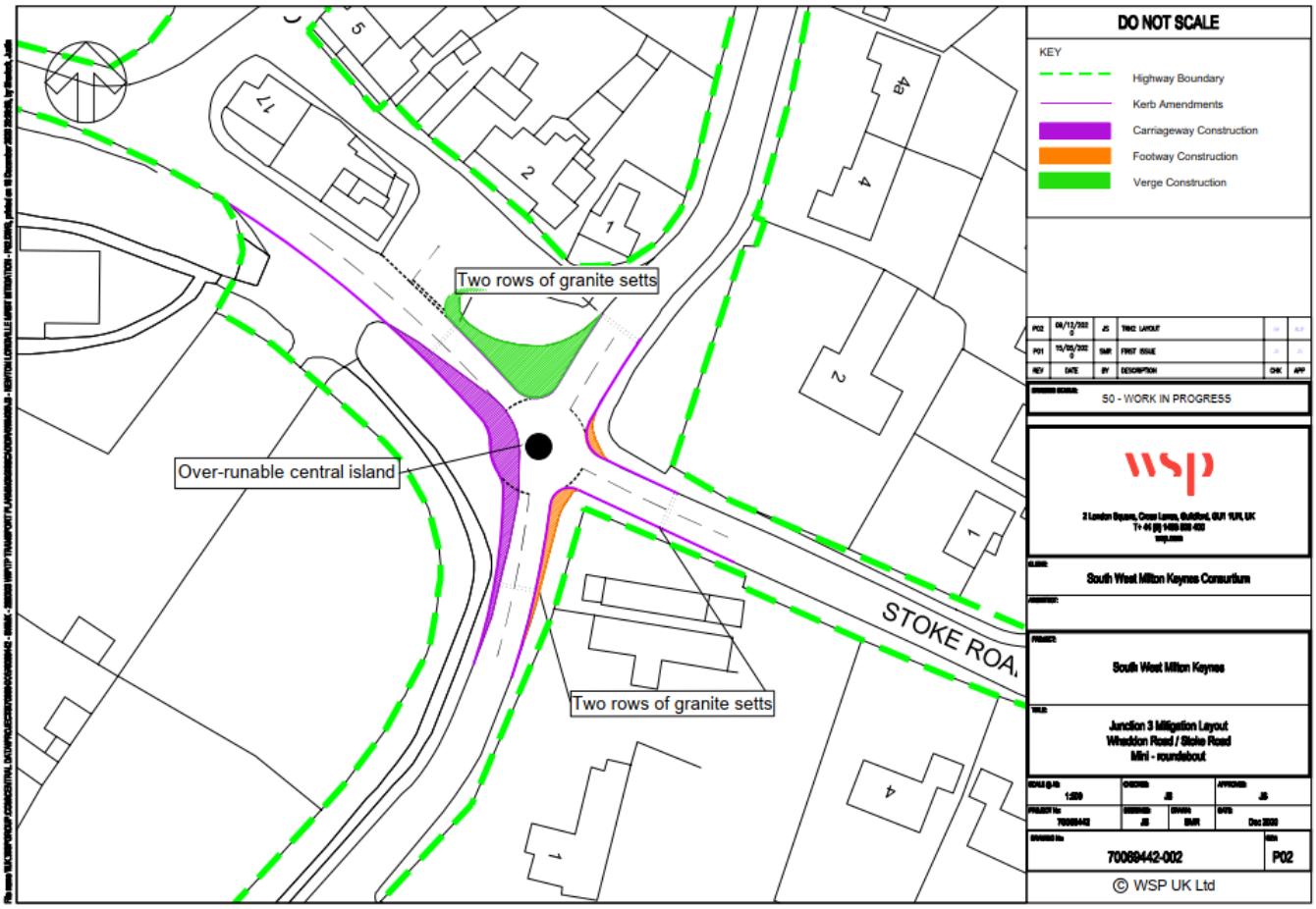
The results show that in the 2020 Base, the Stoke Road arm is approaching theoretical capacity (RFC of 1) in the AM peak and is above practical capacity (RFC of 0.85) in the PM. In the future year of 2033 (Do Nothing) Stoke Road operates at/above capacity (RFC of 1.0) in both peak hours with a maximum queue of 47 vehicles and a delay of 6 minutes in the AM peak. Whaddon Road also exceeds theoretical capacity in 2033 (Do nothing) in the AM with a predicted queue of 16 vehicles and delay of 2.5 minutes.

With the addition of the Proposed Development (Do Something 1 (DS1)), performance of the junction decreases with both Stoke Road and Whaddon now both operating above RFC of 1.0 in both peak periods. There is a maximum queue on Stoke Road of 73 vehicles and a delay of 10 minutes; an increase of 26 vehicles and 4 minutes in the AM peak. In the PM peak the delay increases from 3.5 minutes in the 2033 Do Nothing scenario to 7 minutes in Do Something 1; an increase of approximately 3.5 minutes. Whaddon Road would see an increase in queues from 16 in the 2033 Do Nothing scenario to 46 in the DS1 scenario, an increase of 25 which would extend beyond Manor Road, with an additional 4.5 minutes of delay in the AM.

The results for Do Something 2 (DS2) indicate a slight betterment compared to DS1, but still show a material impact on queues and delay compared to 2033 DN. Do something 3 (DS3) which includes potential Shenley Park traffic shows further worsening of results when compared to DS1 with the longest queue on Stoke Road of 80 vehicles in the AM and delay of 11 minutes.

The modelling exercise has shown that the addition of development traffic would have a material impact on the operation of the junction. The Applicant has however proposed changing the form of the junction from a priority crossroads to a mini roundabout, shown below.

Junction 3: Bletchley Road/Stoke Road/Drayton Road/Whaddon Road – Mitigation proposal



Junction 3: Bletchley Road/Stoke Road/Drayton Road/Whaddon Road – Mitigation Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Something 1 (Post-Mitigation)						
A- Bletchley Road	0.7	8.82	0.4	0.6	8.3	0.38
B-Stoke Road	2.6	18.61	0.73	2.5	18.28	0.72
C-Drayton Road	0.4	7.92	0.31	0.3	7.05	0.22
D-Whaddon Road	1.5	11.94	0.6	1.2	9.85	0.54
2033 Do Something 2 (Post-Mitigation)						
A- Bletchley Road	0.6	8.72	0.39	0.6	8.22	0.38
B-Stoke Road	2.6	18.14	0.73	2.4	17.61	0.71
C-Drayton Road	0.4	7.83	0.31	0.3	6.97	0.22
D-Whaddon Road	1.4	11.65	0.59	1.1	9.68	0.53
2033 Do Something 3 (Post-Mitigation)						
A- Bletchley Road	0.7	9.07	0.4	0.6	8.39	0.38
B-Stoke Road	2.8	19.44	0.74	2.7	19.57	0.74
C-Drayton Road	0.5	8.02	0.32	0.3	7.19	0.23
D-Whaddon Road	1.6	12.7	0.63	1.2	10.06	0.55

The mitigation scheme results indicate the mini-roundabout would operate within practical capacity (RFC of 0.85) for all DS scenarios with a maximum queue of 3 vehicles and delay 20 seconds on Stoke Road. Whilst the change in junction form would improve the capacity, operational road safety concerns were raised within the Road Safety Audit in relation to operation, lack of deflection (due to land constraints) and achievable visibility due to adjacent property lines. Initial indications on review of the mini-roundabout design against 'CD116 Geometric design of roundabouts' showed less than desirable visibility to the right on Drayton Road and stopping sight distance on three of the arms. Paragraph 2.12.1 of CD116 also states that a 4-arm mini-roundabout should not be used where the sum of the

maximum peak hour entry flows for all arms exceeds 500 vehicles per hour, which would be the case in all future year scenarios.

Furthermore, it was considered that by providing a junction with increased capacity would serve to encourage non-local traffic using Stoke Road and Whaddon Road as a 'Rat-run' between the A4146 to the south-east and the A421 to the north-west.

On this basis, the Highway Authority recommends that the junction is retained as a priority crossroads. A new raised junction table should be provided, as part of a comprehensive traffic calming scheme for Newton Longville. This would act to slow vehicle approach speeds to the junction and make the junction more visible to drivers. The cost of providing a raised table in this location has been included in the proposed traffic calming contribution, set out later in this response.

2. Junction 4: Whaddon Road/Westbrook End (Newton Longville)

The junction of Whaddon Road/Westbrooke End is a priority junction. The results of the assessment show that the junction operates within capacity in both the AM and the PM peak in all scenarios tested. No mitigation is therefore required at this junction.

3. Junction 7: A421/Coddimoor Lane/Whaddon Road (Whaddon Crossroads)

The junction of the A421/Coddimoor Lane/Whaddon Road is a large four arm roundabout. All approaches are single carriageway, with flared entries onto the roundabout. The junction has been modelled using Junctions 9 (ARCADY), the results are shown below for the current layout. Capacity corrections were applied to A421 (East) and Whaddon Road to match existing observed queues.

Junction 7: A421/Coddimoor Lane/Whaddon Road – Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A - Coddimoor Ln	0.5	10.8	0.31	0.4	8.98	0.29
B - A421 (East)	4.9	14.67	0.84	6	16.69	0.87
C - Whaddon Rd	9.5	95.28	0.95	12.5	151.34	1.02
D - A421 (West)	11.7	36.14	0.94	5.5	17.49	0.86
2033 Do Nothing						
A - Coddimoor Ln	0.6	13.04	0.39	0.6	11.74	0.38
B - A421 (East)	21.8	55.28	0.99	33.6	74.74	1.01
C - Whaddon Rd	64.6	541.1	1.41	72.1	931.73	1.66
D - A421 (West)	56.7	131.2	1.06	18.6	50.69	0.98
2033 Do Something 1						
A - Coddimoor Ln	0.6	13.14	0.39	0.6	12.47	0.39
B - A421 (East)	42.9	94.53	1.03	55.6	112.02	1.05
C - Whaddon Rd	81.8	731.77	1.48	111.8	1325.61	1.84
D - A421 (West)	77.4	175.41	1.1	31.9	78.3	1.01
2033 Do Something 2						
A - Coddimoor Ln	0.6	13.12	0.39	0.6	12.38	0.39
B - A421 (East)	39.3	88.19	1.03	51.7	105.48	1.05
C - Whaddon Rd	78.4	705.45	1.47	108.2	1280.43	1.83
D - A421 (West)	74.8	168.69	1.09	29.3	73.26	1.01
2033 Do Something 3						
A - Coddimoor Ln	0.6	13.18	0.39	0.7	12.69	0.4
B - A421 (East)	56.9	119.14	1.06	60.6	120.43	1.06
C - Whaddon Rd	93.7	986.05	1.5	121.3	1420.79	1.88
D - A421 (West)	84.4	191.78	1.11	40.2	94.76	1.03

The results show that in the 2020 AM Base, the western arm of A421 along with the Whaddon Road arm are approaching capacity (RFC of 1.0) in the AM. In the 2020 PM Base, the Whaddon Road arm operates above theoretical capacity (RFC of 1.0). In the future year of 2033 DN scenario the approaches of A421 and the Whaddon Road arm are operating at/above capacity (RFC of 1.0) in both the AM and PM peaks. The worst queuing is on Whaddon Road with a maximum queueing of 72

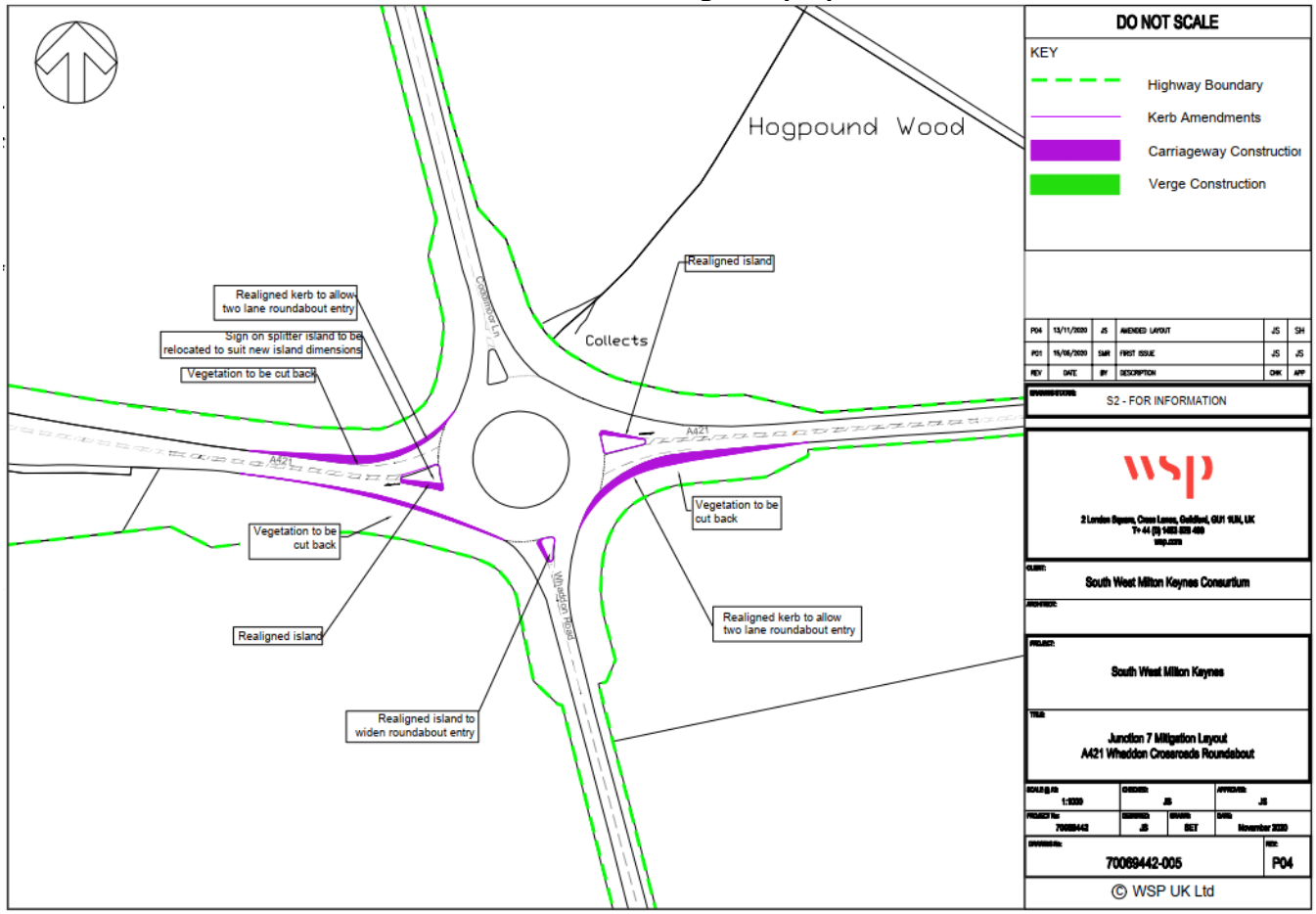
vehicles with a corresponding delay of 15.5 minutes on Whaddon Road in the PM peak. The A421 (W) arm would see queues of 57 in the AM but much lower delay of approximately 2 minutes.

With the addition of the Proposed Development (Do Something 1), performance of the junction decreases with both arms of A421 and Whaddon Road operating above capacity (RFC of 1.0) in the AM and PM peaks. Maximum queueing is 112 vehicles on A421 (E) with a corresponding delay of 22 minutes on Whaddon Road in the PM peak representing an increase in queuing of 40 vehicles and delay of 6.5 minutes. The AM also sees significant increases for Whaddon Road along with both A421 arms. Both arms of A421 and Whaddon Road would continue to operate above RFC of 1.0 for both DS2 and DS3 scenarios, which would be considered significant in the context of NPFF.

DS2 would see an improvement in comparison to DS1 but both A421 arms and Whaddon Road would exceed an RFC of 1.0 in both peaks, whilst DS3 would see additional increases in queues with delays with maximum delay now of approximately 23.5 minutes on Whaddon Road in the PM.

The Applicant has proposed alterations to the current layout to improve capacity, this involves realignment of the kerbs on the approaches from the A421 (east) and A421 (west) with associated amendments to the kerb/islands allowing for two lane roundabout entry and short two lane exit. Whaddon Road entry would also be widened with a reduction in the traffic island size. Due to the minor kerb line amended the previously determined capacity corrections were maintained.

Junction 7: A421/Coddimoor Lane/Whaddon Road – Mitigation proposal



Junction 7: A421/Coddimoor Lane/Whaddon Road – Mitigation Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Something 1 (Post-Mitigation)						
A - Coddimoor Ln	0.8	17.31	0.46	0.7	14.09	0.42
B - A421 (East)	3.7	8.91	0.79	4.2	9.39	0.81
C - Whaddon Rd	48.6	368.99	1.25	67.1	634.65	1.53

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
D - A421 (West)	33.1	78.16	1.02	11.8	31.36	0.94
2033 Do Something 2 (Post-Mitigation)						
A - Coddimoor Ln	0.8	17.26	0.46	0.7	13.93	0.42
B - A421 (East)	3.6	8.7	0.79	4	9.16	0.81
C - Whaddon Rd	46.3	351.86	1.24	64.6	607.98	1.5
D - A421 (West)	31.8	75.77	1.01	11.2	29.97	0.93
2033 Do Something 3 (Post-Mitigation)						
A - Coddimoor Ln	0.8	17.36	0.46	0.7	14.5	0.43
B - A421 (East)	4.2	9.75	0.81	4.3	9.69	0.82
C - Whaddon Rd	57.2	436.84	1.32	73.9	694.36	1.59
D - A421 (West)	36.1	83.55	1.02	13.2	34.85	0.95

The modelling results show that the proposed mitigation package will reduce queueing and delay on the A421 and Whaddon Road arms of the junction below the levels identified in the 2033 Do Nothing Scenario. There will be small increases in queuing and delay on the Coddimoor Lane arm, but these are negligible with predicted queues still less than one and maximum delay of less than 20 seconds.

An independent Stage 1 Road Safety Audit has been undertaken and the Council is satisfied that the problems identified can be resolved during detailed design. The current design encourages two lanes of through traffic that could increase the risk side swipe collisions at the A421 exit arms with additional road markings and signing offered as a potential solution, whilst this may aid in mitigating the potential conflict it may also be necessary to consider lengthening of two lane exit tapers to allow for controlled and safe merging which could be achieved within the highway boundary and will need to be considered as part of detailed design process.

The proposed improvement to this junction should provide a 'nil-detriment' situation, whereby the highway network is 'no worse off' with the proposed development in a future forecast year of 2033. This goes beyond the requirements of the NPPF and therefore is considered acceptable by the Highway Authority. This improvement can be delivered by S278 highways agreement, which is to be secured by way of a S106 obligation.

4. Junction 8: A421/Warren Road

The A421/Warren Road is a priority junction with a ghosted right-hand turn lane, providing access to Little Horwood. Warren Road has a wide entry width to allow vehicles to turn in both directions, without blocking the free flow of traffic. The junction is predicted to operate over capacity (RFC of 1.0) on the minor road arm (Warren Road) in both the AM and PM peak because of the traffic growth forecast to 2033, without development. This is because of higher traffic flow on the A421 preventing sufficient gaps for turning traffic. (It should be noted that the RFC value of 9999 indicates that the through one or more 15 minute time segments that capacity is predicted to be zero, with no movements possible, it is unlikely that this would be the case in practice, with some forced movements performed. The prediction of zero capacity is due to the linear nature of the capacity model).

The results detailed in the Table in TRN2, repeated below, are not a true reflection of delay on Warren Road. Due to the flared nature of the entry results are provided for both the left and right-turning movements. For the 2020 Base the delay in the AM for both movements would be 1,539 seconds and 85 seconds in the PM, not the values of 231 and 74 provided. The combined value has not been recorded for the other scenarios, which explains why the DS scenarios delay are lower than the DN in the AM, if the combined value were used the delay would be greater.

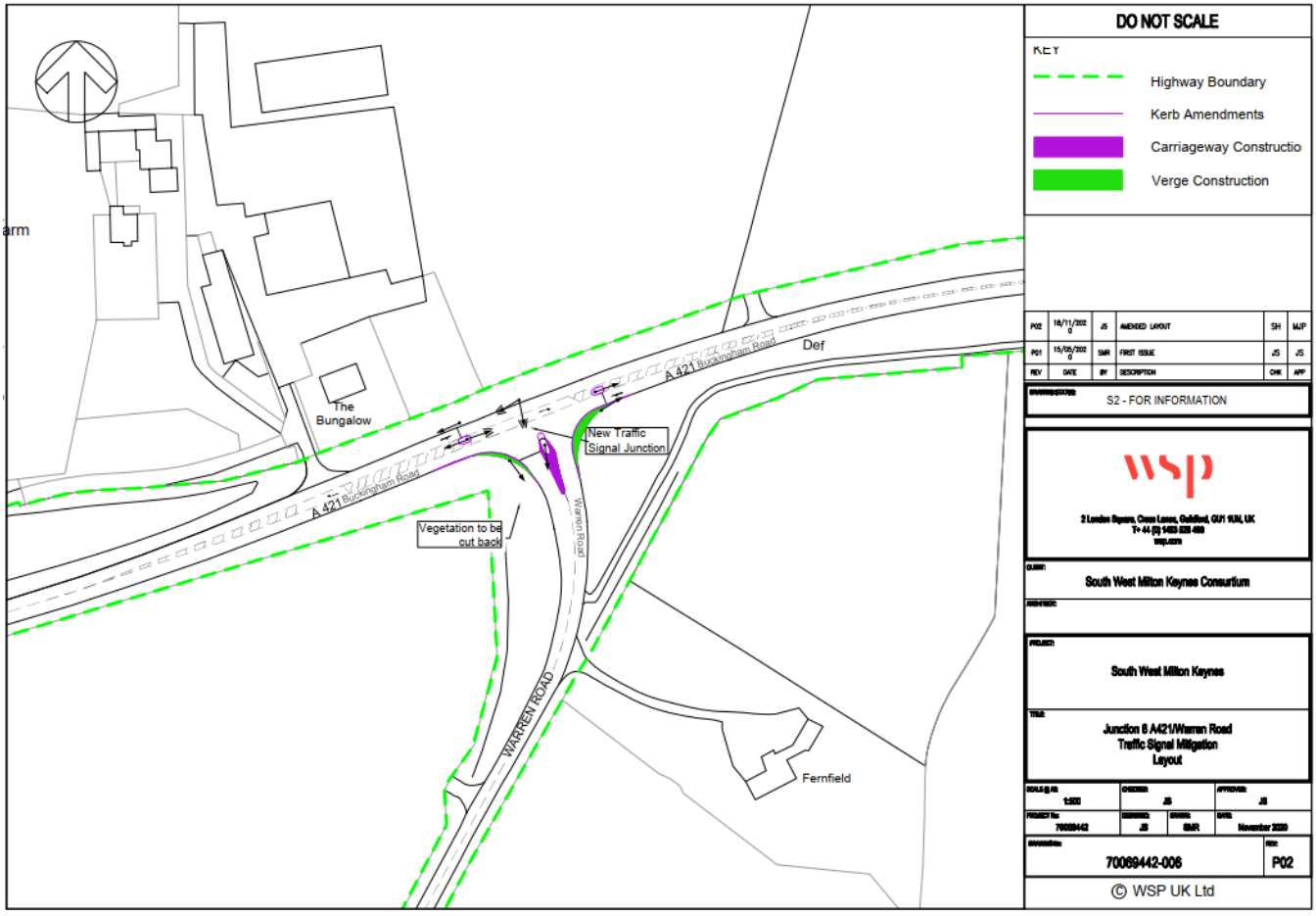
Junction 8: A421/Warren Road – Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
B-Warren Road	6.1	231.06	0.98	0.5	74.43	0.36
C-A421 (West)	0	8.63	0.01	0	9.19	0

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Nothing						
B-Warren Road	56.6	1796.2	9999	15.5	1519.6	9999
C-A421 (West)	0	10.01	0.01	0	10.87	0
2033 Do Something 1						
B-Warren Road	62.1	1469.68	9999	18.8	1598.89	9999
C-A421 (West)	0	10.49	0.01	0	11.37	0
2033 Do Something 2						
B-Warren Road	61.4	1434.12	9999	18.2	1582.52	9999
C-A421 (West)	0	10.43	0.01	0	11.27	0
2033 Do Something 3						
B-Warren Road	62.9	1566.32	9999	18.8	1617.35	9999
C-A421 (West)	0	10.72	0.01	0	11.46	0

The development is only likely to result in a marginal increase in queuing and delay on Warren Road. In reality drivers would look for alternative routes to the A421. The static junction model does not consider re-assignment of traffic, which would be likely to take place. Whilst the development only results in a marginal increase in queuing at this junction, the applicant has proposed a mitigation scheme to increase capacity through signalisation of the junction.

Junction 8: A421/Warren Road – Mitigation proposal



The proposed improvement to the A421/ Warren Road junction has been modelled using LinSig3 and the results indicate significant benefits in terms of queueing and delay on Warren Road in all the modelled scenarios, with the DS3 (including both SWMK and projected Shenley Park development traffic) have predicted queues and delay less than current 2020 results. However, the signalisation of the junction would impose queues and delay on the A421 corridor.

