South West Milton Keynes

Addendum Environmental Statement

Chapter 10 Traffic & Transport; Chapter 11 Air Quality; Chapter 12 Noise & Vibration

WSP

JANUARY 2021

10. TRAFFIC AND TRANSPORT ADDENDUM

Introduction

10.1 This addendum to Chapter 10 (Transport) of the Environmental Statement (ES) sets out findings of supplementary transport assessments undertaken for the Proposed Development, which was required due to an update to the traffic flows associated with the operational phase in the future year (2033). The addendum supports the assessments made of the likely significant effects of the Proposed Development in terms of traffic and transport within Chapter 10.

10.2 Comments received from Buckinghamshire Council (BC) on the submitted Updated TA (May 2020) have led to discussions around an alternative methodology in relation to the distribution of trips generated by the Proposed Development when fully occupied and the calibration of junction capacity models. The alternative methodology is robust and has been agreed with BC. The alternative methodology is described in detail in WSP's Transport Response Note 1 (TRN1), Transport Response Note 2 (TRN2) and Transport Response Note 3 (TRN3).

10.3 This ES addendum uses updated traffic flows generated by the alternative methodology and then follows the same approach to determining the extent of the assessment area, the sensitivity of receptors, the magnitude of impact and the significance of the effects as described within the ES Chapter 10.

10.4 The addendum provides an update to the assessment of likely significant environmental (transport) effects for the operational stage, the associated mitigation measures and to the residual effects. There is no change to the legislative & planning policy context, assessment methodology, baseline conditions, or the assessment of the likely significant effects of the construction stage.

10.5 This addendum is not intended to be read as a standalone assessment and reference should be made to the remainder of the ES, and particularly Chapter 10 in respect of assessment methodologies. This further assessment has not altered the conclusions presented in Chapter 10 and therefore significant effects as a result of the Proposed Development are not likely to occur.

Likely Significant Effects

10.6 The impacts of the Proposed Development using the alternative methodology are described in detail in TRN2 and TRN3, with a summary provided herein.

Operational Stage – Completed Development

10.7 This section considers the impact of the Proposed Development upon the future conditions of the