Junction 8: A421/Warren Road – Mitigation Capacity Results

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)						
A421 (West)	16.7	11.4	86.20%	17	12.1	87.30%
A421 (East)	24.4	13.9	85.50%	29.6	17.9	90.10%
Warren Road	3.6	68.8	65.10%	0.9	51.2	20.30%
2033 Do Something 2 (Post-Mitigation)						
A421 (West)	16.1	11.2	85.90%	16.3	11.8	86.80%
A421 (East)	23.9	13.7	85.10%	29.6	17.4	89.60%
Warren Road	3.5	68.3	64.60%	0.9	51.1	19.80%
2033 Do Something 3 (Post-Mitigation)						
A421 (West)	16.9	12	87.10%	17.9	12.9	88.30%
A421 (East)	25.9	15	87.00%	30.4	18.6	90.60%
Warren Road	3.6	68.8	65.10%	0.9	51.2	20.30%

An independent Stage 1 Road Safety Audit has been undertaken and the Council is satisfied that the problems identified can be resolved during detailed design but may require review of current speed limits to ensure stopping sight distance visibility could be achieved. This would need to be determined if taken forward to detailed design

The cumulative residual impact of the development at this junction cannot be considered 'severe' in the context of paragraph 109 of the NPPF based on the mitigation scheme results. At present the A421 is free flowing along most of its length in Buckinghamshire, with junctions managed through priority junctions or roundabouts. Whilst the introduction of signals would significantly reduce queuing on Warren Road, it would also stop the free flow and introduce delays to the primary route and potentially provide a stop / start scenario. In this regard the principle of commuting an equivalent construction cost of the proposed junction improvement into a Section 106 contribution for A421 corridor improvements between the site and Buckingham is preferable, as set out later in this response.

5. Junction 9: A421/Shucklow Hill/Little Horwood Road

The A421/Shucklow Hill/Little Horwood Road junctions form a left-right staggered priority junction. Both Shucklow Hill and Little Horwood Road are minor rural routes with single lane flared entries. The junction currently operates well with all arms less than 0.75 RFC (Appropriate RFC of 0.75 as this is priority junction on a high-speed road (50mph +) in accordance with the Junctions 9 User Guide). The junction is predicted to operate over capacity on the minor road arms (Shucklow Hill/ Little Horwood Road) in both the AM and PM peak due to traffic growth forecast to 2033, without development. This is because of higher traffic flow on the A421 preventing sufficient gaps for turning traffic out of the minor roads.

The results detailed in the Table in TRN2, repeated below, are not a true reflection of delay on the minor arms. Due to the flared nature of the entry results are provided for both the left and right-turning movements. The combined value has not been recorded but this does not change the overall indication of poor performance.

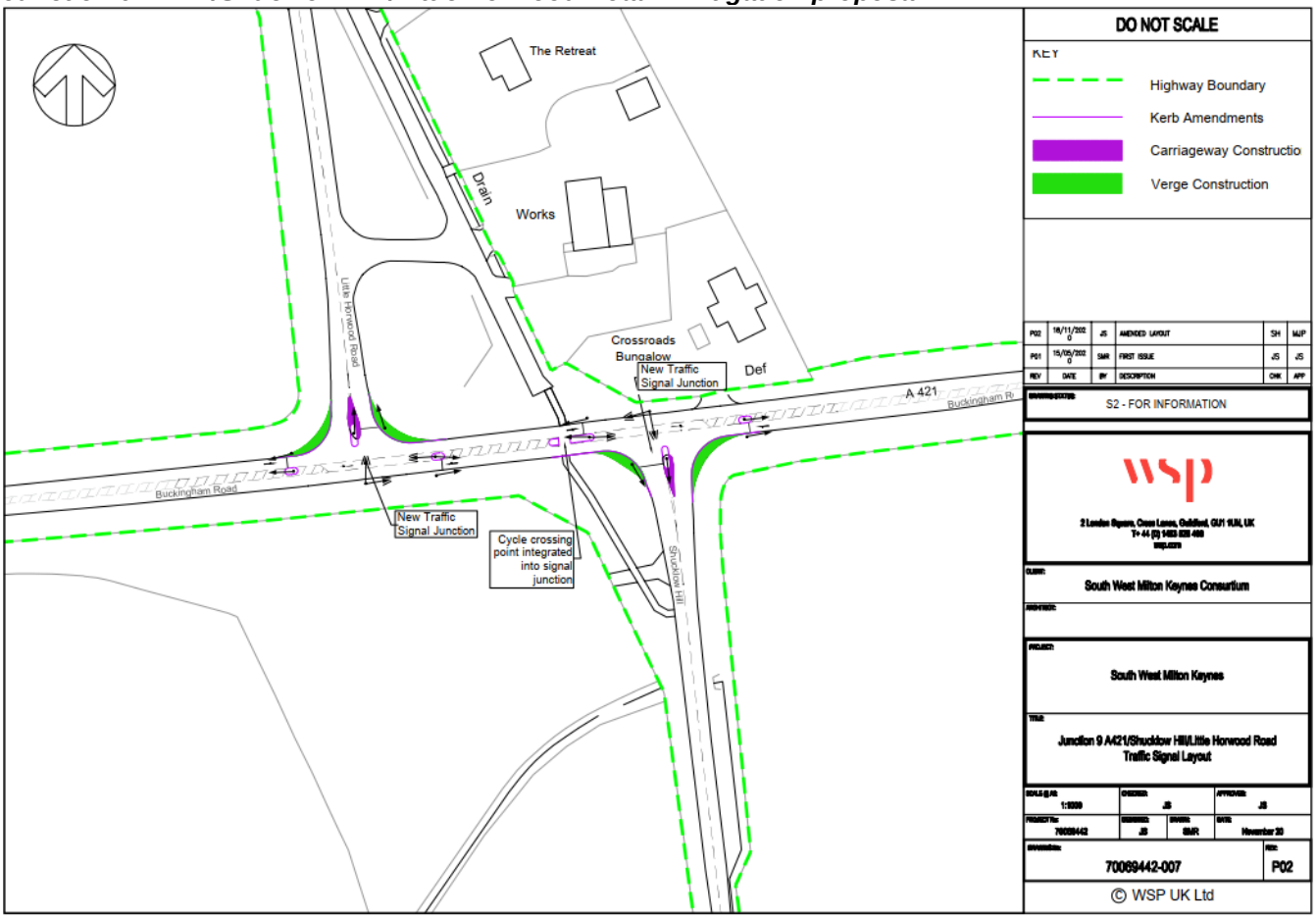
Junction 9: A421/Shucklow Hill/Little Horwood Road – Capacity Results

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	79.04	0.23	0.3	88.39	0.21
C - A421 (West)	0.1	10.41	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	11.48	0.16
B – Shucklow Hill	7.7	1546.81	9999	6.5	1479.7	9999

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
C - A421 (West)	0.3	11.69	0.22	0.1	11.87	0.1
D - Little Horwood Road	24.1	1414.26	9999	0.2	16.76	0.18
2033 Do Something 1						
A - A421 (East)	0.3	12.62	0.23	0.2	12.03	0.17
B – Shucklow Hill	7.8	1625.52	9999	6.5	1513.04	9999
C - A421 (West)	0.3	12.2	0.23	0.1	12.33	0.11
D - Little Horwood Road	24.1	1417.14	9999	0.2	17.69	0.19
2033 Do Something 2						
A - A421 (East)	0.3	12.57	0.24	0.2	11.94	0.17
B – Shucklow Hill	7.8	1614.79	9999	6.5	1506.71	9999
C - A421 (West)	0.3	12.13	0.23	0.1	12.25	0.11
D - Little Horwood Road	24.1	1416.72	9999	0.2	17.54	0.19
2033 Do Something 3						
A - A421 (East)	0.3	12.8	0.21	0.2	12.23	0.17
B – Shucklow Hill	7.8	1675.6	9999	6.6	1524.92	9999
C - A421 (West)	0.3	12.49	0.23	0.1	12.43	0.11
D - Little Horwood Road	24.1	1419.15	9999	0.2	18.03	0.1

The development is only likely to result in a marginal increase in queuing and delay on Shucklow Hill/ Little Horwood Road. Due to the likely capacity restriction on the minor road's drivers would in reality look for alternative routes to the A421. The static junction model does not consider re-assignment of traffic, which would be likely to take place. Despite this, the Applicant has proposed a mitigation scheme to increase capacity through signalisation of the junction.

Junction 9: A421/Shucklow Hill/Little Horwood Road – Mitigation proposal



The proposed improvement to the A421/ Warren Road junction has been modelled using LinSig3 and the results indicate significant benefits in terms of queueing and delay on Shucklow Hill and Little Horwood Road in all the modelled scenarios. However, the signalisation of the junction would impose queues and delay on the A421 corridor with a queue of 24 predicted for the western arm of the Little Horwood side of the staggered crossroads.

Junction 9: A421/Shucklow Hill/Little Horwood Road – Mitigation Capacity Results

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)						
A421 (West)	24.1	13.8	85.30%	24.2	13.9	85.40%
Little Horwood Road	1.4	53.7	29.80%	1.2	52.9	26.90%
A421 (East)	7.8	11.4	85.10%	6.9	10.5	85.10%
A421 (West)	7.9	12.5	87.40%	7.4	11.7	87.40%
Shucklow Hill	2.4	59.1	48.00%	1.4	53.3	29.30%
A421 (East)	13	8.6	81.40%	14.5	9.6	83.80%
2033 Do Something 2 (Post-Mitigation)						
A421 (West)	23.6	13.6	84.90%	23.6	13.6	85.00%
Little Horwood Road	1.4	53.7	29.80%	1.2	52.9	26.90%
A421 (East)	7.6	11.1	84.70%	6.5	10.2	84.80%
A421 (West)	7.8	12.4	87.10%	7.7	11.6	86.90%
Shucklow Hill	2.4	59.1	48.00%	1.4	53.3	29.30%
A421 (East)	12.9	8.5	81.00%	14.4	9.5	83.50%
2033 Do Something 3 (Post-Mitigation)						
A421 (West)	24.9	14.4	86.10%	25.1	14.6	86.40%
Little Horwood Road	1.4	53.7	29.80%	1.2	52.9	26.90%
A421 (East)	8.6	12	86.00%	6.4	10.5	85.60%
A421 (West)	8.6	13.3	88.30%	8.5	12.8	88.40%
Shucklow Hill	2.4	59.1	48.00%	1.4	53.3	29.30%
A421 (East)	13.7	9.2	82.90%	14.5	9.9	84.30%

An independent Stage 1 Road Safety Audit has been undertaken and the Council is satisfied that the problems identified can be resolved during detailed design. One problem raised the issue of the close proximity of the two signalised junctions that could cause confusion leading to rear end shunts or side-swipe collisions. Proposed mitigation involved signing and road markings, but if the scheme moved forward to detailed design the use of louvred traffic signal heads would also need to be considered.

The cumulative residual impact of the development at this junction can therefore not be considered 'severe' in the context of paragraph 109 of the NPPF. At present the A421 is free flowing along most of its length in Buckinghamshire, with junctions managed through priority junctions or roundabouts. Whilst the introduction of signals would significantly reduce queuing on both Shucklow Hill and Little Horwood Road, it would also stop the free flow and introduce delays to the primary route. In this regard the principle of commuting an equivalent construction cost of the proposed junction improvement into a Section 106 contribution for A421 corridor improvements between the site and Buckingham is preferable, as set out later in this response.

6. Junction 10: A421/Nash Road/Winslow Road

The junction of the A421/Nash Road/Winslow Road is a four arm roundabout with single lane entry and flared entries on all approaches. Nash Road and Winslow Road are minor rural roads providing access to local villages. The junction has been modelled using Junctions 9 (ARCADY), the results are shown below for the current layout. Capacity corrections were applied to A421 (West) and Nash Road to match existing observed queues.

Junction 10: A421/Nash Road/Winslow Road – Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A - A421 (East)	3.8	12.94	0.80	4.6	14.57	0.83
B - B4033 Nash Road	7	71.79	0.91	1.8	24.57	0.65
C - A421 (West)	15.2	62.74	0.97	16.3	60.94	0.97
D - Winslow Rd	0.2	5.78	0.14	0.2	5.62	0.14
2033 Do Nothing						
A - A421 (East)	10.8	33.14	0.93	16	45.13	0.96
B - B4033 Nash Road	55.8	444.84	1.32	7.8	96.26	0.94
C - A421 (West)	58.1	212.53	1.10	88.1	286.65	1.15
D - Winslow Rd	0.2	6.09	0.16	0.2	6.00	0.17
2033 Do Something 1						
A - A421 (East)	16.2	47.31	0.97	23.5	61.89	0.99
B - B4033 Nash Road	69.5	569.75	1.43	11.50	132.75	1.01
C - A421 (West)	70.8	266.31	1.12	111.3	388.07	1.20
D - Winslow Rd	0.20	6.10	0.16	0.20	6.02	0.17
2033 Do Something 2						
A - A421 (East)	15.3	45	0.96	22.3	59.23	0.99
B - B4033 Nash Road	67.5	551.12	1.42	10.9	126.51	1.00
C - A421 (West)	68.7	257.56	1.12	107.5	371.45	1.19
D - Winslow Rd	0.20	6.10	0.16	0.200	6.01	0.17
2033 Do Something 3						
A - A421 (East)	20.6	57.77	0.98	25.6	66.18	1.00
B - B4033 Nash Road	75.2	636.97	1.48	12.5	141.86	1.02
C - A421 (West)	75.0	281.01	1.13	119.5	423.04	1.21
D - Winslow Rd	0.20	6.10	0.16	0.20	6.02	0.17

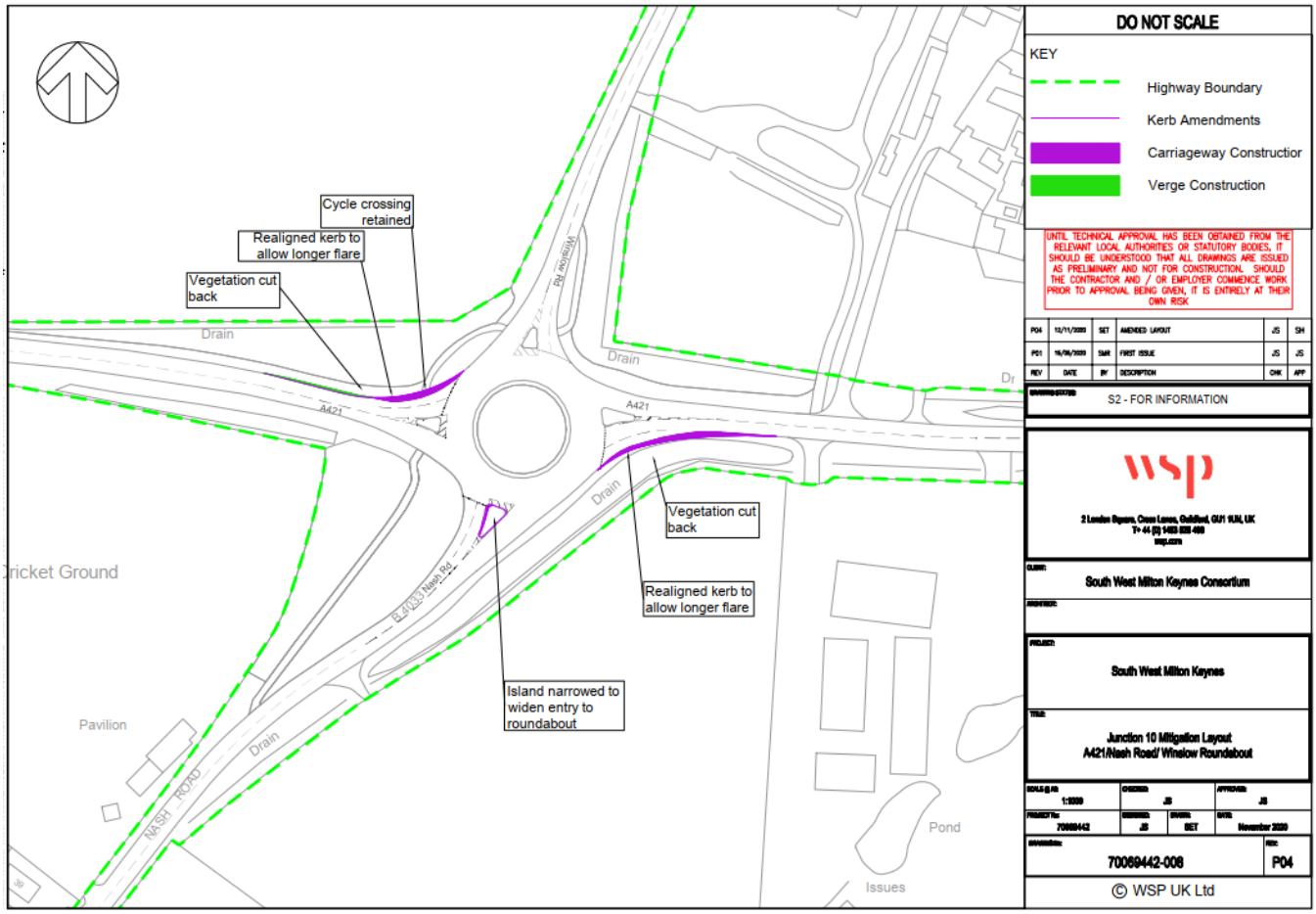
The results of the assessment show that in the 2020 Base scenario A421 (West) is operating close to theoretical capacity (RFC of 1.0) but with relatively small queues and delay of approximately 1 minute in both peaks. experienced. Nash Road exceeds an RFC of 0.85 in the AM, but with small queues and delay of just over a minute, but has no issues in the PM. The remaining arms operate within capacity for both peak periods in the 2020 Base scenario.

In the 2033 DN scenario, without development, the A421 arm (East) now operates with an RFC in the AM and PM peaks above 0.85 and is close to theoretical capacity (RFC of 1.0). A421 (West) would exceed theoretical capacity in both peaks with queues of 58 and 88 respectively with longest delay of approximately 5 minutes. Nash Road would exceed theoretical capacity in the AM and be close in the PM with predicted queues of 56 and 8 respectively, with delay of approximately 7.5 minutes in the AM.

With the addition of development traffic (DS1) A421 (East) still operates between practical and theoretical capacity with similar levels of queues and delay. A421 (West) would seen an increase in queue of 23 vehicles in the PM with an additional delay of nearly 2 minutes. Nash Road would now exceed RFC of 1.0 in both peak periods with an increase of 15 vehicles in the AM queue and additional two minutes delay.

The predicted decrease in capacity due to development, along with the Shenley Park development on the A421 arms may not be considered severe in context of the NPPF. However, the Applicant has submitted a mitigation scheme, in recognition that the junction is operating close to theoretical capacity on the A421 eastern arm and now exceeds this on Nash Road in the PM. This includes realignment to the kerb on the A421 (East) and (West) arms to allow for a longer entry flare to the roundabout, with some minor amendments to the traffic island on Nash Road.

Junction10: A421/Nash Road/Winslow Road – Mitigation proposal



The proposed improvement to the A421/Nash Road/Winslow Road junction has been modelled using Junctions 9 (ARCADY) with the results detailed below.

Junction 10: A421/Nash Road/Winslow Road – Mitigation Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
2033 Do Something 1						
A - A421 (East)	2.1	6	0.68	2.3	6.14	0.7
B - B4033 Nash Road	70.1	561.95	1.42	12.9	147.2	1.01
C - A421 (West)	8.6	30.52	0.91	17.1	52.81	0.97
D - Winslow Rd	0.2	6.83	0.18	0.2	7.21	0.19
2033 Do Something 2						
A - A421 (East)	2.1	5.94	0.68	2.3	6.08	0.7
B - B4033 Nash Road	67.8	541.72	1.40	11.8	137.61	1.00
C - A421 (West)	8.4	29.79	0.91	16	50.05	0.97
D - Winslow Rd	0.2	6.8	0.18	0.2	7.17	0.19
2033 Do Something 3						
A - A421 (East)	2.3	6.26	0.70	2.4	6.23	0.71
B - B4033 Nash Road	77.7	632.19	1.48	14.5	162.18	1.03
C - A421 (West)	9	31.68	0.91	19.7	59.27	0.98
D - Winslow Rd	0.2	6.84	0.18	0.2	7.29	0.20

This improvement is shown that in the Do Something 1 scenario RFC, queuing and delay is reduced to below the 2033 Do Nothing scenario on the two A421 arms. Nash Road will experience a slight worsening of results but these would not be considered significant. This improvement can be delivered by S278 highways agreement, which is to be secured by way of a S106 obligation.

7. Junction 11: Stock Lane/Shenley Road/Coddimoor Lane

The Stock Lane/Shenley Road/Coddimoor Lane junction is a three arm priority junction. The results of the assessment show that the junction operates within capacity in both the AM and the PM peak in all scenarios tested. No mitigation is therefore required at this junction.

The accuracy of the traffic flows, and subsequent traffic modelling was queried by a consultee, on the basis that road closures were in place within Milton Keynes impacting the potential movements through the junction. A sensitivity test was performed where the 2015 data collection was growthed by 40%, in line with consultees comment, along with re-routing development traffic heading north off Milton Keynes included in the assessment as detailed in the development trip distribution. The results of the sensitivity test are detailed below which indicates that even in the worst case (where all northbound movement from both the Whaddon Road and Buckingham Road access) the junction would continue to work well within capacity.

Junction 11: Stock Lane/Shenley Road/Coddimoor Lane – Sensitivity Testing

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Something 1						
Shenley Road left-turn	0.2	7.22	0.16	0.2	6.78	0.15
Shenley Road right-turn	0.2	11.00	0.14	0.3	10.27	0.23
Coddimoor Lane right-turn	0.7	7.79	0.34	0.3	6.43	0.17

8. Mitigation Package A421 Corridor:

The A421 provides a key east-west link within the Aylesbury Vale District, connecting the M40 with the M1 via Buckingham and Milton Keynes. The majority of the A421 is single carriageway; however the route becomes a dual carriageway after crossing the boundary with Milton Keynes. There are concerns regarding congestion on the A421 at peak times, and its function as a strategic east-west link. The further impact of potential developments on the A421 in Buckinghamshire is therefore of particular concern. As part of the application the A421 has been subject to extensive modelling and testing to ensure the highway network can accommodate the proposed development.

Several the junctions along the A421 corridor are shown to be operating over capacity in 2033 without development traffic. This is a direct result of background traffic growth. The Applicant has however demonstrated that the impact of the development on the surrounding highway network can be mitigated and therefore the cumulative residual impact of the development cannot be considered ‘severe’ in the context of paragraph 109 of the NPPF. Furthermore, several the improvements proposed are likely to provide a ‘nil-detriment’ situation, whereby the highway network is ‘no worse off’ with the proposed development in a future forecast year of 2033.

At present the A421 is free flowing along most of its length in Buckinghamshire, with junctions managed through priority junctions or roundabouts. The Applicant has proposed signalisation of the priority junctions of the A421/ Warren Road and A421/Shucklow Hill/Little Horwood Road. Whilst the signal schemes proposed adequately resolves queuing on the minor road, it would also stop the free flow and introduce delays to the primary route.

It is therefore considered more prudent to commute the costs of construction of the signal schemes into a S106 agreement. A contribution (amount to be determined) towards corridor improvements will be agreed with the Applicant to aid in management of the A421 and the safe access and exit from its joining roads that are predicted to be suffer capacity issues in future years.

Milton Keynes:

The majority of traffic generated by the development is on roads within Milton Keynes. As such a detailed assessment of the junctions within this area has been performed to ensure that the development proposals do not have a significant impact on the overall wider network. The Milton Keynes junction assessments were detailed in the May 2020 TA and updated in TRN3 considering the

revised and raised trip generation, traffic flow diagrams, model calibration and geometric parameter review as detailed previously.

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

The Sherwood Drive/Water Eaton Road/B4034 Buckingham Road junction is a four arm roundabout situated in close proximity to Bletchley Rail and Bus Stations. junction. B4034 Buckingham Road (West) Sherwood Drive and Water Eaton Road are all single lane entries widening to two lanes at entry, B4034 Buckingham Road (East) is two lane approach and entry. The junction has been assessed using Junctions 9 (ARCADY) in 'lane simulation' mode to accurately reflect the existing lane markings and uneven usage of the lanes. Capacity corrections were applied to all arms for both peaks periods to match observed queue lengths.

Where a junction has been modelled using the lane simulation mode within ARCADY 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.

Junction 1: Sherwood Drive/Water Eaton Road/B4034 Buckingham Road – Capacity Results

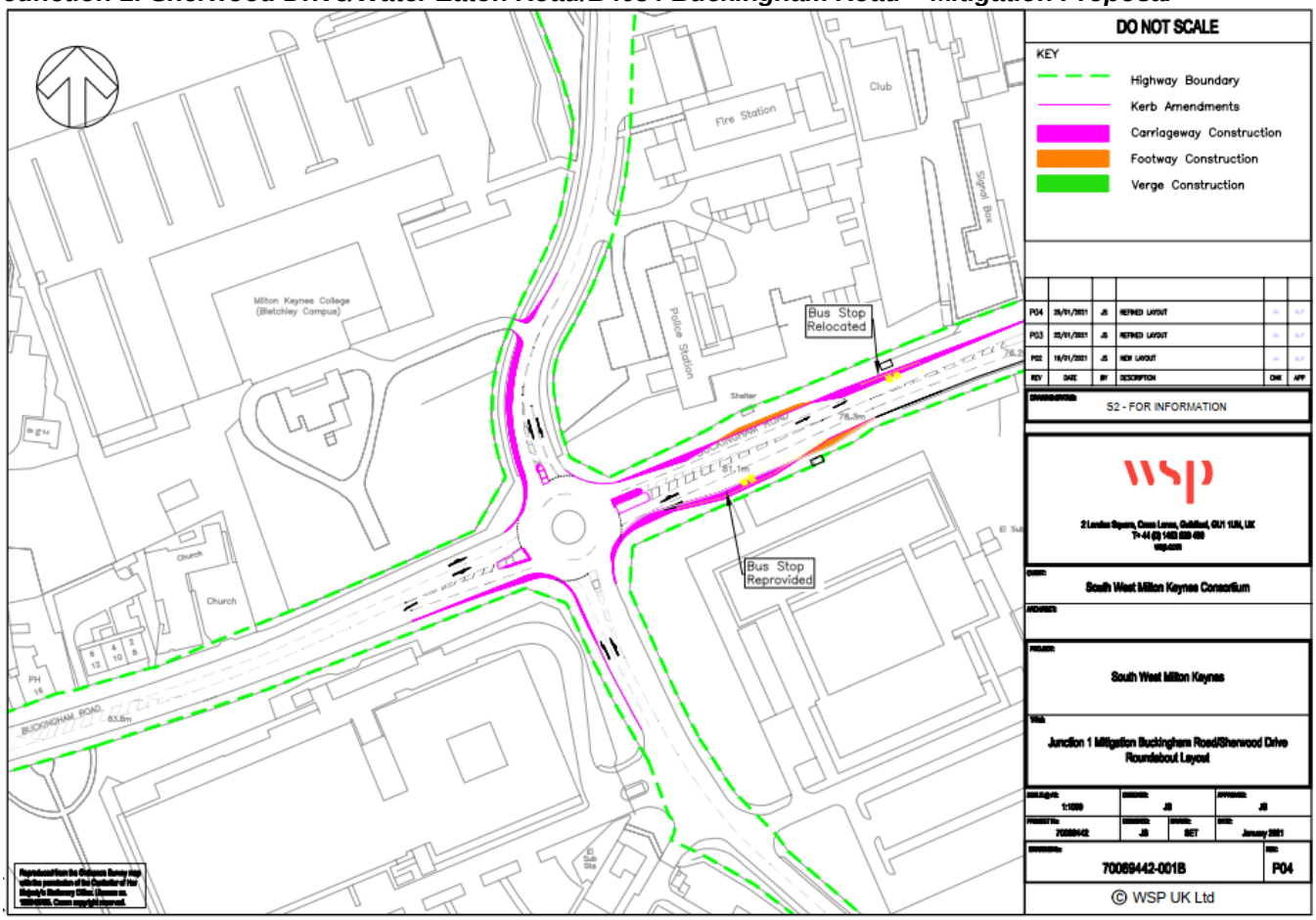
Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	LoS	Queue (Veh)	Delay (s)	LoS
2020 Base						
A - Sherwood Drive	8.7	44.29	E	7.4	37.34	E
B - B4034	9.2	36.3	D	35.5	85.06	F
C - Water Eaton Road	5.8	50.17	F	9.2	72.57	F
D - B4034 Buckingham Road	27	77.8	F	15.8	67.11	F
2033 Do Nothing						
A - Sherwood Drive	28.5	117.55	F	27.7	115.38	F
B - B4034	29.9	95.93	F	136	373.16	F
C - Water Eaton Road	28.1	201.16	F	42.6	289.06	F
D - B4034 Buckingham Road	144.4	459.53	F	79.9	344.51	F
2033 Do Something 1						
A - Sherwood Drive	25	101.43	F	31.6	120.26	F
B - B4034	51.9	168.06	F	224.2	595.04	F
C - Water Eaton Road	40.4	315.81	F	55.2	397.92	F
D - B4034 Buckingham Road	255.6	773.83	F	146	647.15	F
2033 Do Something 2						
A - Sherwood Drive	26.1	110.35	F	30.1	120.83	F
B - B4034	45.7	152.08	F	206.9	554.01	F
C - Water Eaton Road	42.7	333.33	F	49.9	367.03	F
D - B4034 Buckingham Road	243.6	742	F	136.8	613.61	F
2033 Do Something 3						
A - Sherwood Drive	25	103.57	F	34.3	130.53	F
B - B4034	60.9	212.98	F	257.8	673.03	F
C - Water Eaton Road	47.4	376.45	F	58.6	466.43	F
D - B4034 Buckingham Road	323.9	948.63	F	172.7	747.73	F

In the 2020 Base scenario Sherwood Drive, Buckingham Road (W) and Water Eaton Road operate at/above capacity with a LoS of E/F in the AM with queues on Buckingham Road beyond the long flare, due to unbalanced flows the outside right-turn lane suffers from starvation. In the PM peak all the arms operate at/above capacity with a LoS of E/F with the longest queue on Buckingham Road (E) of 35 vehicles and delay of 85 seconds, with the queue mainly contained in the nearside lane, but no lane blocking occurs.

In the 2033 DN scenario all arms operate above capacity with LoS of F in both peaks. Queues on Sherwood Drive would extend to Selwyn Close with an approximate 70 seconds of additional delay in each peak. On Buckingham Road (E) the nearside lane and holds majority of queue with the AM queue now extending to the Rail Bridge with an additional minute of delay whilst in the PM queues would block back to and beyond next roundabout with 5 minutes additional delay. On Buckingham Road (W) within each peak the nearside lane queue extends beyond the flared section with approximate 2 minutes more delay in the AM and 3.5 minutes in the PM. On Water Eaton Road within both peaks the nearside lane extends beyond the flare and blocks the outside lane which suffers from starvation, resulting in approximately respectively 6- and 4.5-minute additional delay in the AM and PM peaks. The addition of development traffic (DS1) would see further worsening of results with queues on Sherwood Drive extending to the fire station in the AM and in and PM beyond Selwyn Close with near identical delay. Both Buckingham Road approaches would see queues extending significantly further with delay increasing from 6 to 10 minutes in the PM on both arms and from 7.5 to 13 mins on the AM for Buckingham Road (W).

The predicted decrease in capacity due to development traffic would be considered significant and the Applicant has submitted a mitigation scheme. This includes providing two straight ahead lanes on the Buckingham Road (B4034) arms of the junction and minor kerb amendments to the Water Eaton Road and Sherwood Drive arms. To allow for two lane exit on the Buckingham Road (East) the bus stop layby on the north side of road has been replaced with an on-carriageway stop.

Junction 1: Sherwood Drive/Water Eaton Road/B4034 Buckingham Road – Mitigation Proposal



The proposed improvement to the A421/Nash Road/Winslow Road junction has been modelled using Junctions 9 (ARCADY) using the Lane Simulation mode with the results detailed below.

Junction 1: Sherwood Drive/Water Eaton Road/B4034 Buckingham Road – Mitigation Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	LoS	Queue (Veh)	Delay (s)	LoS
2033 Do Something 1						
A - Sherwood Drive	45.5	183.96	F	30.5	114.95	F
B - B4034	33.9	101.65	F	86.6	159.7	F
C - Water Eaton Road	15.9	109.84	F	58.6	489.88	F
D - B4034 Buckingham Road	5.4	12.27	B	5.3	19.39	C
2033 Do Something 2						
A - Sherwood Drive	42.1	171.14	F	27	105.09	F
B - B4034	30	89.36	F	74.2	137.83	F
C - Water Eaton Road	15.5	108.75	F	54.4	457.11	F
D - B4034 Buckingham Road	5	12.81	B	5.5	19.5	C
2033 Do Something 3						
A - Sherwood Drive	57.1	228.42	F	35.8	131.83	F
B - B4034	41	119.15	F	107.3	210.46	F
C - Water Eaton Road	18.1	123.88	F	68.7	587.73	F
D - B4034 Buckingham Road	7.2	15.58	C	6	22.11	C

The results show that with the provision of the proposed mitigation queueing and delay on B4034 Buckingham Road (W) is significantly reduced when compared to the existing layout 2033 Do Nothing scenario in the AM and PM peaks with delay now less than 20 seconds (compared to 6 to 7.5 minutes). Buckingham Road (E) would see a slight increase in queues in the AM, but now distributed more evenly across the lanes with no blocking back to the previous roundabout, whilst in the PM the new layout would see a reduction on queue and delay that would still block to the next roundabout but not beyond and is an improvement compared to the DN scenario. There would be slight worsening of results for Sherwood Drive in both peaks, and Water Eaton Road in the PM but overall the junction results would see an improvement considering both peaks compared to 2033 DN with the demand weighted Junction Delay reducing from 250.19 to 84.96 seconds in the AM and from 242.62 to 89.36 seconds in the PM.

Buckinghamshire Council raised concern over the apparent new footway width on Buckingham Road (E) on the southern side is narrowed to accommodate the revised bus stop location. A site visit was performed to measure existing footway widths on the southern side of the road either side of the junction, some discrepancy was noted between the OS plan used as basis for design and the current layout, with variations between 0.4 and 1.8 metres. This may result in the footway behind the bus stop being in the region of 1.5 metres. This concern was provided as part of ongoing application discussions and the Applicant responded by formal letter dated 7th April 2021, this resolved that a width of 1.5 metres would be compliant with the Department for Transport's Inclusive Mobility[1] as the minimum acceptable footway width to enable a wheelchair user and a walker to pass one another. The Applicant also stated that further assessment would be completed at the detailed design stage and subject to finalising the s278 agreement. Whilst the actual resultant footway width will not be known until detailed design is performed the potential conflict point is noted for future consideration.

Buckinghamshire Council also sought clarification on the proposed design in terms of swept path analysis. The Appellant provided swept path analysis on the 7th April 2021, along with junctions within Milton Keynes. On review of this information is noted that the two lane movement from Buckingham Road (W) to Buckingham Road (E) are close to touching and the corner kerb line. While the analysis shows the movement is possible it is considered that further minor alteration may be required as part of the detailed design process, however this does not result in the improvement being undeliverable as it is possible that small amount of additional road space could be taken from the central island to accommodate the movements. Small amendments to design such as this are common as part of the detailed design process.

An independent Stage 1 Road Safety Audit has been undertaken and the Council is satisfied that the problems identified can be resolved during detailed design. It is considered that the proposed mitigation

[1] Department for Transport, Inclusive Mobility (2005) – Section 3.1

scheme offers a viable alternative and is proportionate and reasonably related in scale to the impact of the development, as required by the NPPF.

2. Junction 2: Shenley Road/Newton Road/B4034 Buckingham Road

The Shenley Road/Newton Road/B4034 Buckingham Road junction is a double mini-roundabout situated in close proximity to Bletchley Rail and Bus Stations. junction. Both the B4034 Buckingham Road arms are single lane approaches widening to two lanes at entry, while both Newton Road and Shenley Road are single lane approaches and entries. The two internal arms on Buckingham Road are also two lanes.

The nearside lane on Buckingham Road (W) junction takes 86 to 92% of movements during the peak periods, which will likely create some unbalanced usage with overestimation of entry capacity and starvation. A negative capacity correction was applied against observed queue lengths to replicate current patterns and reduce likelihood of overestimation of capacity for all scenarios modelled. The junction has been assessed using Junctions 9 (ARCADY) with the existing layout results shown below.

Junction 2: Shenley Road/Newton Road/B4034 Buckingham Road – Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
E – A - Shenley Road	2.1	21.64	0.69	1.2	13.34	0.56
E – B - Buckingham Road (E)	0.7	5.2	0.42	3	11.9	0.76
E – C - Buckingham Road (W)	5.7	23.02	0.86	1.3	7.73	0.56
W – A - Buckingham Road (E)	0.9	5.79	0.49	3.4	13.07	0.78
W – B - Newton Road	2.1	15.51	0.69	1.3	13.6	0.57
W – C - Buckingham Road (W)	1.7	12.11	0.63	0.6	6.03	0.36
2033 Do Nothing						
E – A - Shenley Road	3.8	33.94	0.81	4.5	39.91	0.86
E – B - Buckingham Road (E)	1	6.3	0.51	47	129.22	1.1
E – C - Buckingham Road (W)	5.9	24.05	0.87	2.1	10.55	0.68
W – A - Buckingham Road (E)	1.3	6.96	0.58	5.9	20.35	0.87
W – B - Newton Road	55.9	412.45	1.23	2.3	21.02	0.71
W – C - Buckingham Road (W)	59.8	411.56	1.23	0.9	7.54	0.47
2033 Do Something 1						
E – A - Shenley Road	4.7	42.89	0.84	10	76.89	1.01
E – B - Buckingham Road (E)	1.4	7.46	0.59	131.2	448.39	1.29
E – C - Buckingham Road (W)	5.9	23.19	0.87	3	13.86	0.76
W – A - Buckingham Road (E)	1.8	8.35	0.65	5.9	21.03	0.87
W – B - Newton Road	87.5	670.83	1.35	2.7	24.85	0.74
W – C - Buckingham Road (W)	141.9	933.69	1.41	1.3	9.42	0.57
2033 Do Something 2						
E – A - Shenley Road	4.5	41.35	0.84	9	70.45	0.99
E – B - Buckingham Road (E)	1.4	7.29	0.58	117.9	389.22	1.26
E – C - Buckingham Road (W)	5.9	23.19	0.88	2.9	13.19	0.75
W – A - Buckingham Road (E)	1.7	8.15	0.64	5.9	20.88	0.87
W – B - Newton Road	82.7	633.7	1.34	2.6	24.21	0.74
W – C - Buckingham Road (W)	129.5	843.48	1.38	1.2	9.06	0.56
2033 Do Something 3						
E – A - Shenley Road	5.3	48.7	0.86	9.8	76.09	1
E – B - Buckingham Road (E)	1.6	8.01	0.62	176.3	591.93	1.35
E – C - Buckingham Road (W)	5.9	23.24	0.87	3.4	15.15	0.78
W – A - Buckingham Road (E)	2	9.01	0.67	5.9	21.02	0.87
W – B - Newton Road	102.6	794.36	1.39	2.8	26.36	0.75
W – C - Buckingham Road (W)	199.6	1296.73	1.5	1.5	10.14	0.6

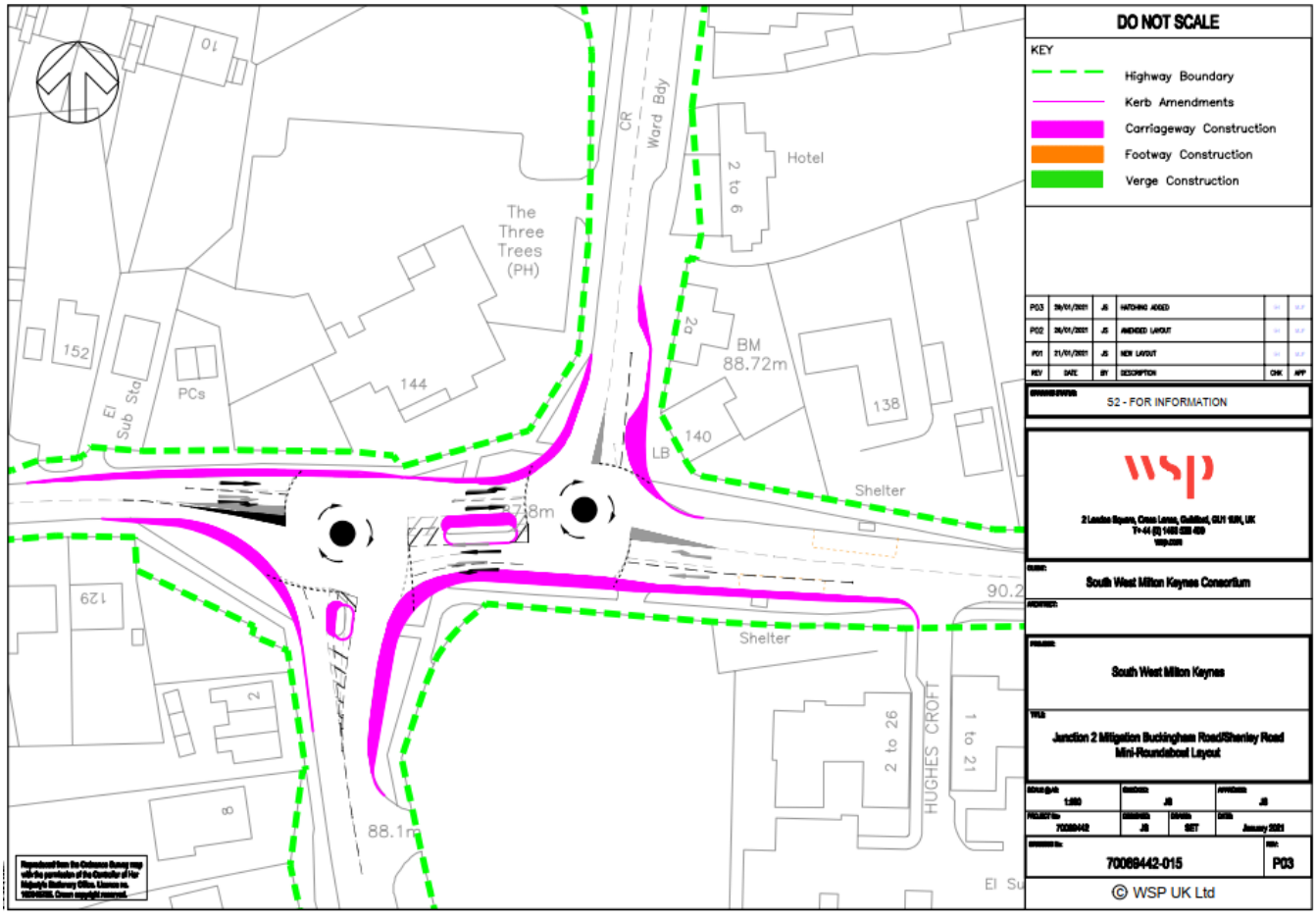
The results show that in the 2020 Base, the junction operates with satisfactory performance with all arms operating within capacity (RFC of 1.0) with only internal Buckingham Road (W) on the eastern roundabout operating above RFC of 0.85. All queues and delays are short ranging between from 0 to 6 vehicle queue and maximum delay of 23 s. Taking into account local traffic growth the 2033 Base DN

scenario shows that at the eastern junction Buckingham Road (E) will operate above RFC 1.0 in the PM with the queue now extending 270 m to Milton Grove (47 vehicles). This is due to the storage on the internal arm on entry to the western roundabout creating an exit restriction. On the western roundabout in the AM Newton Road and Buckingham Road (W) are above theoretical capacity (RFC of 1.0) with the queue on Buckingham Road extending to Tattenhoe Lane with delay of 7 minutes (from 15 seconds in 2020) and the queue on Newton Road extending to St. Mary's Avenue (56 vehicles) with delay of 7 minutes (from 15 seconds in 2020).

The inclusion of development traffic in DS1 would result in Shenley Road in the PM operating above capacity (RFC of 1.0) along with Buckingham Road (E) at the eastern roundabout with Newton Road and Buckingham Road (W) operating further above capacity at the western roundabout. At the eastern roundabout Buckingham Road (E) in the PM the queue now extends to Wilkinson Close (approximately 750m) with delay increasing from 2 to 7.5 minutes. At the western junction in the AM queues are further increased with Newton Road now extending for 500m to St. Aidans Close with delay of 11 minutes. On Buckingham Road (W) the queue extends to Whaddon Road with delay up to 15.5 minutes. The junction would be further detrimentally impacted when considering the Shenley Park development (DS3) but see some improvement when considering the travel planning scenario (DS2), albeit some arms would still perform poorly.

The predicted decrease in capacity due to development traffic would be considered significant and the Applicant has submitted a mitigation scheme. This includes kerb widening on all arms of the mini roundabout to improve capacity. To allow for two lane entry on Shenley Road the existing short layby (covered by no waiting at any time restrictions and hence not used for parking) would need to be removed.

Junction 2: Shenley Road/Newton Road/B4034 Buckingham Road – Mitigation Proposal



The proposed improvement to the A421/Nash Road/Winslow Road junction has been modelled using Junctions 9 (ARCADY) with the previous capacity correction maintained as only kerb changes are proposed.

Junction 2: Shenley Road/Newton Road/B4034 Buckingham Road – Mitigation Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Something 1						
E – A - Shenley Road	1.2	10.32	0.55	2.4	21.74	0.72
E – B - Buckingham Road (E)	1	5.46	0.51	133.5	448.74	1.28
E – C - Buckingham Road (W)	5.9	18.7	0.87	1.6	6.98	0.61
W – A - Buckingham Road (E)	1.8	8.53	0.65	5.9	21.13	0.87
W – B - Newton Road	28.7	163.44	1.1	1.9	17.26	0.66
W – C - Buckingham Road (W)	32.5	137.8	1.08	0.9	6.05	0.46
2033 Do Something 2						
E – A - Shenley Road	1.2	10.17	0.54	6.9	54.9	0.94
E – B - Buckingham Road (E)	1	5.37	0.51	120	392.42	1.27
E – C - Buckingham Road (W)	5.9	18.69	0.87	1.5	6.79	0.6
W – A - Buckingham Road (E)	1.8	8.32	0.64	5.9	20.98	0.87
W – B - Newton Road	24.7	140.86	1.08	1.9	16.93	0.66
W – C - Buckingham Road (W)	26.9	117.25	1.06	0.8	5.89	0.45
2033 Do Something 3						
E – A - Shenley Road	1.2	10.84	0.56	0.9	8.04	0.47
E – B - Buckingham Road (E)	1.1	5.75	0.54	179.6	603.73	1.34
E – C - Buckingham Road (W)	5.9	18.93	0.87	1.7	7.3	0.63
W – A - Buckingham Road (E)	2.1	9.22	0.68	5.9	20.4	0.87
W – B - Newton Road	41.5	255.3	1.16	2	17.99	0.67
W – C - Buckingham Road (W)	57.1	262.31	1.16	0.9	6.33	0.49

The results show that with the provision of the proposed mitigation that overall the junction results would see an improvement considering both peaks compared to existing layout 2033 DN with the demand weighted Junction Delay reducing. At the eastern junction Buckingham Road (E) in the PM queue will still extend to Wilkinson Close (approximately 750m), this is impacted by the downstream internal link storage being filled, creating an exit restriction. The remaining arms on the eastern roundabout would have improved or similar results compared to 2033 DN. At the western junction in the AM queues and delay are reduced compared to 2033 DN existing layout with Buckingham Road (W) seeing queue reductions from 60 to 33 and delay reducing from 7 to 2.5 mins. Newton Road is also expected to see an improvement, with queues and delay reducing by over half compared to DN 2033, however, a new lane has been formed but with the turning proportions unbalanced in both peak periods the outside lane is likely to suffer from some starvation so the benefits on this arm are likely to be overestimated, although overall it is considered that the junctions will see improvement.

Buckinghamshire Council also sought clarification on the proposed design in terms of swept path analysis. The Appellant provided swept path analysis on the 7th April 2021, along with other junctions within Milton Keynes. On review of this information no concerns were raised with the major movement considered to be able to be completed satisfactorily.

An independent Stage 1 Road Safety Audit has been undertaken and the Council is satisfied that the problems identified can be resolved during detailed design. It is considered that the proposed mitigation scheme offers a viable alternative and is proportionate and reasonably related in scale to the impact of the development, as required by the NPPF. Although it should be noted that widening for the western roundabout on the Buckingham Road (W) arm indicates converting existing footway allocation to carriageway, this is not considered appropriate and as part of detailed design it will need to be shown that at minimum similar level of footway provision is present, with possible conversion of the existing verge (within the highway).

Some consultees have queried the modelling on the Buckingham Road and that current congestion is not accounted for, with no suitable mitigation available. The modelling for J1 and J2 has been reviewed and is considered to be appropriate in terms of model development. This included use of current traffic demand and existing queues with the base model calibrated to reflect existing conditions with significant queues on the A421. The DN 2033 scenario models have identified that significant queuing and delay along the A421 at these junctions without development traffic. The mitigation proposed for

each junction would see overall junction improvements in terms of collective reduced delay with the A421 at J1 predicted to see similar or much reduced predicted queues and delay. Whilst at J2 it is noted that A421 westbound movement is predicted to worsen compared to the DN scenario in the PM but the eastbound movement in the AM would see marked improvement. Buckinghamshire Council are satisfied that the modelling performed at these junctions are robust and fit for purpose with the proposed mitigation providing overall improvements and reducing the worst queues and delay.

3. Junction 5: Tattenhoe Roundabout

The junction is a large four arm roundabout with both A421 Standing Way arms being two lane dual carriageway approach with flared entries to three lanes. Snelshall Street and Buckingham Road are both single carriageway but with flared two-lane entries onto the roundabout. A negative capacity correction was applied against observed queue lengths to replicate current patterns and reduce likelihood of overestimation of capacity for all scenarios modelled on A421 Standing Way (E), Buckingham Road and A421 Standing Way (W) in the AM and all arms in the PM. The junction has been assessed using Junctions 9 (ARCADY) with the existing layout results shown below.

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Junction 5: Tattenhoe Roundabout – Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	LoS	Queue (Veh)	Delay (s)	LoS
2020 Base						
A – V1 Snelshall Street	24.2	115.62	1.03	18.5	97.05	1.00
B - A421 Standing Way (E)	6.2	23.59	0.87	9.8	34.71	0.93
C – B4034 Buckingham Road	6.2	53.35	0.89	6.3	50.4	0.89
D - A421 Standing Way (W)	5.9	13.78	0.86	5.7	15.26	0.86
2033 Do Nothing						
A – V1 Snelshall Street	186.9	843.6	1.52	120.1	611.91	1.35
B - A421 Standing Way (E)	20.7	66.81	0.99	47.2	127.2	1.06
C – B4034 Buckingham Road	48.6	311.65	1.20	59	405.99	1.22
D - A421 Standing Way (W)	31.5	60.9	1.00	43.9	89.29	1.03
2033 Do Something 1						
A – V1 Snelshall Street	424.6	2352.72	1.92	325.2	1879.59	1.73
B - A421 Standing Way (E)	162	506.2	1.23	398	1216.96	1.44
C – B4034 Buckingham Road	559.1	4200.35	2.23	450.6	2828.96	1.86
D - A421 Standing Way (W)	110	181.68	1.11	99.5	193.47	1.11
2033 Do Something 2						
A – V1 Snelshall Street	389.6	2054.65	1.87	293.6	1710.2	1.67
B - A421 Standing Way (E)	136.4	423.67	1.2	323.1	969.81	1.38
C – B4034 Buckingham Road	477.2	3609.37	2.10	318.5	1953.72	1.65
D - A421 Standing Way (W)	97.5	157.19	1.09	101.5	201.82	1.11
2033 Do Something 3						
A – V1 Snelshall Street	348.7	2114.49	1.86	228.4	1309.65	1.65
B - A421 Standing Way (E)	177.7	551.58	1.25	409.7	1278.84	1.44
C – B4034 Buckingham Road	540.7	3745.24	2.11	468.7	2773.23	1.85
D - A421 Standing Way (W)	111.4	186.84	1.11	52.7	106.34	1.05

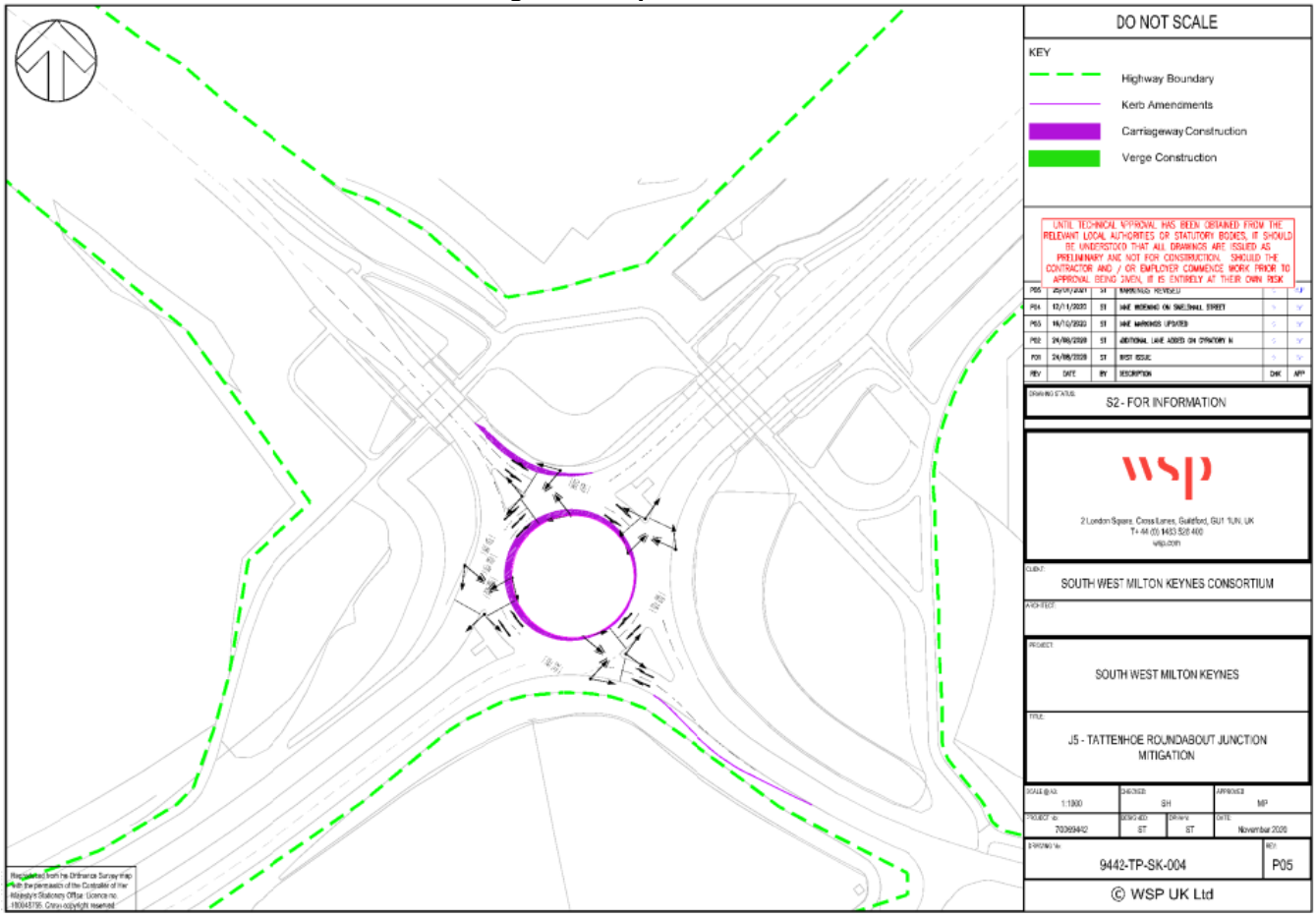
The results show that in the 2020 Base Snelshall Street operates at/above capacity (RFC of 1.0) in both peak periods, with the longest queue of 24 vehicles and delay of nearly 2 minutes in the AM. The remaining arms operate above practical capacity (RFC of 0.85) in both peak periods, with the longest queue of 10 on A421 Standing Way (E) and the greatest delay of nearly 1 minute on Buckingham Road. Considering local traffic growth, the 2033 Base DN scenario shows all arms are above theoretical capacity (RFC of 1.0) except for A421 (E) in the AM which is 0.99. This would have the greatest impact on Snelshall Street with the queue now over 180 vehicles in the AM extending for over 1 km with delay of 14 minutes. The Buckingham Road queue would now extend to, and beyond in the PM, the proposed new access roundabout.

The inclusion of development traffic in DS1 would result in further degradation of performance, with all arms above theoretical capacity (RFC of 1.0), with Buckingham Road in the AM showing an RFC of 2.23. The model predicts queues on Snelshall Street over 425 vehicles in the AM blocking for over

2.5km with delay at 40 minutes. This is slightly better in the PM but there is still a queue over 2km with delay at 30 minutes, in both peaks this would extend beyond Junction 12. On Buckingham Road the queue would now extend to and beyond Junction 2 in the AM and PM. In the AM a queue of over 3km is possible that would nearly extend to Junction 1. Delays were modelled at 70 and 47 minutes respectively.

The predicted decrease in capacity due to development traffic would be considered significant and the Applicant has submitted a mitigation scheme. This includes altering the junction to 'part-time' traffic signals that would operate at peak periods with flare extended on Buckingham Road to provide greater stacking space. The central island would also be slightly narrowed to better accommodate two-lane straight-ahead and turning movements.

Junction 5: Tattenhoe Roundabout – Mitigation Proposal



The proposed improvement to the Bottledump roundabout has been modelled using the industry standard LinSig software.

Junction 5: Tattenhoe Roundabout – Mitigation Capacity Results

Arm Description	AM			PM		
	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)	DoS
2033 Do Something 1						
A421 Standing Way (W) Left Ahead	12.5	22.2	89.00%	8.6	16.7	75.80%
A421 Standing Way (W) Ahead	12.5	24.6	87.10%	8.8	18	68.80%
V1 Snelshall Street Left Ahead	178.6	626.8	147.40%	108.8	423.7	125.90%
A421 Standing Way (E) Ahead Left	8	16.9	74.90%	9.2	16.6	76.50%
A421 Standing Way (E) Ahead	7.5	17.7	70.70%	9.2	17.5	69.80%
B4034 Buckingham Road Ahead Left	8.3	23.5	83.60%	20.3	58.3	97.70%
2033 Do Something 2						
A421 Standing Way (W) Left Ahead	10.2	15.6	81.00%	8	15.4	73.50%
A421 Standing Way (W) Ahead	11.3	17.8	79.30%	8.2	16.4	65.30%

Arm Description	AM			PM		
	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)	DoS
V1 Snelshall Street Left Ahead	174.8	623.1	145.90%	96.8	385.3	122.70%
A421 Standing Way (E) Ahead Left	7.3	13.8	66.80%	8.4	14.8	72.40%
A421 Standing Way (E) Ahead	6.9	14.3	61.60%	8.1	15.4	64.10%
B4034 Buckingham Road Ahead Left	8.9	26.2	84.00%	12.7	36	91.20%
2033 Do Something 3						
A421 Standing Way (W) Left Ahead	15.2	25.9	90.60%	8.9	17.1	74.80%
A421 Standing Way (W) Ahead	15.2	28.5	89.90%	9.2	18.4	70.00%
V1 Snelshall Street Left Ahead	155.4	619.1	145.40%	20	73.8	98.70%
A421 Standing Way (E) Ahead Left	7.6	14.2	68.80%	35.6	14.6	92.50%
A421 Standing Way (E) Ahead	7.3	14.8	63.80%	44.8	15.4	92.80%
B4034 Buckingham Road Ahead Left	9.5	24.6	85.00%	21.3	55.2	97.60%

The results show that with change to part-time signal control shows, that all arms would see an improvement considering both peaks compared to 2033 DN existing layout, especially on Buckingham Road where queues would reduce from 50 to 8 in the AM and 59 to 20 in the PM, which would be contained in the link between the junction and the new access on Buckingham Road. Snelshall Street would still expericne queues and delay but these would be less than those predicted for the 2033 DN scenario and would not extend back to J12.

There are some potential safety concerns over queuing within the internal areas blocking exits, especially in the PM. It is evident that the proposal provides significantly better option in terms of capacity than the existing layout with no queues blocking back to the site access on Buckingham Road which was raised previously. It is estimated that you may get partial blocking of the exits on some arms every other cycle based on uniform queue lengths. To mitigate against this additional 'Keep Clear' road markings have been included in the design.

An independent Stage 1 Road Safety Audit has been undertaken and the Council is satisfied that the problems identified can be resolved during detailed design. The mitigation proposal offers a viable alternative and is proportionate and reasonably related in scale to the impact of the development, as required by the NPPF and would not be considered severe.

4. Junction 6: Bottle Dump Roundabout

The junction is a large three arm roundabout with A421 Standing Way being two lane dual carriageway approach and entry. A421 Buckingham Road and Whaddon Road are both single carriageway but with flared two-lane entries onto the roundabout. The junction has been assessed using Junctions 9 (ARCADY) in 'lane simulation' mode to accurately reflect the existing lane markings and uneven usage of the lanes. A capacity correction was applied to A421 Standing Way to match observed queue lengths. A421 Standing Way has unbalanced flow with the outside straight-ahead lane accounting for over 83% of all movements in both peak periods. The remaining arms are well balanced.

Observation of video survey showed blocking back from the Buckingham Road exit into the roundabout, restricting movements from Whaddon Road. The same survey did not show queues extending back from Junction 7 with no obvious cause for temporary blocking except for weight of traffic seeking to pass ahead from the two lane high speed dual carriageway to a narrow single lane carriageway. Therefore, an exit restriction added was to replicate current operation.

Junction 6: Bottledump Roundabout – Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	LoS	Queue (Veh)	Delay (s)	LoS
2020 Base						
A – A421 Standing Way	5.2	14.35	B	19.9	44.86	E
B - Whaddon Road	4.5	37.88	E	6.5	67.84	F
C – A421 Buckingham Road	4.6	10.21	B	2.9	7.73	A
2033 Do Nothing						
A – A421 Standing Way	31.5	67.74	F	97.8	218.82	F

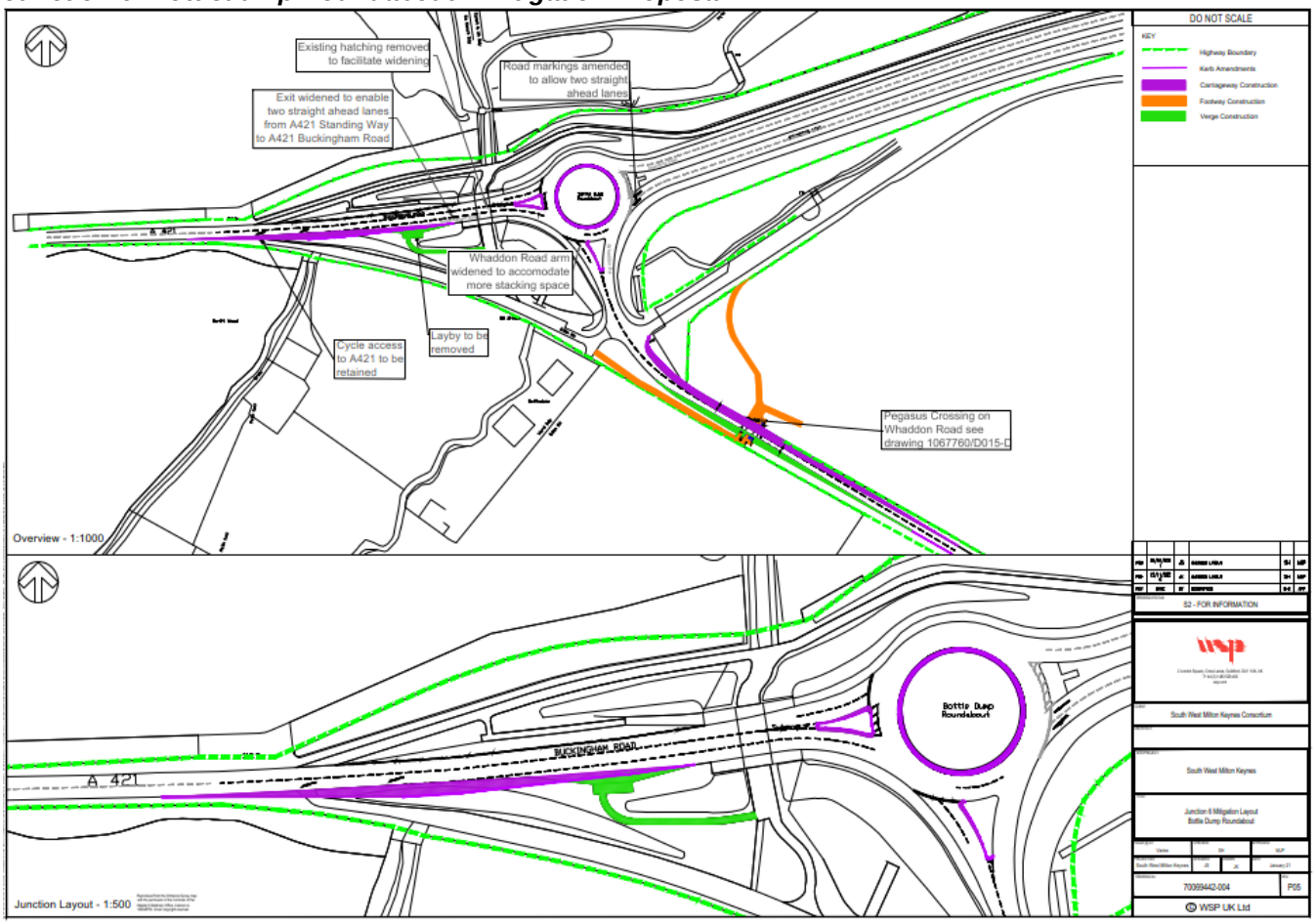
Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	LoS	Queue (Veh)	Delay (s)	LoS
B - Whaddon Road	47.8	350.59	F	19.4	190.36	F
C – A421 Buckingham Road	11.2	22.18	C	4.9	10.61	B
2033 Do Something 1						
A – A421 Standing Way	40.5	85.75	F	125.4	305.45	F
B - Whaddon Road	108.9	658.39	F	31.3	273.81	F
C – A421 Buckingham Road	18.6	34.97	D	6.9	14.99	B
2033 Do Something 2						
A – A421 Standing Way	35.7	75.98	F	117.8	279.15	F
B - Whaddon Road	97.3	624.43	F	40	345.76	F
C – A421 Buckingham Road	18.2	31.58	D	6.5	13.12	B
2033 Do Something 3						
A – A421 Standing Way	18.8	42.94	E	91.7	208.61	F
B - Whaddon Road	81.5	455.66	F	39.8	362.36	F
C – A421 Buckingham Road	23.1	40.6	E	4.8	11.32	B

The results show that in the 2020 Base A421 Standing Way in the PM and Whaddon Road in both peaks operate at/above capacity, but with acceptable queues (maximum of 20 vehicles on A421 Standing Way) and greatest delay of just over 1 minute. Considering local traffic growth, the 2033 Base DN scenario shows A421 Standing Way and Whaddon Road would operate above capacity. A421 Standing Way is predicted to experience queues of approximately 30 in the AM and 100 in the PM which would extend for about 500m, all within the outside lane. This may lead to greater use of nearside lane to bypass queues with potential for conflict in the circulatory carriageway or exit to A421 Buckingham Road. On Whaddon Road the queue would extend for approximately 250 metres with delay of 6 minutes, increased of approximately 5.5 minutes.

The inclusion of development traffic in DS1 would result in further degradation of performance, with A421 Standing Way predicted to experience queues of approximately 40 in the AM and 125 in the PM which would extend for about 750 m, again all in the outside lane. Whaddon Road queues in the AM are now predicted at 109 vehicles which would extend for approximately 530 metres, in the vicinity of the proposed Whaddon Road access.

The predicted decrease in capacity due to development traffic would be considered significant for the A421 Standing Way and Whaddon Road and the Applicant has submitted a mitigation scheme. This includes widening the Buckingham Road exit to two lanes for an extended length to allow straight ahead movements from both lanes on A421 Standing Way, this would require a reduction of the flare available on A421 Buckingham Road. Furthermore, Whaddon Road would be widened slightly and the central island narrowed to better accommodate two lane straight ahead movement. A new Pegasus crossing is also proposed on Whaddon Road south of the junction.

Junction 6: Bottledump Roundabout – Mitigation Proposal



The proposed improvement to the Bottledump roundabout has been modelled using Junctions 9 (ARCADY).

Junction 6: Bottledump Roundabout – Mitigation Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	LoS	Queue (Veh)	Delay (s)	LoS
2033 Do Something 1						
A – A421 Standing Way	2.9	6.67	A	4.5	8.63	A
B - Whaddon Road	1.3	7.35	A	1	6.77	A
C – A421 Buckingham Road	28.1	48.61	E	4.9	12.4	B
2033 Do Something 2						
A – A421 Standing Way	3	6.57	A	4.2	8.41	A
B - Whaddon Road	1.3	7.29	A	0.9	6.56	A
C – A421 Buckingham Road	24.2	42.51	E	5	10.9	B
2033 Do Something 3						
A – A421 Standing Way	2.6	6.36	A	3.5	8.06	A
B - Whaddon Road	1.2	7.17	A	1.1	5.56	A
C – A421 Buckingham Road	32.1	55.86	F	4.2	9.63	A

The results show that with the provision of the proposed mitigation A421 Standing Way would no longer suffer from lane starvation and would be well below existing layout 2033 DN queues and delay results and operates well within capacity. With the addition of the extended two lane exit and relocation of the exit restriction Whaddon Road also now operates well within capacity with negligible queues and delay. However, there is a minor increase in queuing and delay on the Buckingham Road arm results. Queuing on Buckingham Road increases from 11 vehicles in the 2033 DN scenario to 28 in DS1, an increase of 17 vehicles. Delay increases from 22 seconds to 49 seconds, an increase of 27 seconds.

An independent Stage 1 Road Safety Audit has been undertaken and the Council is satisfied that the problems identified can be resolved during detailed design. Overall the junction results would see a significant improvement considering both peaks compared to 2033 DN existing layout and it is considered that the proposed mitigation scheme offers a viable alternative and is proportionate and reasonably related in scale to the impact of the development, as required by the NPPF.

5. Junction 12: Kingsmead Roundabout

The junction is a large four arm roundabout with all approach's single carriageway but with flared two-lane entries onto the roundabout. The junction has been modelled using Junctions 9 (ARCADY), the results are shown below for the current layout.

The nearside lane on Chaffron Way takes 75 to 85% of movements during the peak periods, which will likely create some unbalanced usage with overestimation of entry capacity and starvation. A negative capacity correction was applied against observed queue lengths to replicate current patterns and reduce the likelihood of overestimation of capacity for all scenarios modelled.

Junction 12: Kingsmead Roundabout – Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V1 Snelshall Street (N)	1.4	6.16	0.58	0.6	3.85	0.36
B – H7 Chaffron Way	3.5	27.18	0.79	2.3	17.07	0.71
C – V1 Snelshall Street (S)	0.8	5.38	0.45	1.1	6.27	0.54
D - Hayton Way	0.1	2.63	0.08	0	2.6	0.04
2033 Do Nothing						
A – V1 Snelshall Street (N)	4.8	19.16	0.84	1	5.42	0.5
B – H7 Chaffron Way	79	454.91	1.28	110.2	570.72	1.31
C – V1 Snelshall Street (S)	1.3	7.13	0.56	3.2	13.6	0.77
D - Hayton Way	0.7	4.22	0.42	0.2	3.16	0.18
2033 Do Something 1						
A – V1 Snelshall Street (N)	10.6	39.21	0.93	1.5	6.73	0.6
B – H7 Chaffron Way	120	770.76	1.46	168.7	935.63	1.49
C – V1 Snelshall Street (S)	2	9.32	0.67	5.4	20.97	0.85
D - Hayton Way	0.8	4.65	0.44	0.2	3.35	0.19
2033 Do Something 2						
A – V1 Snelshall Street (N)	9.5	35.44	0.92	1.2	5.89	0.54
B – H7 Chaffron Way	114.4	729.81	1.44	130.6	691.13	1.38
C – V1 Snelshall Street (S)	1.9	8.94	0.66	5.1	20.28	0.85
D - Hayton Way	0.8	4.59	0.44	0.2	3.34	0.19
2033 Do Something 3						
A – V1 Snelshall Street (N)	4.6	18.5	0.83	1	5.44	0.5
B – H7 Chaffron Way	84.9	490.73	1.3	114	590.86	1.32
C – V1 Snelshall Street (S)	1.4	7.51	0.59	2.9	12.63	0.75
D - Hayton Way	0.7	4.31	0.42	0.2	3.12	0.18

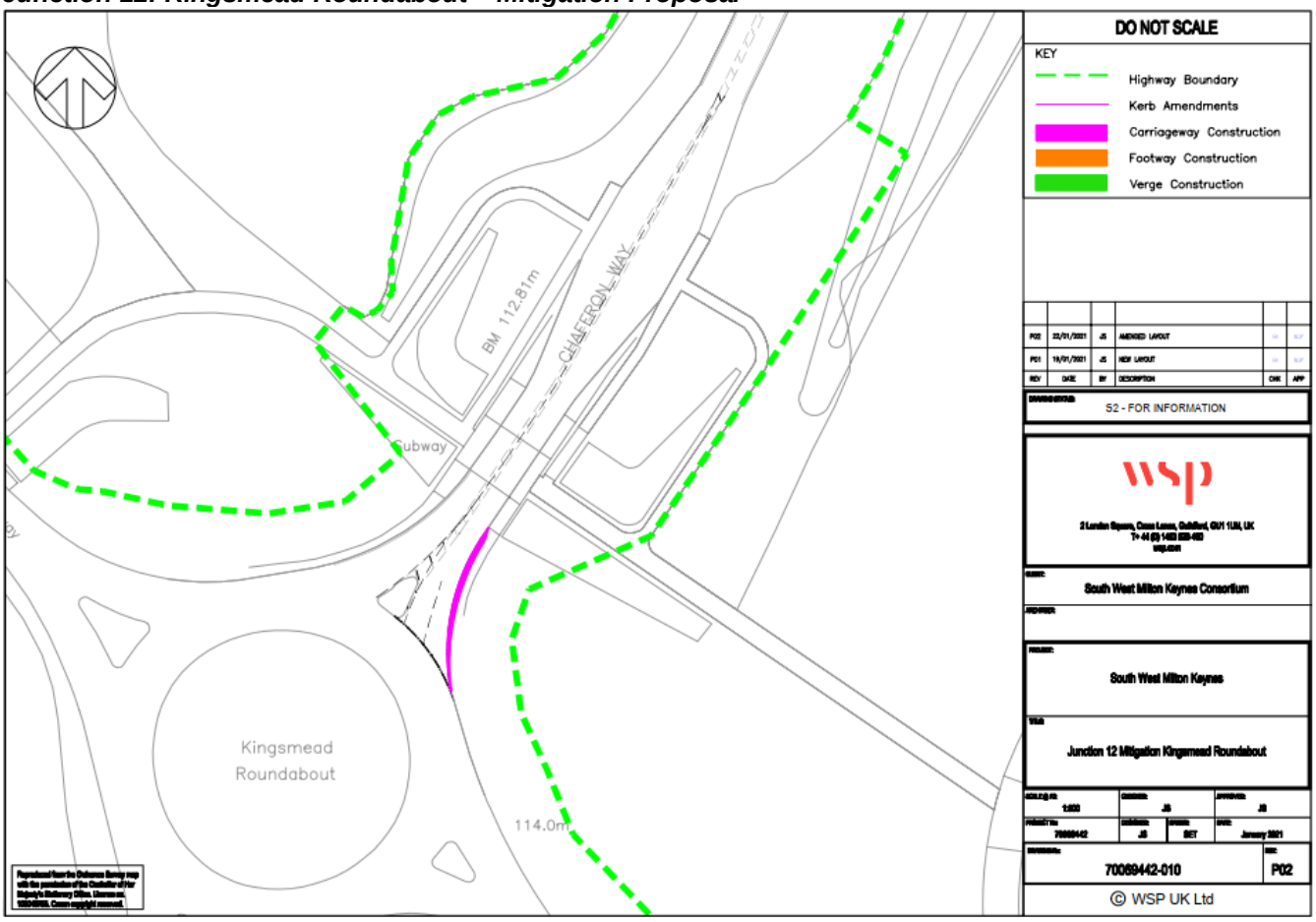
The results show that in the 2020 Base, the junction operates with satisfactory performance with all arms operating within practical capacity (RFC of 0.85) with no queue exceeding 4 vehicles and a maximum delay of 27 seconds. Considering local traffic growth the 2033 Base DN scenario shows All arms bar H7 Chaffron Way still operate under practical capacity (0.85). H7 Chaffron Way now operates over theoretical capacity (RFC of 1.0) with long queues and delay, especially in the PM where delay is now 9.5 minutes (previously 17 seconds) with queues increasing from 2 to 110 vehicles and extending for of rover 500m.

For all 2033 scenarios the queue on Snelshall Street (N) in the AM and Snelshall Street (S) in the PM may extend beyond the current flare on occasion, this may result in short-term blocking of an entry lane and mean the results are slightly optimistic. However, for the majority of the modelled period this is unlikely to occur and it is anticpated that the results would not alter to a point where significant change would be recorded.

The inclusion of development traffic in DS1 would result in further queues and delay on Chaffron Way in both peak periods with queues blocking back to Junction 13 (Westcroft roundabout) with delay of 15.5 minutes in the PM. Snelshall Street (N) and (S) in the PM operate at or above practical capacity, but still under theoretical capacity, but queues and delay are still small with maximum queue of 10 vehicles on Snelshall Street (N) in the AM and delay of 39 seconds. In DS3 (Shenley Park development) the inclusion of Shenley Park link road would see fewer vehicles through the junction and less impact with DS3 providing very similar results to 2033 DN.

The predicted decrease in capacity due to development traffic would be considered significant for Chaffron Way and the Applicant has submitted a mitigation scheme. This includes kerb widening Chaffron Way to improve capacity.

Junction 12: Kingsmead Roundabout – Mitigation Proposal



The proposed improvement to the Kingsmead roundabout has been modelled using Junctions 9 (ARCADY) with the previous capacity correction on Chaffron Way maintained as only kerb changes are proposed.

Junction 12: Kingsmead Roundabout – Mitigation Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Something 1						
A – V1 Snelshall Street (N)	11	40.8	0.94	1.5	6.73	0.6
B – H7 Chaffron Way	72.9	390.88	1.25	104.1	501.33	1.29
C – V1 Snelshall Street (S)	2.1	9.67	0.68	6.1	23.94	0.87
D - Hayton Way	0.8	4.69	0.44	0.2	3.39	0.19
2033 Do Something 2						
A – V1 Snelshall Street (N)	9.4	36.81	0.93	1.2	5.89	0.54
B – H7 Chaffron Way	69	359.63	1.24	79.1	343.04	1.21

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
C – V1 Snelshall Street (S)	1.9	9.27	0.66	5.8	23.11	0.86
D - Hayton Way	0.8	4.62	0.44	0.2	3.37	0.19
2033 Do Something 3						
A – V1 Snelshall Street (N)	4.7	18.94	0.83	1	5.44	0.5
B – H7 Chaffron Way	45.5	226.57	1.13	67.3	272.27	1.17
C – V1 Snelshall Street (S)	1.4	7.74	0.59	3.1	13.74	0.76
D - Hayton Way	0.7	4.34	0.42	0.2	3.15	0.18

The results show that with the provision of the proposed mitigation means that overall the junction results would see an improvement considering both peaks compared to the 2033 DN existing layout with the demand weighted Junction Delay reducing in the AM from 113.41 to 101.68 seconds and in the PM from 185.82 to 155.87 seconds. Chaffron Way still operates above theoretical capacity (RFC of 1.0) but has improved compared to the DN scenario with delay reduced from 7.5 to 6.5 minutes in the AM and 9.5 to 8.3 minutes in the PM, with the queue in the PM no longer blocking back to Junction 13. Minor increases in queuing and delay are evident on the other arms of the junction but overall, the mitigation measures would provide an improvement when compared to the 2033 Do Nothing scenario.

An independent Stage 1 Road Safety Audit has been undertaken and the Council is satisfied that the problems identified can be resolved during detailed design. It is considered that the proposed mitigation scheme offers a viable alternative and is proportionate and reasonably related in scale to the impact of the development, as required by the NPPF. It was noted that Chaffron Way has unbalanced lane usage with approximately 82 to 87% of vehicles likely to use the nearside lane to turn left or straight ahead. Altering the lane assignment for Chaffron Way so the nearside lane is left turn only and the outside lane caters for the remaining movements would provide more balanced lane use, with the nearside lane not catering for 48 to 63% of movements. This could be considered as part of detailed design and may aid in reducing queues and delay on this arm further.

6. Junction 13: Westcroft Roundabout

The junction is a large four arm roundabout with all approach's single carriageway but with flared two-lane entries onto the roundabout. The junction has been modelled using Junctions 9 (ARCADY), the results are shown below for the current layout. A negative capacity correction was applied against Tattenhoe Street (N) and (S) Chaffron Way (E) in the AM and for Tattenhoe Street (S) and Chaffron Way (W) in the PM to replicate current patterns and reduce likelihood of overestimation of capacity for all scenarios modelled.

Junction 13: Westcroft Roundabout – Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V2 Tattenhoe Street (N)	2.9	17.78	0.75	0.5	3.25	0.35
B – H7 Chaffron Way (E)	3.6	24.72	0.79	1.2	5.19	0.55
C – V2 Tattenhoe Street (S)	6	23.77	0.87	1.7	9.08	0.63
D – H7 Chaffron Way (W)	1.4	6.4	0.58	5.1	31.65	0.85
2033 Do Nothing						
A – V2 Tattenhoe Street (N)	57.4	275.31	1.18	0.7	3.72	0.42
B – H7 Chaffron Way (E)	30.6	150.11	1.06	3.6	11.42	0.79
C – V2 Tattenhoe Street (S)	43.5	130.51	1.06	7.1	34.09	0.89
D – H7 Chaffron Way (W)	8.1	26.28	0.9	84.2	378.17	1.24
2033 Do Something 1						
A – V2 Tattenhoe Street (N)	62.9	298.49	1.20	0.7	3.75	0.42
B – H7 Chaffron Way (E)	31.3	153.06	1.06	3.7	11.6	0.79
C – V2 Tattenhoe Street (S)	46.7	138.45	1.07	7.7	36.61	0.90
D – H7 Chaffron Way (W)	8.3	26.89	0.91	87.2	397.2	1.25
2033 Do Something 2						
A – V2 Tattenhoe Street (N)	64.2	303.76	1.20	0.7	3.74	0.42

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
B – H7 Chaffron Way (E)	31.2	153.56	1.06	3.6	11.56	0.79
C – V2 Tattenhoe Street (S)	46.8	138.65	1.07	7.7	36.95	0.90
D – H7 Chaffron Way (W)	8.3	26.87	0.91	88.6	405.81	1.25
2033 Do Something 3						
A – V2 Tattenhoe Street (N)	64.8	306.23	1.20	0.7	3.75	0.42
B – H7 Chaffron Way (E)	31.5	154.32	1.06	3.7	11.62	0.79
C – V2 Tattenhoe Street (S)	49.2	144.73	1.07	7.8	37.29	0.90
D – H7 Chaffron Way (W)	8.4	27.1	0.91	87.7	401.26	1.25

All arms in both peaks operate under theoretical capacity (RFC of 1.0) but Tattenhoe Street (S) in the AM and Chaffron Way (W) in the PM operate at or above practical capacity (RFC of 0.85). No queue exceeds 6 vehicles with a maximum delay of 32 seconds. Considering local traffic growth, the 2033 Base DN scenario shows V2 Tattenhoe Street (N) and (S) and Chaffron Way (E) operate above RFC of 1.0 in the AM and Chaffron Way (W) in the PM. This results in long queues in the PM of Chaffron Way (W) of 84 vehicles (from 5) and delay increasing from 32 seconds to 6.5 minutes. In the AM there is significant increase in queues and delay, with the longest delay now at 4.5 minutes compared to 24 seconds and the longest queue is now 57 vehicles compared to 6.

The inclusion of development traffic would result in only minor increases in results for both AM and PM peaks with queues predicted to stay similar to 2033 DN levels or increase by at worst 6 vehicles and delay by approximately 30 seconds. The residual cumulative impact of the Proposed Development in 2033 at this junction would not be significant and mitigation is therefore not required.

7. Junction 14: Furzton Roundabout

The junction is a large four arm roundabout with all approach's single carriageway but with flared two-lane entries onto the roundabout. The junction has been modelled using Junctions 9 (ARCADY), the results are shown below for the current layout. A negative capacity correction was applied against Fulmer Street (S) and Chaffron Way (E) and (W) in the AM, and for Fulmer Street (N) and (S) and Chaffron Way (E) in the PM to replicate current patterns and reduce likelihood of overestimation of capacity for all scenarios modelled.

Junction 14: Furzton Roundabout – Capacity Results

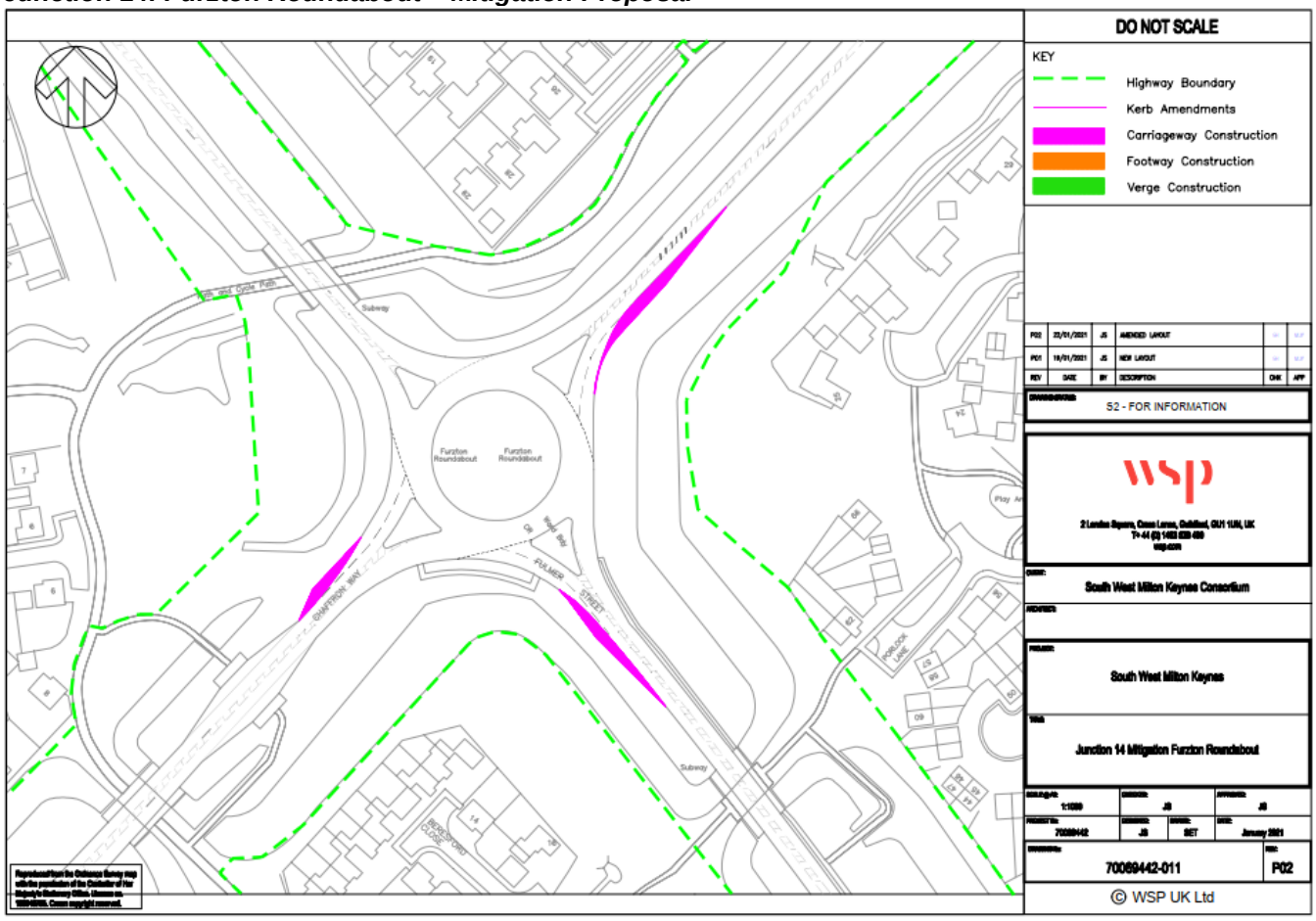
Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A - Fulmer Street (N)	0.7	4.71	0.4	3.1	11.05	0.76
B – H7 Chaffron Way (E)	1.5	9.22	0.6	28.9	109.19	1.03
C - Fulmer Street (S)	6.6	23.58	0.88	3.4	21.82	0.78
D – H7 Chaffron Way (W)	14.7	58.65	0.97	0.5	3.45	0.33
2033 Do Nothing						
A - Fulmer Street (N)	0.9	5.59	0.48	12.2	29.9	0.94
B – H7 Chaffron Way (E)	3.5	17.4	0.78	289.9	1085.76	1.58
C - Fulmer Street (S)	67	176.59	1.1	9.4	53.69	0.93
D – H7 Chaffron Way (W)	264	898.08	1.42	0.8	4.27	0.45
2033 Do Something 1						
A - Fulmer Street (N)	0.9	5.77	0.48	14.9	48.1	0.96
B – H7 Chaffron Way (E)	4.3	20.66	0.82	349	1275.24	1.66
C - Fulmer Street (S)	94.5	240.12	1.16	12.7	67.89	0.96
D – H7 Chaffron Way (W)	274.9	1021.28	1.43	0.8	4.37	0.46
2033 Do Something 2						
A - Fulmer Street (N)	0.9	5.75	0.48	14.5	46.89	0.96
B – H7 Chaffron Way (E)	4.2	20.19	0.82	340	1246.27	1.64
C - Fulmer Street (S)	90.2	230.06	1.15	12.2	65.91	0.96
D – H7 Chaffron Way (W)	273.3	1002.66	1.43	0.8	4.36	0.46
2033 Do Something 3						
A - Fulmer Street (N)	0.9	5.62	0.48	15.1	48.72	0.96

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
B – H7 Chaffron Way (E)	4.4	20.99	0.82	350	1279.48	1.66
C - Fulmer Street (S)	96.8	245.56	1.16	13.8	72.6	0.97
D – H7 Chaffron Way (W)	275.7	1037.51	1.43	0.8	4.39	0.46

The results show that in the 2020 Base, Fulmer Street (S) and Chaffron Way (W) are approaching capacity (RFC of 1.0) in the AM peak, but with relatively small queues (maximum 15 vehicles) and delay not exceeding 1 minute. In the PM peak Chaffron Way (E) operates above capacity (RFC of 1.0) with a queue of approximately 30 vehicles and delay of 110 seconds. By the 2033 (Do Nothing), Fulmer Street (S) and Chaffron Way (W) will operate above capacity (RFC of 1.0) in the AM peak with queues now in region of 70 and 260 vehicles respectively, with Chaffron Way (W) likely to block to and beyond J13 (Westcroft roundabout). In the PM Chaffron Way (E) operates above capacity (RFC of 1.0) with a queue of nearly 300 vehicles which would block back to and beyond The Bowl Roundabout.

With the addition of the development traffic (DS1) those already poorly performing arms would see further increases in queueing and delay, with the largest increase evident on Fulmer Street (S) in the AM peak and Chaffron Way (E) in the PM peak. The predicted decrease in capacity due to development traffic would be considered significant and the Applicant has submitted a mitigation scheme. This includes kerb widening on Chaffron Way (E) and (W) and Fulmer Street (S) to improve capacity.

Junction 14: Furzton Roundabout – Mitigation Proposal



The proposed improvement to the Kingsmead roundabout has been modelled using Junctions 9 (ARCADY) with the previous capacity corrections were maintained as only kerb changes are proposed.

Junction 14: Furzton Roundabout – Mitigation Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Something 1						
A - Fulmer Street (N)	1	6.28	0.51	15.2	48.87	0.96
B – H7 Chaffron Way (E)	1.7	7.84	0.63	128.4	356.18	1.23
C - Fulmer Street (S)	24.2	67.88	1.00	8.3	44.71	0.91
D – H7 Chaffron Way (W)	162.6	514.34	1.31	0.7	3.69	0.42
2033 Do Something 2						
A - Fulmer Street (N)	1	6.25	0.51	14.7	47.6	0.96
B – H7 Chaffron Way (E)	1.7	7.77	0.63	123.5	338.58	1.22
C - Fulmer Street (S)	22.1	63.16	0.99	8.1	44.01	0.91
D – H7 Chaffron Way (W)	160.7	501.73	1.31	0.7	3.68	0.42
2033 Do Something 3						
A - Fulmer Street (N)	1	6.33	0.51	15.4	49.55	0.96
B – H7 Chaffron Way (E)	1.7	7.89	0.63	128.8	358.43	1.23
C - Fulmer Street (S)	25.4	70.47	1.00	8.9	47.35	0.92
D – H7 Chaffron Way (W)	163.6	520.99	1.31	0.7	3.71	0.42

The results show that with the provision of the proposed mitigation that overall the junction results would see an improvement considering both peaks compared to 2033 DN with the demand weighted Junction Delay reducing in the AM from 364.45 to 193.91 seconds and in the PM from 389.62 to 143.39 seconds. When comparing DS1 to 2033 DN existing layout both Fulmer Street (S) and Chaffron Way (W) in the AM still operate at or above theoretical capacity (RFC of 1.0) but queues and delay are less with Chaffron Way (W) now no longer blocking back to J13 (Westcroft Roundabout). While in the PM Chaffron Way (E) is also still above theoretical capacity (RFC of 1.0) but queues and delay are less and will no longer block back to The Bowl roundabout.

An independent Stage 1 Road Safety Audit has been undertaken and the Council is satisfied that the problems identified can be resolved during detailed design. It is considered that the proposed mitigation scheme offers a viable alternative and is proportionate and reasonably related in scale to the impact of the development, as required by the NPPF with overall improvement in capacity terms. It was noted that Chaffron Way (W) has unbalanced lane usage with majority of vehicles likely to use the nearside lane to turn left or straight ahead. Altering the lane assignment for Chaffron Way (W) so the nearside lane is left turn only and the outside lane caters for the remaining movements would provide more balanced lane use. This could be considered as part of detailed design and may aid in reducing queues and delay on this arm further.

8. Junction 15: Bleak Hall Roundabout

The junction is a large four arm roundabout with all approach's dual carriageway with two lane entries, except for both Grafton Street arms which are flared with three-lane entries. The junction has been modelled using Junctions 9 (ARCADY), the results are shown below for the current layout. A negative capacity correction was applied against all arms in the AM and PM to replicate current patterns and reduce likelihood of overestimation of capacity for all scenarios modelled.

Junction 15: Bleak Hall Roundabout – Capacity Results

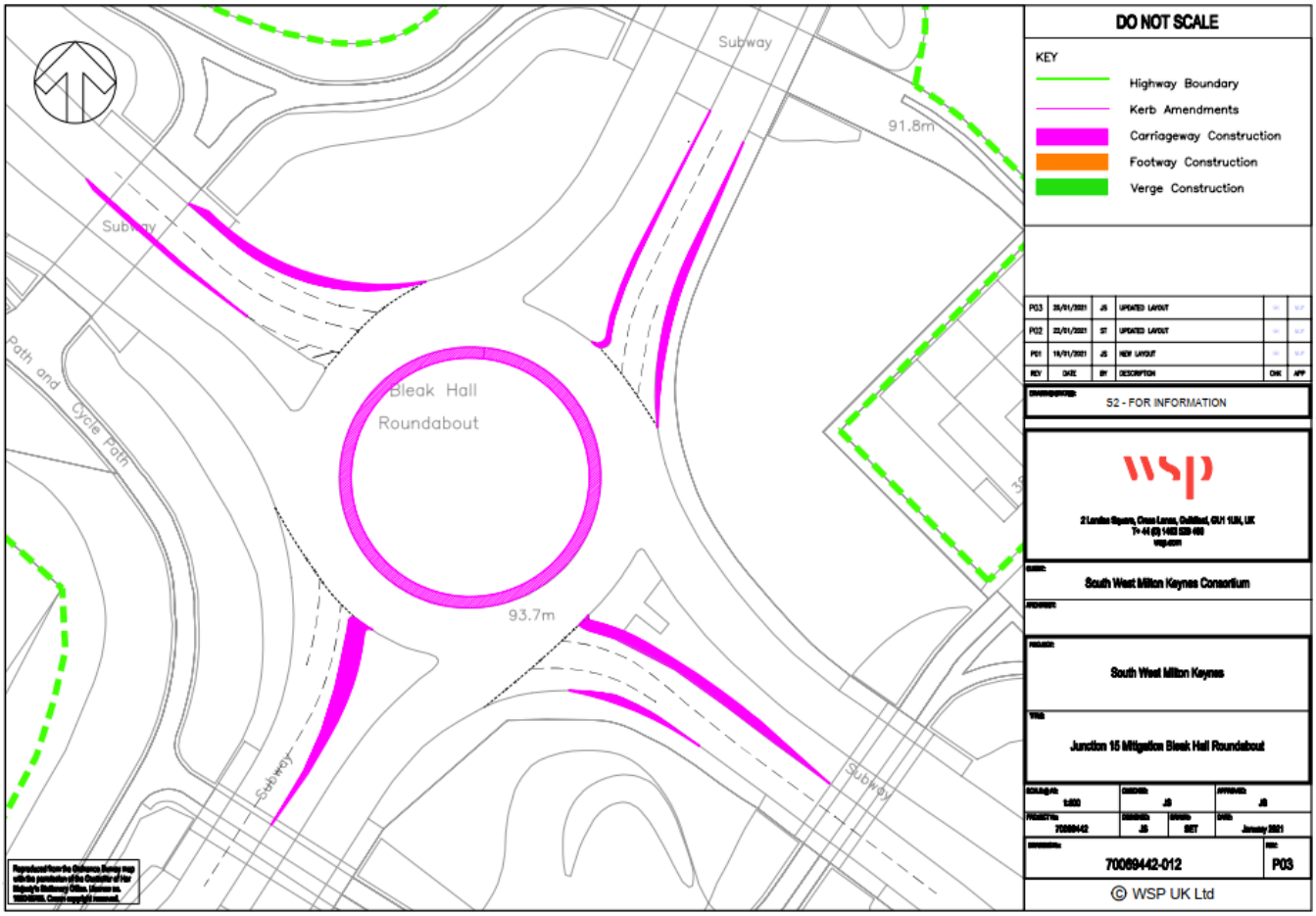
Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V6 Grafton Street (N)	33.4	117.36	1.05	41.2	130.15	1.07
B – A421 Standing Way (E)	44.9	109.16	1.05	20	59.55	0.99
C – V6 Grafton Street (S)	35.3	91.15	1.03	26.4	91.12	1.02
D – A421 Standing Way (W)	31.9	85.31	1.02	46.2	98.38	1.04
2033 Do Nothing						
A – V6 Grafton Street (N)	109.3	438.15	1.22	131.7	486.62	1.24
B – A421 Standing Way (E)	153.8	429.08	1.22	99.9	265.99	1.14

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
C – V6 Grafton Street (S)	132.7	365.66	1.19	121.1	456.99	1.23
D – A421 Standing Way (W)	138.2	394.63	1.2	165.6	390.12	1.20
2033 Do Something 1						
A – V6 Grafton Street (N)	157.8	621.85	1.28	214.4	767.85	1.34
B – A421 Standing Way (E)	245.4	653.69	1.3	300.1	830.28	1.36
C – V6 Grafton Street (S)	164.2	476.73	1.23	198.2	757.95	1.33
D – A421 Standing Way (W)	378.5	1050.39	1.42	311.2	689.96	1.31
2033 Do Something 2						
A – V6 Grafton Street (N)	151.8	599.78	1.27	200.9	719.95	1.32
B – A421 Standing Way (E)	232.9	624.16	1.29	262.6	721.02	1.32
C – V6 Grafton Street (S)	159.7	463.31	1.23	186.7	711.19	1.32
D – A421 Standing Way (W)	339.5	934.56	1.39	286.3	641.49	1.30
2033 Do Something 3						
A – V6 Grafton Street (N)	163.1	644.19	1.29	218.4	788.29	1.35
B – A421 Standing Way (E)	256.9	687.61	1.31	304.4	847.26	1.36
C – V6 Grafton Street (S)	170.9	491.02	1.24	217	834.92	1.36
D – A421 Standing Way (W)	406.4	1113.89	1.45	316.9	699.01	1.32

The results show that in the 2020 Base all arms operate above theoretical capacity (RFC of 1.0) in both peaks. In the AM A421 Standing Way (E) experiences the longest queue (45 vehicles) and Grafton Street (N) the longest delay at almost 2 minutes. In the PM A421 Standing Way (W) has the longest queue at 46 vehicles and Grafton Street (N) the longest delay once more at just over two minutes. By the 2033 (Do Nothing) all the arms are shown to have queues at or exceeding 100 vehicles in both peak periods, with A421 Standing Way (W) queues extending close to Junction 16 (Elfield Park Roundabout). Maximum delay in the AM on Grafton Street (N) of just over 7 minutes and just over 8 minutes in the PM.

With the addition of the development traffic (DS1) further reduction in capacity is expected with queues now predicting to exceed 300 or close to reaching 400 vehicles with A421 Standing Way blocking back to Junction 16. The predicted decrease in capacity due to development traffic would be considered significant and the Applicant has submitted a mitigation scheme. This includes kerb widening on all arms to improve capacity.

Junction 15: Bleak Hall Roundabout – Mitigation Proposal



The proposed improvement to the Kingsmead roundabout has been modelled using Junctions 9 (ARCADY) with the previous capacity corrections were maintained as only kerb changes are proposed.

Junction 15: Bleak Hall Roundabout– Mitigation Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Something 1						
A – V6 Grafton Street (N)	112.2	441.54	1.21	206.9	720.32	1.36
B – A421 Standing Way (E)	119.6	265.99	1.15	136.4	323.06	1.17
C – V6 Grafton Street (S)	65.89	139.57	1.08	67	185.02	1.11
D – A421 Standing Way (W)	196.7	465.51	1.25	121.3	206.81	1.12
2033 Do Something 2						
A – V6 Grafton Street (N)	106.7	412.22	1.2	192.8	658.14	1.34
B – A421 Standing Way (E)	112.4	247.14	1.14	113.9	258.81	1.14
C – V6 Grafton Street (S)	62.9	133.47	1.07	60.2	164.72	1.09
D – A421 Standing Way (W)	168.3	404.34	1.22	107.8	176.47	1.11
2033 Do Something 3						
A – V6 Grafton Street (N)	117.6	467	1.22	211.9	744.95	1.37
B – A421 Standing Way (E)	127.3	292.58	1.16	139.4	322.53	1.17
C – V6 Grafton Street (S)	68.8	143.92	1.08	76.8	221.67	1.13
D – A421 Standing Way (W)	219.7	511.31	1.27	124.2	212.55	1.12

The results show that with the provision of the proposed mitigation that overall the junction results would see an improvement considering both peaks compared to 2033 DN exiting layout with the demand weighted Junction Delay reducing in the AM from 405.00 to 326.66 seconds and in the PM from 392.55 to 339.20 seconds. When comparing DS1 to 2033 DN queuing and delay is reduced on the Standing Way (E) and Grafton Street (N) arms in the AM peak. In the PM peak queueing and delay is reduced on the Grafton Street (S) and Standing Way (W) arms. Increases in queueing and delay are

evident on the other arms of the junction when compared to the 2033 Do Nothing scenario but overall sees junction improvements, with A421 Standing Way (W) queue potentially close to blocking to J16 but not predicted to do so.

Buckinghamshire Council also sought clarification on the proposed design in terms of swept path analysis. The Appellant provided swept path analysis on the 7th April 2021, along with other junctions within Milton Keynes. On review of this information no concerns were raised with the major movement considered to be able to be completed satisfactorily.

An independent Stage 1 Road Safety Audit has been undertaken and the Council is satisfied that the problems identified can be resolved during detailed design. It is considered that the proposed mitigation scheme offers a viable alternative and is proportionate and reasonably related in scale to the impact of the development, as required by the NPPF with overall improvement in capacity terms. Furthermore, the junction has been identified in two separate Milton Keynes studies (LTP4 Transport Infrastructure Development Plan (TIDP) and MK Multi Modal Model Impacts of Plan MK report, November 2017) as a site for potential capacity improvements due to known capacity issues.

9. Junction 16: Elfield Park Roundabout

The junction is a large four arm roundabout with both A421 Standing Way approach's dual carriageway with flared three lane entries. Watling Street (S) is single carriageway approach but widens to two lanes approximately 350 metres from the roundabout with a short flare for a three-lane entry. Watling Street (N) is single carriageway approach with a short flare for a two lane entry. A negative capacity correction was applied against all arms in the AM and PM to replicate current patterns and reduce likelihood of overestimation of capacity for all scenarios modelled.

Junction 16: Elfield Park Roundabout – Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V4 Watling Street (W)	9.7	75.94	0.95	36.2	165.84	1.09
B – A421 Standing Way (N)	41.6	98.86	1.04	30.7	68.01	1.01
C – Watling Street (E)	21.3	60.43	0.99	36.3	113.13	1.05
D – A421 Standing Way (S)	27.2	62.48	1.00	47.8	105.18	1.05
2033 Do Nothing						
A – V4 Watling Street (W)	38.9	266.7	1.13	106.4	566.78	1.27
B – A421 Standing Way (N)	150.8	400.19	1.21	153.9	338.51	1.18
C – Watling Street (E)	101.8	260.35	1.14	130.2	474.42	1.24
D – A421 Standing Way (S)	147.3	333.16	1.18	169.5	421.97	1.21
2033 Do Something 1						
A – V4 Watling Street (W)	51.2	394.29	1.18	119.4	640.35	1.29
B – A421 Standing Way (N)	252.1	628.11	1.29	437.4	960.99	1.4
C – Watling Street (E)	125.4	353.14	1.18	157	575.52	1.27
D – A421 Standing Way (S)	386.8	872.97	1.38	348.3	826.33	1.36
2033 Do Something 2						
A – V4 Watling Street (W)	49.6	387.65	1.17	117.8	631.01	1.28
B – A421 Standing Way (N)	237.3	597.08	1.28	386.8	839.51	1.36
C – Watling Street (E)	122.3	341.94	1.18	153.9	563.76	1.26
D – A421 Standing Way (S)	345.5	769.51	1.35	318.8	748.36	1.33
2033 Do Something 3						
A – V4 Watling Street (W)	60.4	473.21	1.21	122.4	651.99	1.29
B – A421 Standing Way (N)	258.6	638.41	1.3	459	1012.13	1.41
C – Watling Street (E)	128.1	364.61	1.19	158.3	580.78	1.27
D – A421 Standing Way (S)	403.8	917.51	1.39	359.1	858.22	1.37

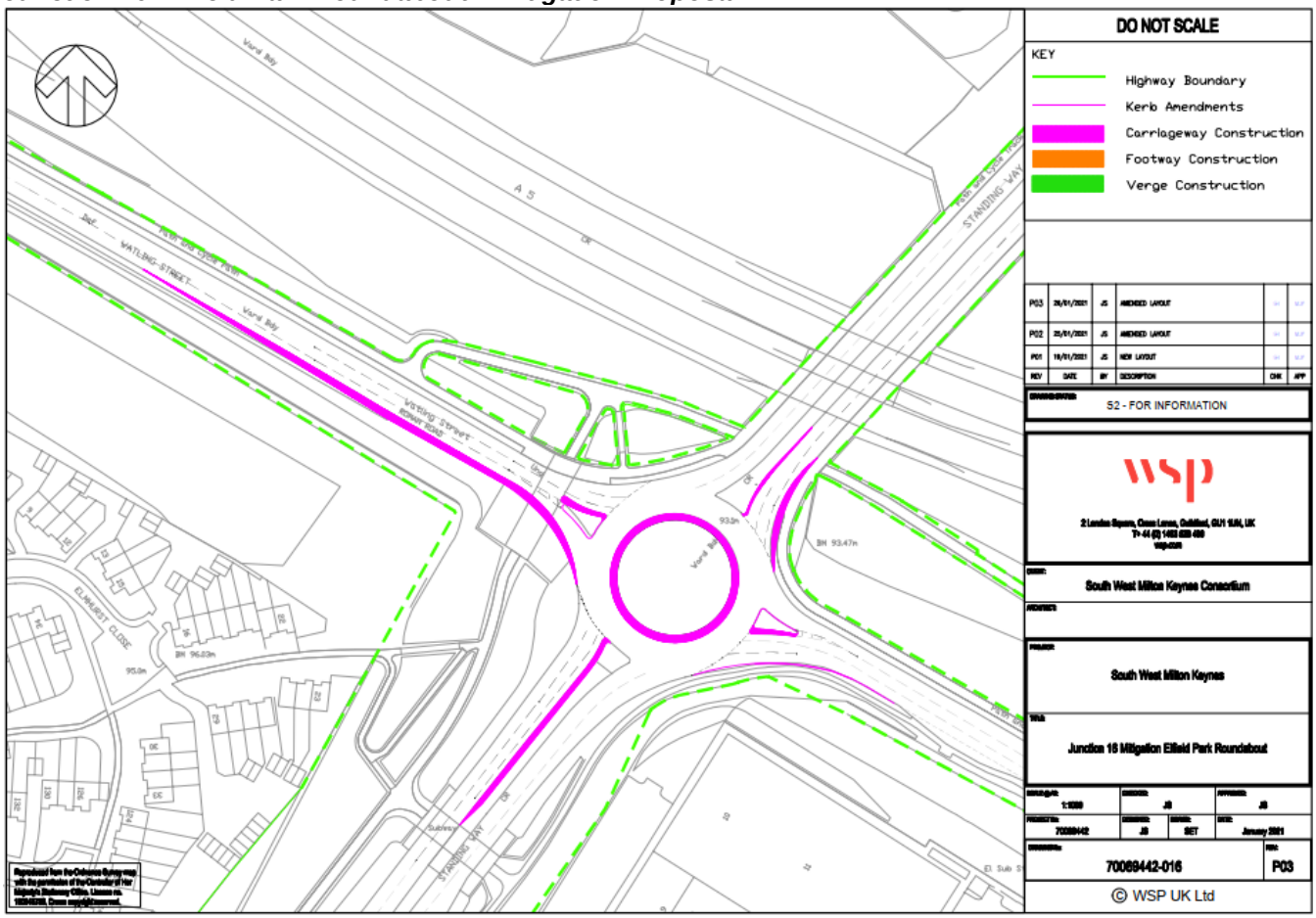
The results show that in the 2020 Base Watling Street (E) and (W) are approaching theoretical capacity (RFC of 1.0) in the AM, while both A421 Standing Way arms operate above theoretical capacity. In the PM all arms operate above theoretical capacity. The longest queue is recorded on A421 Standing Way (S) with nearly 50 vehicles with Watling Street (W) seeing the worst delay at nearly 3 minutes. By the

2033 (Do Nothing) all the arms operate above theoretical capacity with queues on all arms (except Watling Street (W)) exceeding 100 vehicles with the greatest delay experienced on Watling Street (W) in the PM of nearly 10 minutes.

With the addition of the development traffic (DS1) further reduction in capacity is expected with queues on A421 Standing Way (S) and (N) now predicting to exceed 300 or close to reaching 400, with A421 Standing Way (N) exceeding 400 vehicles in the PM, which would block back to and beyond Junction 15 (Bleak Hall Roundabout). The longest delay would now be found on A421 Standing Way (N) of 16 minutes. Maximum RFC's are lower in the DS2 (travel planning) scenario but indicate similar results to that of the Do Something 1 scenario. In the DS3 (Shenley Park) scenario the results show slightly higher RFCs than the DS1 scenario.

The predicted decrease in capacity due to development traffic would be considered significant and the Applicant has submitted a mitigation scheme. This includes kerb widening on all arms to improve capacity.

Junction 16: Elfield Park Roundabout – Mitigation Proposal



The proposed improvement to the Kingsmead roundabout has been modelled using Junctions 9 (ARCADY) with the previous capacity corrections were maintained as only kerb changes are proposed.

Junction 16: Elfield Park Roundabout – Mitigation Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Something 1						
A – V4 Watling Street (W)	6.9	48.47	0.90	51.9	216.86	1.12
B – A421 Standing Way (N)	140.5	290.58	1.17	292.2	581.67	1.28
C – Watling Street (E)	68.3	151.08	1.09	99.2	329.49	1.17
D – A421 Standing Way (S)	243.6	499.37	1.26	152.3	302.9	1.17
2033 Do Something 2						

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
A – V4 Watling Street (W)	6.6	46.61	0.89	50.5	208.17	1.11
B – A421 Standing Way (N)	131.8	268.5	1.16	247.9	503.26	1.25
C – Watling Street (E)	65.4	144.78	1.08	96.4	316.98	1.16
D – A421 Standing Way (S)	209.8	438.38	1.24	135.5	261.75	1.15
2033 Do Something 3						
A – V4 Watling Street (W)	8.4	57.35	0.92	53.1	222.15	1.12
B – A421 Standing Way (N)	147.5	309.47	1.18	311.8	616.44	1.3
C – Watling Street (E)	70	155.02	1.09	100.4	334.86	1.17
D – A421 Standing Way (S)	259.7	529.51	1.27	159.2	321.49	1.17

The results show that with the provision of the proposed mitigation that overall the junction results would see an improvement considering both peaks compared to 2033 DN existing layout. With the demand weighted Junction Delay reducing in the AM from 327.48 to 310.44 seconds and in the PM from 427.02 to 396.22 seconds. When comparing DS1 to 2033 DN queuing and delay is reduced on the Watling Street (W) and (E) in both peak periods. A421 Standing Way (N) would see reduction in the AM and A421 Standing Way (S) in the PM. A421 Standing Way (N) in the PM and A421 Standing Way (S) in the AM would see increase in queues and delay with A421 Standing Way (N) predicted queues likely to extend back to beyond J15. In DS2 the queues and delay would be reduced while DS3 would see a slight increase in results.

BC highways registered concern over the potential blocking back to J15 Bleak Hall roundabout. The Applicant provided a response on 7th April 2021. This highlighted further review of the junction flows used in the model and that only a slight reduction (5%) in network flow would result in no blocking back. It is agreed that a robust growth has been applied to the flows used in the modelling, with TEMPRO growth factor over 15% along with higher banded of employment rates to provide a 'worst case' flow scenario. The Applicant also made reference to the Department for Transport's 'Appraisal and Modelling Strategy – A Route Map For Updating TAG During Uncertain Times' (July 2020) which recommends the use of scenarios to assist with modelling future outcomes. Although the DfT has yet to publish updated forecasts, there is a clear indication of a downward trend in trips to account for the lower economic output.

BC highways also sought clarification on the proposed design in terms of swept path analysis. The Appellant provided swept path analysis on the 7th April 2021 along with other junctions within Milton Keynes. On review of this information no concerns were raised with the major movement considered to be able to be completed satisfactorily.

An independent Stage 1 Road Safety Audit has been undertaken and the Council is satisfied that the problems identified can be resolved during detailed design. It is considered that the proposed mitigation scheme offers a viable alternative and is proportionate and reasonably related in scale to the impact of the development, as required by the NPPF with overall improvement in capacity terms. The issue of blocking back to J15 Bleak Hall roundabout has been discussed and clarified. It is accepted that flows used are the 'worst case' scenario with current indicators that future growth is likely to be less than used in the model. This, along with the proposed travel planning initiatives that will form part of the Developments Travel Plans (along with any wider sustainable travel initiatives implemented as part of Plan:MK) indicates that in actuality blocking may not occur with lower than predicted flows.

10. Junction 17: Emerson Roundabout

The junction is a large four arm roundabout with both A421 Standing Way approach's two lane dual carriageway with flared three lane entries. Fulmer Street and Shenley Road are single carriageway approaches with a short flare for a two lane entry. A negative capacity correction was applied to Fulmer Street, A421 Standing Way (N) and Shenley Road in the AM and all arms in the PM to replicate current patterns and reduce likelihood of overestimation of capacity for all scenarios modelled.

Junction 17: Emerson Park Roundabout – Capacity Results

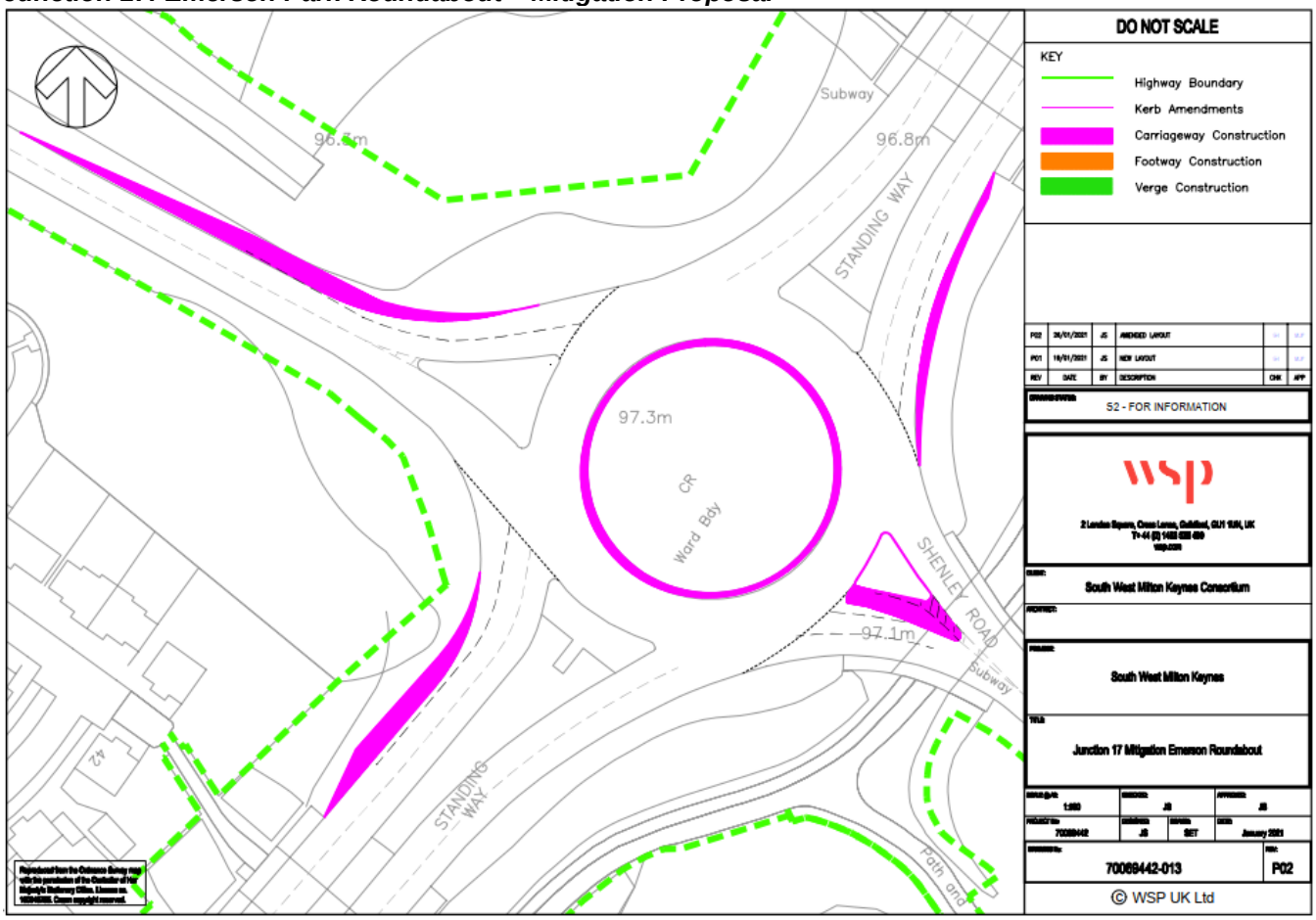
Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V3 Fulmer Street	9.8	60.35	0.94	7.2	44.65	0.90
B – A421 Standing Way (N)	18.5	55.72	0.98	12.7	27.51	0.94
C - Shenley Road	12.6	82.61	0.98	9.6	69.79	0.95
D – A421 Standing Way (S)	4.8	9.43	0.83	8	22.79	0.90
2033 Do Nothing						
A – V3 Fulmer Street	99.1	482.61	1.38	55.4	282.68	1.17
B – A421 Standing Way (N)	78.4	210.98	1.10	106.8	168.11	1.10
C - Shenley Road	55.2	329.81	1.18	58.2	407.73	1.22
D – A421 Standing Way (S)	20.2	34.61	0.97	49	104.87	1.04
2033 Do Something 1						
A – V3 Fulmer Street	203.4	1488.88	1.61	111	645.34	1.3
B – A421 Standing Way (N)	173.5	487.84	1.23	366	675.9	1.31
C - Shenley Road	86.3	582.43	1.27	109.4	839.26	1.35
D – A421 Standing Way (S)	164.3	227.24	1.13	167.7	385.85	1.20
2033 Do Something 2						
A – V3 Fulmer Street	186.8	1227.63	1.59	100.3	587.32	1.28
B – A421 Standing Way (N)	158.7	439.63	1.21	313.1	585.85	1.28
C - Shenley Road	82.4	554.47	1.26	101.9	767.14	1.33
D – A421 Standing Way (S)	137.2	177.4	1.11	146.9	330.55	1.17
2033 Do Something 3						
A – V3 Fulmer Street	214.7	1604.55	1.63	112.2	651.26	1.3
B – A421 Standing Way (N)	181.8	499.23	1.24	377.3	695.4	1.32
C - Shenley Road	88.4	594.55	1.27	115.5	891.99	1.37
D – A421 Standing Way (S)	175.4	247.62	1.14	170.2	391.85	1.20

The results show that all arms, except A421 Standing Way (S), operate above practical capacity (RFC of 0.85) in the AM and all arms in the PM. However, only two arms are predicted to encounter delay at or just above a minute and no queue is predicted to extend for 20 vehicles. By the 2033 DN all arms, except A421 Standing Way (S), operate above theoretical capacity (RFC of 1.0) in the AM and all arms in the PM. With the longest queue now at approximately 100 vehicles on A421 Standing Way (N) and delay at approximately 8 minutes on Fulmer Street in the AM.

With the addition of the development traffic (DS1) further reduction in capacity is expected with queues on Fulmer Street predicted to extend for potentially just over 1 km with delay of 25 minutes in the AM. While A421 Standing Way (N) queues could reach approximately 350 vehicles, which if stacked equally on the dual carriageway could extend for just over 1km in the PM. In the DS3 scenario the results show slightly higher RFCs than the DS1 scenario while the DS2 scenario would see a slight improvement compared to DS1.

The predicted decrease in capacity due to development traffic would be considered significant and the Applicant has submitted a mitigation scheme. This includes kerb or central island widening on all arms to improve capacity.

Junction 17: Emerson Park Roundabout – Mitigation Proposal



The proposed improvement to the Emerson Park roundabout has been modelled using Junctions 9 (ARCADY) with the previous capacity corrections were maintained as only kerb changes are proposed.

Junction 17: Emerson Park Roundabout – Mitigation Capacity Results

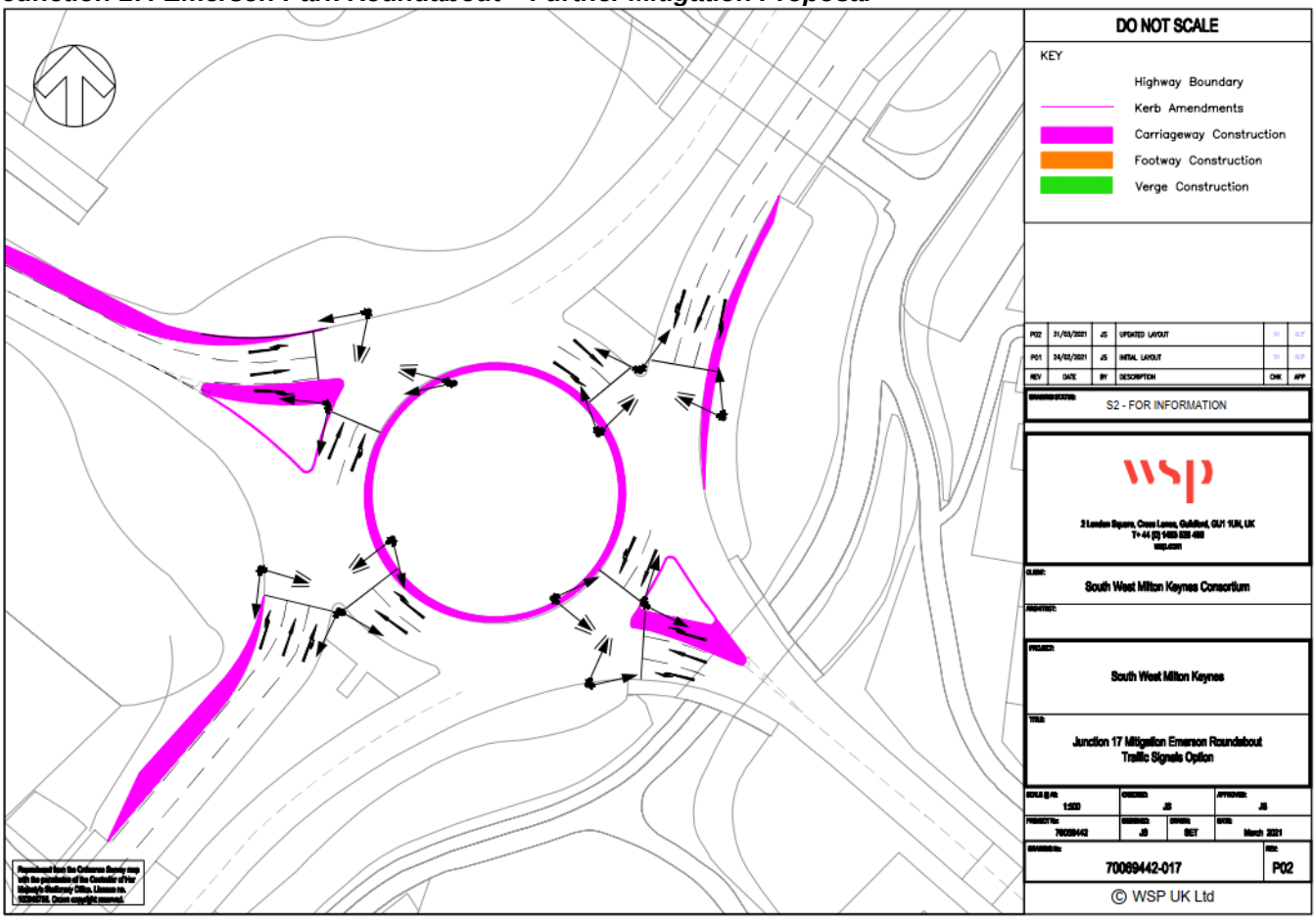
Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Something 1						
A – V3 Fulmer Street	70.6	313.99	1.23	21.1	95.01	1.02
B – A421 Standing Way (N)	96	223.51	1.12	242.5	425.54	1.23
C - Shenley Road	45.8	246.53	1.13	62.9	464.09	1.21
D – A421 Standing Way (S)	59.9	75.68	1.03	52.2	93.74	1.04
2033 Do Something 2						
A – V3 Fulmer Street	62.7	273.14	1.2	16.6	77.97	0.99
B – A421 Standing Way (N)	86.6	204.61	1.11	207.6	348.22	1.2
C - Shenley Road	42.7	216.52	1.12	57.4	422.17	1.19
D – A421 Standing Way (S)	41.8	56.87	1.01	39	74.44	1.02
2033 Do Something 3						
A – V3 Fulmer Street	74.9	349.78	1.24	21.5	96.81	1.02
B – A421 Standing Way (N)	101	234.65	1.13	249.9	441.45	1.24
C - Shenley Road	47	257.03	1.14	67.6	496.69	1.23
D – A421 Standing Way (S)	68.3	84.28	1.04	53.8	96.02	1.04

The results show that with the provision of the proposed mitigation that overall the junction results would see a mixed impact, when considering both peaks compared to 2033 DN with the demand weighted Junction Delay reducing in the AM from 186.38 to 169.56 seconds but in the PM increasing from 193.17 to 276.25 seconds. When comparing DS1 to the existing layout 2033 DN scenario queuing and delay is reduced on Fulmer Street and Shenley Road in both peak periods. A421 Standing Way (S) would see reduction in the PM. However, A421 Standing Way (N) would see a worsening of results

in both peak periods and A421 Standing Way (S) in the AM would see increase in queues and delay. No arm is expected to block back or to inhibit movements from upstream major junctions if queuing is equal between the two lanes where dual carriageway. In DS2 the queues and delay would be reduced while DS3 would see a slight increase in results.

BC highways raised concern over the predicted negative impact on demand weighted Junction Delay in the PM and the resultant long queues on A421 Standing Way (N). The Appellant provided a response in a letter dated 7th April 2021. This provided details of a potential further mitigation measures that could be deployed at the junction, this involved conversion of the junction to part-time signal control.

Junction 17: Emerson Park Roundabout – Further Mitigation Proposal



The proposed improvement to the Bottledump roundabout has been modelled using the industry standard LinSig software.

Junction 17: Emerson Park Roundabout – Further Mitigation Capacity Results for DS1

Arm Description	AM			PM		
	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)	DoS
2033 Do Something 1						
A421 Standing Way (W) Left Ahead	64.5	131.4	105.50%	27	71.4	99.70%
A421 Standing Way (W) Ahead	53.6	125.9	104.80%	12.9	71.9	99.30%
Fulmer Street Left Ahead	3.8	34.4	62.20%	2.5	25.7	40.50%
Fulmer Street Ahead	25.4	166.3	105.40%	24.2	134.8	103.30%
A421 Standing Way (E) Ahead Left	13	24.7	85.90%	28.4	46.8	97.90%
A421 Standing Way (E) Ahead	12.9	25.7	85.10%	27.5	46.5	97.50%
Shenley Road Left Ahead	31.2	219.6	109.30%	11.5	87.7	96.30%
Shenley Road Ahead	2.5	27.5	42.60%	3.4	32.7	57.30%

Such a scheme would have positive impact at the junction with Fulmer Street and Shenley Road both operating below 2033 DN existing layout conditions. A421 Standing Way (N) would now also operate better than the projected DN 2033 scenario with queues in the PM of 56 PCU (compared to 240 vehicles in the TRN3 mitigation scheme). A421 Standing Way (S) would perform better in the PM but would see worse results in the AM in the part-time signal control layout, albeit not as significantly as A421 Standing (N) in the TRN3 mitigation scheme with queues of 118 PCU and delay of just over 4 minutes (compared to 20 vehicle queue and delay of 35 seconds compared to DN 2033). The layout of the part-time signal could be relatively easily retrofitted onto the TRN3 mitigation with limited additional alterations to the junction layout.

The Applicant does not consider that the further mitigation measures are required, with the TRN3 mitigation scheme showing overall junction improvement. The part-time signals are offered on a 'Monitor and Manage' basis and only implemented when considered necessary to do so. The S278 agreement could be developed to allow the flexibility for this approach.

Buckinghamshire Council have reviewed the further mitigation scheme and are content that the model has been coded correctly as per the proposed layout. As per the J5 Tattenhoe roundabout there is the potential that the uniform queues within the internal stop lines partially blocking exits, but this is unlikely to occur every cycle. To mitigate against this 'Keep Clear' marking could be used, and it is acknowledged that during the detailed design stage, the signals would likely be better optimised. Based on the review of further mitigation proposal BC highways would support the use of the 'Monitor and Manage' approach to implement the design as and only if necessary, with the required trigger point to be determined by the respective parties.

Buckinghamshire Council also sought clarification on the proposed design in terms of swept path analysis. The Appellant provided swept path analysis on the 7th April 2021 (attached at Appendix XX), along with other junctions within Milton Keynes. On review of this information no concerns were raised with the major movement considered to be able to be completed satisfactorily.

An independent Stage 1 Road Safety Audit has been undertaken on the TRN3 mitigation proposal and BC highways is satisfied that the problems identified can be resolved during detailed design. It is considered that the proposed mitigation scheme offers a viable alternative and is proportionate and reasonably related in scale to the impact of the development, as required by the NPPF. It is noted that the scheme will potentially result in long queues on A421 Standing Way (N) in the PM, with the potential alternative part-time signal control scheme that could be retrofitted into the proposed mitigation layout that would resolve this issue, and provide overall improvement in capacity terms. Buckinghamshire Council consider that this potential alternative is appropriate and could be implemented via the 'Monitor and Manage' arrangement.

11. Junction 18: Windmill Hill Roundabout

The junction is a large four arm roundabout with all A421 Standing Way approach's being two lane dual carriageway which are flared with three-lane entries. Tattenhoe Street and Tattenhoe Lane are single carriageway approaches with short flares and two lane entries. A negative capacity correction was applied against all arms in the AM and PM to replicate current patterns and reduce likelihood of overestimation of capacity for all scenarios modelled.

Junction 18: Windmill Roundabout – Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2020 Base						
A – V2 Tattenhoe Street	16.8	94.14	1.00	7.6	44.38	0.91
B - A421 Standing Way (N)	6.8	23.74	0.88	4.5	12.07	0.82
C - Tattenhoe Lane	8.8	66.29	0.93	6.4	62.68	0.90
D - A421 Standing Way (S)	15.6	37.58	0.96	5.8	19.71	0.86
2033 Do Nothing						
A – V2 Tattenhoe Street	87.4	502.27	1.26	59.6	257.18	1.17
B - A421 Standing Way (N)	29.1	81.43	1.01	17.7	41.22	0.97

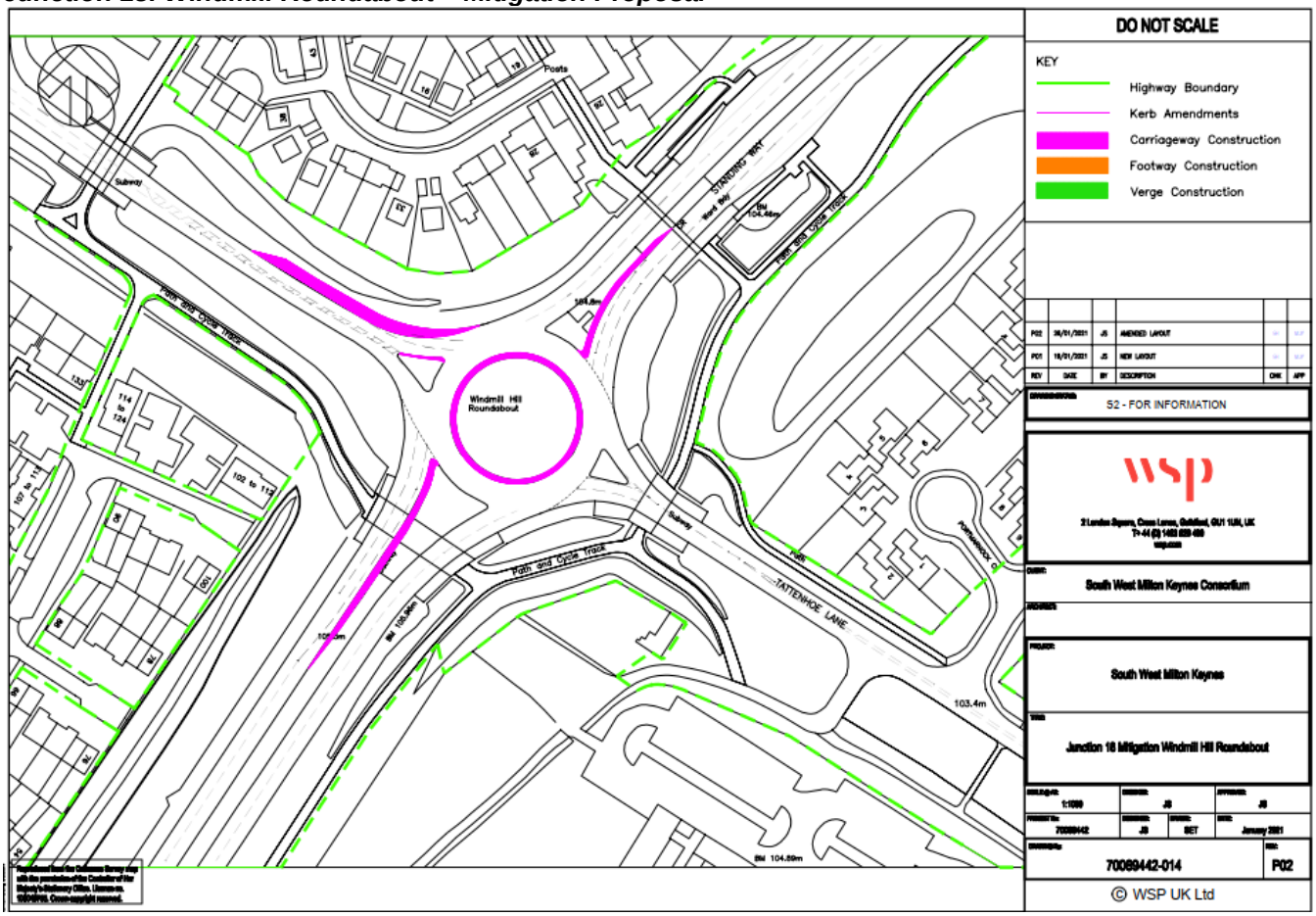
Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
C - Tattenhoe Lane	53.7	322.5	1.20	61.1	471.85	1.36
D - A421 Standing Way (S)	98.5	185.52	1.11	24.6	68.85	1.00
2033 Do Something 1						
A – V2 Tattenhoe Street	138.6	832.06	1.35	103.6	593.24	1.28
B - A421 Standing Way (N)	138.2	391.34	1.20	225.5	478.33	1.23
C - Tattenhoe Lane	99.2	744.73	1.34	151.5	1911.13	1.68
D - A421 Standing Way (S)	367.5	749.17	1.33	140.7	365.59	1.19
2033 Do Something 2						
A – V2 Tattenhoe Street	133.2	790.54	1.34	96.9	554.56	1.27
B - A421 Standing Way (N)	121.4	335.31	1.17	178.7	372.95	1.19
C - Tattenhoe Lane	93.4	700.73	1.32	140.4	1745.09	1.65
D - A421 Standing Way (S)	316.3	653.86	1.30	117.7	296.8	1.16
2033 Do Something 3						
A – V2 Tattenhoe Street	142.7	861.1	1.36	105.4	603.4	1.28
B - A421 Standing Way (N)	144.9	414.59	1.21	237.7	501.1	1.24
C - Tattenhoe Lane	104.5	784.59	1.35	154.5	1949.16	1.69
D - A421 Standing Way (S)	389.2	798.99	1.35	144	375.23	1.19

The results show that in the 2020 Base AM that all arms operate above practical capacity (RFC of 0.85) with Tattenhoe Street at theoretical capacity (RFC of 1.0). In the PM all arms except for A421 Standing Way (N) operate above practical capacity (RFC of 0.85). The longest queue is 17 vehicles on Tattenhoe Street in the AM and greatest delay is 1.5 minutes on the same arm. By the 2033 (Do Nothing) all the arms in the AM and PM are shown to operate at or above theoretical capacity except for A421 Standing Way (N) in the PM. The longest queue would form on A421 Standing Way (S) of nearly 100 vehicles and greatest delay on Tattenhoe Street of nearly 8.5 minutes, an increase of 7 minutes.

With the addition of the development traffic (DS1) further reduction in capacity is expected with all arms in both peak periods now exceeding RFC of 1.0. Queues are predicted to exceed 100 vehicles in both peaks with A421 Standing Way (N) in the PM exceeding 200 vehicles and A421 Standing Way (S) in the PM exceeding 360 vehicles. The greatest delay would still be Tattenhoe Street of nearly 14 minutes.

The predicted decrease in capacity due to development traffic would be considered significant and the Applicant has submitted a mitigation scheme. This includes kerb widening on all Tattenhoe Street and A421 Standing Way (N) and (S) with amended road markings on Tattenhoe Lane to create a longer flare and wider entry, all with the intent on improving capacity.

Junction 18: Windmill Roundabout – Mitigation Proposal



The proposed improvement to the Windmill roundabout has been modelled using Junctions 9 (ARCADY) with the previous capacity corrections were maintained as only kerb or road marking changes are proposed.

Junction 18: Windmill Roundabout– Mitigation Capacity Results

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Do Something 1						
A – V2 Tattenhoe Street	2.8	13.32	0.74	1.9	8.66	0.66
B - A421 Standing Way (N)	55	119.81	1.06	121.8	185.35	1.12
C - Tattenhoe Lane	23.2	131.76	1.04	44.8	408.84	1.2
D - A421 Standing Way (S)	152.6	253.19	1.15	20.2	47.09	0.98
2033 Do Something 2						
A – V2 Tattenhoe Street	2.7	12.98	0.74	1.7	8.09	0.64
B - A421 Standing Way (N)	42.2	96.55	1.04	85.3	134.42	1.08
C - Tattenhoe Lane	20.4	116.93	1.03	39.7	352.38	1.18
D - A421 Standing Way (S)	123.8	189.24	1.12	14.4	35.39	0.95
2033 Do Something 3						
A – V2 Tattenhoe Street	2.9	13.55	0.75	1.9	8.76	0.66
B - A421 Standing Way (N)	60.9	130.96	1.07	129.7	196.56	1.13
C - Tattenhoe Lane	25.4	141.84	1.05	46.3	424.11	1.2
D - A421 Standing Way (S)	165.3	280.88	1.16	21.2	49.01	0.98

The results show that with the provision of the proposed mitigation that overall the junction results would see an improvement considering both peaks compared to 2033 DN existing layout with the demand weighted Junction Delay reducing in the AM from 225.69 to 163.86 seconds and in the PM from 136.59 to 133.11 seconds.

When comparing DS1 to 2033 DN Tattenhoe Street sees a marked improvement with the arm operating under practical capacity (RFC of 0.85) with negligible queues and delay. Tattenhoe Lane would still operate above capacity but with an improvement in capacity operation and reduction in queues and delay. A421 Standing Way (N) would see an increase in queuing and delay, as well as A421 Standing Way (S) in the AM. Overall junction delay is reduced in both peaks, showing improvements with no blocking of major node junctions.

An independent Stage 1 Road Safety Audit has been undertaken and the Council is satisfied that the problems identified can be resolved during detailed design. It is considered that the proposed mitigation scheme offers a viable alternative and is proportionate and reasonably related in scale to the impact of the development, as required by the NPPF with overall improvement in capacity terms. It was noted that with the extend flare on Tattenhoe there is the potential alter the lane assignment so the nearside lane is left turn only and the outside lane caters for the remaining movements, this would provide more balanced lane use and could be considered as part of detailed design and may aid in reducing queues and delay on this arm further.

Milton Keynes Council expressed initial concern (prior to the review of TRN2 and TRN3) that the impact of the development within Milton Keynes would be considered severe on the highway network as per NPFF. Furthermore, the static modelling used does not take account of potential redistribution through the network. Buckingham Council are content that the network junction assessment has been performed via the use of industry standard modelling software with the base models undergoing a rigorous calibration process and that the comprehensive mitigation package for the local junctions, as detailed in TRN2 and TRN3, will reasonably accommodate the impact of the Proposed Development on the local junction network. This is taking into consideration the flows used are the 'worst case' scenario. The mitigation modelling with development traffic has shown that overall, most junctions will operate at the same level or better than the current layout using the DN scenario, whilst noting that some arms may perform worse but when considering each junction as a whole across both peak periods improvements can be observed and would therefore not be considered as severe.

9. Impact Traffic through the Villages

The agreed development trip distribution has identified additional trips passing through local villages including Newton Longville, Little Horwood, Mursley and Great Horwood. The Transport Assessment considers the impact of the proposed development on these villages, in terms of capacity, and has been assessed 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 which have been used to determine the impact of the development:

- 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.

Traffic flows through the villages were identified via the traffic flow diagrams developed and agreed as part of the development trip generation and distribution process and provided in TRN2. 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.

2033 Do Nothing Village Traffic Flows

Location		AM Peak			PM Peak		
		N/b	S/b	Total	N/b	S/b	Total
1	Nash	135	104	239	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	775	416	316	732

The increase in link flow through the Villages as a result of the Proposed Development was updated in TRN and the following tables provide the percentage increase compared to the 2033 Do Nothing Scenario.

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%	3%	2%	3%	2%	2%
4	Little Horwood	8%	7%	7%	20%	7%	10%
5	Mursley	3%	6%	4%	8%	4%	6%
		E/b	W/b	Total	E/b	W/b	Total
6	Newton Longville	17%	12%	14%	12%	20%	15%

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%	2%	2%	2%	2%	2%
4	Little Horwood	7%	7%	7%	13%	5%	7%
5	Mursley	2%	5%	3%	8%	4%	6%
		E/b	W/b	Total	E/b	W/b	Total
6	Newton Longville	15%	10%	12%	10%	17%	13%

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%	2%	2%	2%
4	Little Horwood	8%	7%	7%	20%	7%	10%
5	Mursley	2%	6%	4%	8%	4%	6%
		E/b	W/b	Total	E/b	W/b	Total
6	Newton Longville	16%	11%	14%	12%	19%	15%

The results of this revised assessment indicate that the increase in traffic flow through Nash, Great Horwood, and Mursley are not considered to be significant (do not exceed the 10% traffic growth for sensitive areas) and would not result in a significant impact on the local highway network. Little Horwood does have a conservation area and should therefore be considered 'sensitive' in nature and against the lower GEART threshold (10%) for impact, which is predicted to be 20% increase for both DS1 and D3 scenarios in the PM. However, the actual change in traffic flow in the PM peak is only six vehicles northbound and seven vehicles southbound (a total of 13 vehicles) and this is not considered to be a significant change in traffic flow and I would not result in a severe impact through the village.

Newton Longville also has a conservation area and should be considered against the lower GEART threshold (10%) for impact. The assessment has shown there be 10% or more growth through the village in both peak periods for the scenarios which is considered to constitute a significant impact. The

Applicant has therefore proposed a traffic calming scheme to mitigate the impact of the development, which is addressed later in this response and is to be secured in a S106 Agreement.

Whilst no impact is predicted for Whaddon a consultee has queried the accuracy of the traffic flows, and subsequent traffic impact modelling, may have affected the journey time analysis on the basis that road closures were in place within north Milton Keynes impacting the potential movements through the village. A previous financial contribution of £22,000 to improve road safety and enhance the existing traffic calming was previously agreed, to mitigate against potential redistribution via Whaddon Village and improve road safety through the village discussion are ongoing for the previous agreement is to be maintained and secured in a S106 Agreement.

Some consultees have quired the validity of the impact on local villages, including citing that the assessment does not include neighbouring developments. Buckinghamshire Council are satisfied that the impact on villages performed by the Applicant is robust and founded on 'worst' case whole development trip generation and appropriate trip distribution and includes committed developments in the area and the sensitivity test for Shenley Park and therefore is fit for purpose. Where necessary mitigation measures have been proposed to alleviate potential impacts.

10. Impact on Highway Safety

The agreed development trip distribution has identified additional trips on the network and the Applicant has utilised the computer programme COBALT (Cost and Benefit to Accidents – Light Touch) developed by the Department of Transport (DfT) to undertake analysis of the impact of the Proposed Development on highway safety. 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.

COBALT analysis provides a summary of the likely impact on collisions across a defined study area. Each link is 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. Traffic flows identified via the traffic flow diagrams developed and agreed as part of the development trip generation and distribution process and provided in TRN2 were used to perform the analysis.

The analysis indicates that most links across the study area will see very small changes in 'negative benefits' (as they are described in COBALT), with B4304 Buckingham Road and A421 Standing Way to the east of the site showing the greatest impact of the development traffic, as shown below.

COBALT analysis

The COBAL analysis also predicts and a change in collisions and casualties (over a 60-year period). The results of which are shown below and predict that there will be an increase of 140 collisions with 202 casualties because of development traffic. This equates to on average to 2.4 collisions and 3.4 casualties per year. It should be noted that the analysis does not consider mitigation measures proposed as part of the development application.

COBALT Collisions - Casualty Prediction Over 60 years

	Slight	Serious	Fatal	Total Casualties
Without Proposed Development	2,857	356	48	3,261
With Proposed Development	3,037	377	50	3,464
Difference (60 years)	+180	+21	+2	+203
Difference (average per year)	+3.0	+0.35	+0.033	+3.38

Buckinghamshire Council are satisfied that the development will not have a significant impact on highway safety and that overall does not represent an unacceptable impact.

1. Impact of Construction Traffic:

The Applicant has produced 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

The table below provides the summary of likely construction traffic per phase of development.

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

Phase 1 of the development is likely to generate the largest number of movements. The table below provides the peak construction phase trip generation presented as an AADT and AAWT.

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

The Applicant has stated the intention to route all construction traffic to and from the site through the Whaddon Road access within Buckinghamshire. The main reason being that this will provide the best segregation between residential and construction traffic through the phasing of the site build. All Heavy Goods Vehicles (HGVs) have been assumed to utilise the A421 to access and egress the site, whilst workers will arrive and depart via using the agreed employment distribution. In this regard it is proposed that a planning condition is agreed in relation to the Construction Environmental Management Plan, which stipulates that HGVs would utilise A421 and would not route via Newton Longville or any other local village in the immediate environs, i.e. those villages included in the Impact on Villages.

The Applicant has performed analysis of the proposed increase in base traffic as a result of construction traffic. This shows that the link with the highest anticipated increase is Whaddon Road

between the new access and Bottledump roundabout. This will not exceed the 10% GEART threshold that would represent a discernible change in traffic volume given day to day fluctuations in 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%

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. The CEMP and the Construction Traffic Management Plan (CTMP) will be agreed with both Buckinghamshire Council and Milton Keynes Council prior to the commencement of construction.

Buckinghamshire Council are satisfied with the arrangement for the use of the Whaddon Road access for the primary construction access and egress point and the derived construction traffic flows. The CEMP and CTMP will need to be agreed prior to construction with relevant a planning condition applied to negate any potential impact on the surrounding villages and peak hour traffic.

11. Newton Longville Traffic Calming Proposals

An indicative traffic calming scheme for Newton Longville has been submitted as part of the revised Transport Assessment, which includes enhanced gateway features on all roads leading into the village, pinch points along Whaddon Road, raised junction tables and signing/lining. Buckinghamshire Council has undertaken a Stage 1 Road Safety Audit on the scheme and revisions to the proposals have been carried out, including the removal of the mini-roundabout and the installation of raised tables.

A number of consultee responses made reference to the increase in traffic through the village being of detriment to road safety, capacity and the environment. Buckinghamshire Council is satisfied that the scheme would provide the desired effect of deterring traffic that could otherwise use the strategic road network, by slowing journey times through the village. Despite this, the Council is aware that Newton Longville Parish Council has their own aspirations for traffic calming within the village and is of the view that it would be more appropriate for a financial contribution towards the design, consultation and implementation of traffic calming be paid by the Applicant. This will allow the Council to work with the Parish Council to provide a comprehensive traffic calming scheme that meets the aspirations of the local community. A contribution of (exact amount to be determined) is required and will be secured in a S106 Agreement.

12. Public Transport Provision

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.

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.

To ensure that all new dwellings are within 400m walking distance to a bus stop, it is essential for a bus service to be provided that enters the site. The Applicant has proposed to either enhance an existing bus service or provide a new start up service to operate between the proposed development and Central Milton Keynes (CMK) via the existing rail station. The objective is to provide a high quality, fast, frequent and reliable bus service that serves the social and accessibility needs of those without access to a car. It is also expected that with the effective marketing initiatives included within the Framework Travel Plan, people who would otherwise use a private car will be encouraged to use the proposed bus service for many of their work and leisure-based journeys.

The Applicants 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.

The bus service would have a phased operation based on the anticipated 'build-out' of the Proposed Development with the intention 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. The proposed bus service between the Site and Central Milton Keynes would commence no later than the occupation of the 100th dwelling. Buckinghamshire Council have requested that a second trigger be applied to the start of the bus service so the service would start no later than the occupation of the100th dwelling or 12 months from first occupation, this trigger is to be secured through the s106 agreement. Buckinghamshire Council also requires the submission of a bus service phasing plan, which can be secured by condition.

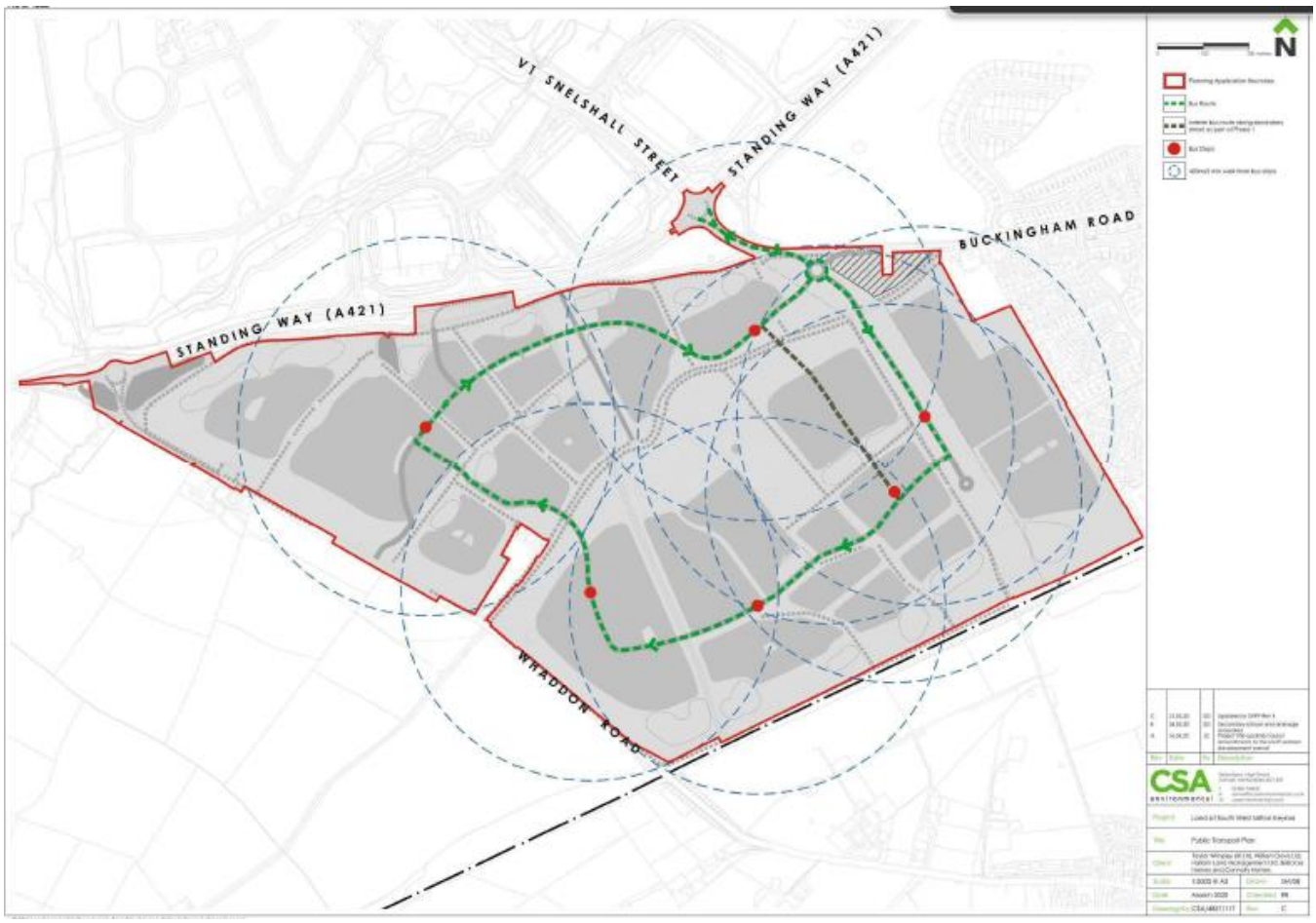
The initial phase of the development will include the construction of the primary school. The new/extended bus service should be available prior to the schools opening and becoming fully operational.

The required hours of operation are detailed below:

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

The contract for operating the new service would normally be tendered by Milton Keynes Council in conjunction with the public transport team at Buckinghamshire Council. On this occasion however, the Applicants wish to have a service level agreement directly with the preferred operator and agree the appropriate costs to operate a viable high quality service in perpetuity. This will be provided by way of a S106 obligation, in consultation with both Milton Keynes Council and Buckinghamshire Council.

Indicative locations of the bus stops are shown on the illustrative masterplan and the majority of residential properties are within 400m walking distance of a bus stop, which is considered appropriate.



13. Rail Provision

The nearest railway station to the development sites is Bletchley Railway Station, approximately 4km distance to the east via the A421 / B4034. The station has provision for 628 parking spaces with 29 for use by the mobility impaired. There is also sheltered parking for 58 bicycles at the station. It provides an hourly service to Milton Keynes, London Euston, Bedford, Croydon and Clapham Junction and links to the north including Milton Keynes Central and Birmingham New Street.

Bus access to Bletchley Railway Station would be via Bus Route 4 that operates with a frequency of every 20 minutes. The nearest bus stop for Route 4 is on Whaddon Way in Bletchley, a 950m walk from the Buckingham Road site access. Bus users would alight at Sherwood Road, from where it is a 300m walk to the Railway Station. The total journey time for this route would be 20 minutes (11 minute walk, 5 minutes bus, 4 minute walk).

Cycle access to Bletchley Railway Station would be via Buckingham Road. There is an existing Redway along Buckingham Road to Caernarvon Crescent, from where the route would be on-road to the station. The route is 3.2km long, equivalent to a 13 minute cycle (based on an average cycling speed of 15kph). An alternative route would be via the Redway on Buckingham Road initially, then using the quieter on-road routes of Whaddon Way, Shenley Road, Church Green Road, Wilton Avenue and a short cycle path to the station. The route on quieter roads is 4km; equivalent to a 16 minute cycle. The Applicant has proposed a contribution for the provision of additional sheltered and secure cycle parking at Bletchley Station , to promote the use of sustainable travel to and from the station. This is to be secured as an obligation by way of a S106 Agreement.

Milton Keynes Central Railway Station is approximately 7km from the site (via Snelshall Street, Childs Way and Elder Gate). It provides an hourly service to Watford Junction, London Euston, Croydon and

Clapham Junction. Access to Milton Keynes Central Railway Station by public transport would be via a new or extended bus service, with an approximate travel time of 20 minutes from the Site. The station provides sheltered storage for 900 bicycles and can be accessed from the site via the Redway network, a journey of approximately 30 minutes.

Buckinghamshire Council consider that new residents of the proposed development would have ability to access rail services by means other than that of the private car.

14. Cycle and Pedestrian Provision

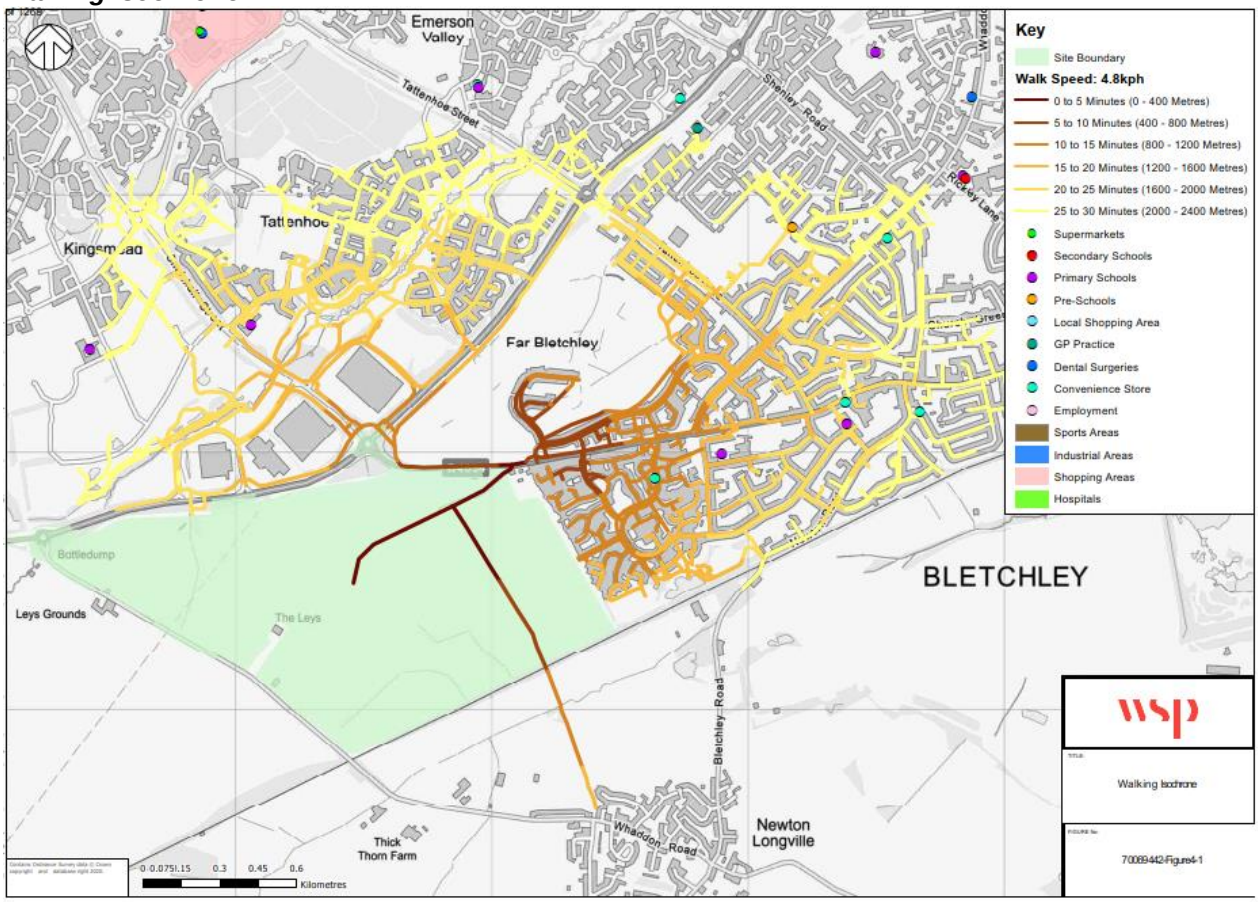
The Site is currently served by a network of existing pedestrian footways and public rights of way predominantly to the north and east of the Site and provide suitable access from the site to local footway/footpaths and the local cycle network, providing connections to services and facilities within the area. The existing opportunities for walking to the south and of the Site are limited given the more rural nature of those locations.

National Cycle Route 51 is the nearest cycle route to the A421 corridor; it runs between Bletchley and Winslow, passing to the south of Salden Chase, before continuing to Bicester. Furthermore, the majority of the A421 corridor consists of unclassified rural roads, where on-road cycling is a viable option.

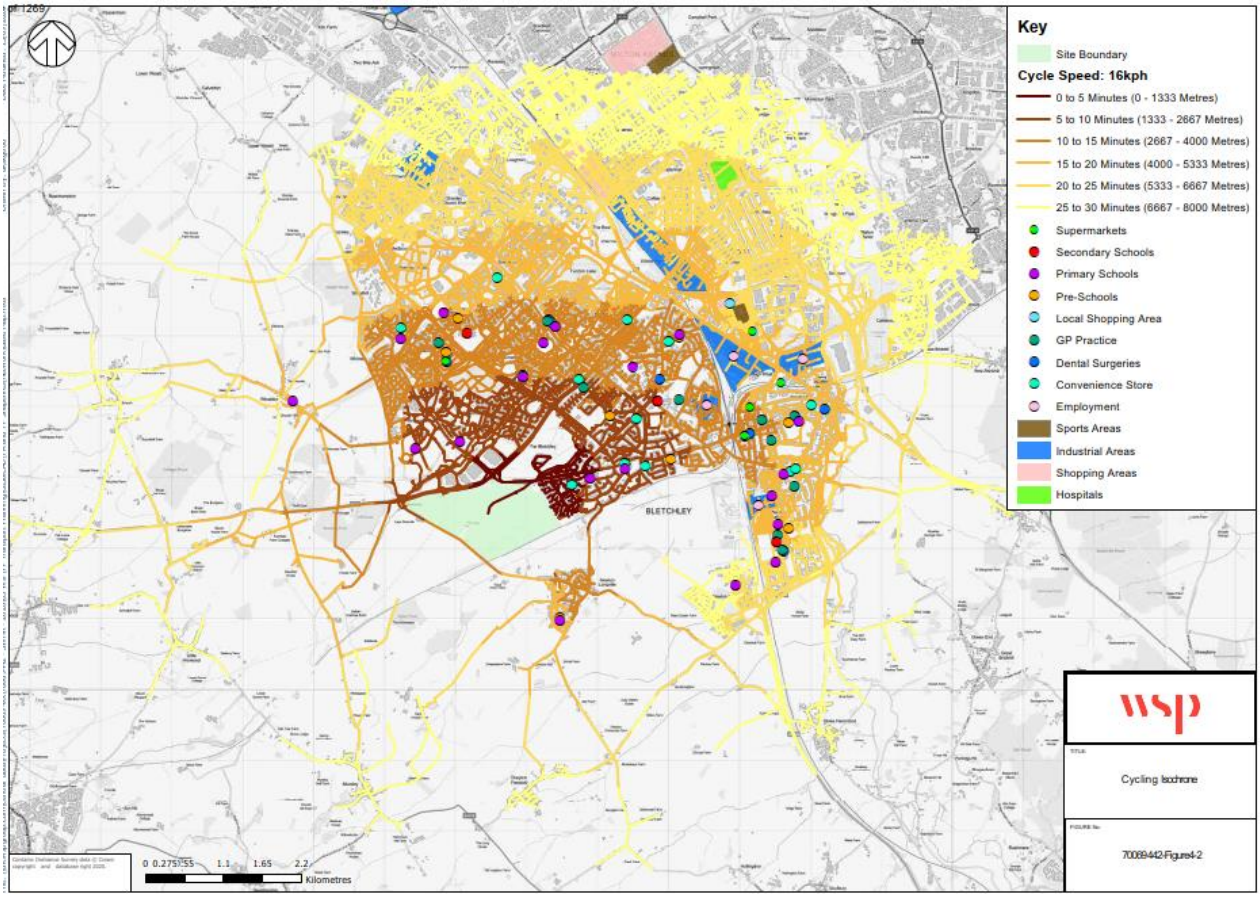
The Milton Keynes Cycle Network, known as the Redway System, commences west of the Bottle Dump roundabout and continues eastbound, north of the A421 Standing Way. The existing infrastructure provides highway quality routes from the site to both Milton Keynes City Centre and Central Milton Keynes Railway Station.

Updated walking and cycling isochrones were provided in TRN1 to highlight the range of facilities and amenities accessible within walking and cycling distance of the Site. These indicate that most of the existing amenities and facilities will be within an acceptable cycling distance but fall outside typical pedestrian distances. This is offset by the proposed development providing on site facilities and amenities which will likely minimise the need for longer walking journeys, with a convenience store, primary and secondary schools, retail space for Café, Pub or Takeaway and community facilities. Furthermore, as part of the S106 agreement the securement of a contribution toward the delivery of healthcare facilities either on or off site has been agreed.

Walking Isochrone



Cycle isochrone



An updated illustrated masterplan has been submitted in support of the planning application. The masterplan aims to encourage walking and cycling as realistic alternatives to that of the private car, through high quality infrastructure. Pedestrian access to the proposed development will be achieved as follows (with all but the recreational footpaths being available for use by cyclists):

- The old Buckingham Road south of the current A421 dual carriageway
- Whaddon Road - across the A421close to Bottle Dump Roundabout via the existing subway
- The existing Subway across A421 to Snelshall West
- Buckingham Road – south east of the Tattenhoe Roundabout

Consideration will need to be paid to pedestrian crossing facilities as part of any future reserved matters application. At this stage the following crossings have been identified:

- A toucan crossing across the Primary Road at Weasel Lane
- A surface crossing to provide safe and convenient access to the secondary school. This should be in the form of a controlled facility
- A Pegasus crossing across Whaddon Road
- Toucan crossings on Buckingham Road East and Buckingham Road West

The application proposes a new connection for walkers and cyclists between Weasel Lane and the Bottle Dump roundabout, along a green corridor. This will provide an important strategic connection between NCN 51; the proposed new cycling route along the old Buckingham Road (A421); and the Redways alongside the new A421.

As this is an outline application with all matters reserved except access, details of the cycle and pedestrian infrastructure within the site will need to form and be considered as part of any future reserved matters application.

Buckinghamshire Council consider that new residents of the proposed development would have ability to access on-site amenities and facilities on foot or on bike, with external trips being achievable by bike but limited local trips on foot due to distance. However, the new high frequency bus service will provide the opportunity for multi-modal journeys to be performed and consider the overall the development will have a positive impact on pedestrian and cyclist movements.

15. Public Rights of Way:

Several improvements to the surfacing of the local footpaths is proposed by the Applicant, as outlined below. Those within the site will be completed as part of the development and a financial contribution is to be secured as part of the Section 106 Agreement for those routes outside of the site.

Weasel Lane

Passing south-west to north-east through the centre of the site, Weasel Lane is likely to be a busy walking and cycling route used by new residents. Weasel Lane is restricted by a byway, for use by pedestrians, cyclists and horseback. Notwithstanding its status, Weasel Lane is accessible to motor vehicles from both Whaddon Lane and Buckingham Road and provides access to the existing residential property.

It is proposed as part of this application to improve the surface of Weasel Lane, which will encourage walking and cycling within the site but also longer trips to Milton Keynes and Winslow that National Cycle Route (NCN 51) aims to achieve. A 3m wide walking cycling route should be secured by way of condition and supported by a section 106 to resurface Weasel Lane outside the red line, from Whaddon Road south-east to the property Weasels'. A 2.5m x 1,200m loose surface, such as road planings, was originally suggested, this will be secured by means of the S106 agreement (exact amount to be determined).

Connection to Newton Longville

Footpath 19 Newton Longville Parish connects the parish of Newton Longville with the new development site. As part of the package to mitigate the impact of the development and improve connectivity with Newton Longville, an improvement is required along Footpath NLO/19/2 and NLO/19/3. The footway within the site is to be resurfaced to a sealed carriageway standard to a width of 3m between Weasel Lane and the railway underpass, to be dedicated as a public bridleway. South of the railway bridge, a contribution (exact amount to be determined)is required for the improvement of the footpath between the site and Nos. 36 and 38 Whaddon Road, Newton Longville to provide a 2m wide granite to dust path.

16. Internal Road Layout

As part of the illustrative masterplan submitted in support of the planning application, a new network of Primary Streets will form the principal circulation route for all vehicular traffic. The route will connect with the existing highway network at the three access points. The indicative plans show that the primary street is to be 7.3m wide, with a footway/cycleway of 3m wide, which is considered to be appropriate for the nature of the road.

The primary streets are to form part of the proposed bus route. The primary streets therefore need to be designed to avoid on-street car parking, which could result in obstructions to the bus route. This could be achieved by ensuring appropriate off-street parking is provided, the use of on-street car parking laybys, and frontage car parking with dropped kerbs. This will need to be considered as part of any future reserved matter applications.

The illustrative masterplan shows the tertiary roads to be between 4.8m and 5.5m, which are considered appropriate for the nature of the road. It should be noted that if a shared surface is to be proposed then a minimum width of 4.8m (not including service margins) would be required. All roads will need to be designed to accommodate an 11.2m refuse vehicle in line with Buckinghamshire Council and tracking should be provided as part of any future reserved matters application.

There are two schools (a primary and secondary) proposed as part of the development. The internal road layout will need to be carefully designed as part any future reserve matters application to accommodate these facilities. The design will need to consider drop off provision, widened footways, crossing points, road signage and lining to provide for a serviced school site. In addition, the bus stops serving the school will need to be designed to accommodate the predicted number of buses/coaches, to ensure that they do not obstruct the free flow of traffic. This will require early engagement with Buckinghamshire Council's Education and Highways Development Management team.

17. Grid Road:

Whilst the proposed development only requires a single carriageway road for access, the masterplan has been developed to ensure that a dual carriageway could be provided in the future. The land for the grid road will need to be adequately secured in the S106 Agreement, so that the Councils can develop and implement a scheme in the future. Furthermore, the detailed design should look to limit the future cost of dualling and this will need to be demonstrated as part of a future reserved matters application.

18. Framework Travel Plan:

The Applicant has developed a Framework Travel Plan (FTP) for the Site with the aim in reducing traffic generated by the Proposed Development and increasing the use of sustainable travel modes.
The FTP submitted as part of the planning application includes details of the initial targets that will be set regarding modal shift and details of the measures that will be put into place to achieve this modal shift. Buckingham Council requested that the FTP be costed to determine appropriate levels of commitment would be provided to support the initiatives.

A costed action plan was provided in TRN1 for the residential element of the Framework Travel Plan (FTP) including the role of Travel Plan Manager. This cost has been provided for the life of the TP (i.e:

based on the agreed FTP) which is assumed to be 14 years from first occupation of the development through to full occupation (anticipated in 2031) plus five years (i.e. 2036).

Overall, the submitted Framework Travel Plan generally meets the standards set out in the Buckinghamshire Council (BC) Travel Plan Guidance for residential employment and education uses. There are some areas that would require improvement and would be addressed as part of the formal Travel Plan adoption process. Overall Buckingham Council are satisfied that FTP is well thought out with some good measures to reduce single occupancy car use, but the following Planning Conditions will need to be secured to obtain FTP acceptance:

- Education
  - The provision of cycle parking spaces at both schools.
  - The provision of disabled parking spaces, and their locations.
- Residential
  - The provision of cycle parking spaces, and their locations.
  - The provision of disabled parking spaces, and their locations.
- Employment
  - The provision of cycle parking spaces, and their locations.
  - The provision of disabled parking spaces, and their locations.

19. Conclusion:

The Council therefore concludes that the outline application is acceptable to the Highway Authority **subject to appropriate transport planning conditions and a Section 106 Agreement to secure the appropriate works and contributions, which are still being discussed.**

The final agreed conditions, works and contributions will be provided in a separate letter.

Yours sincerely

James Bedingfeld
Highways Development Management
Planning Growth & Sustainability

Please note:
This advice is given at officer level only and is based on the facts and information you have supplied. It must be understood that the final decision on any planning application that may be submitted in the future rests with the Planning Authority.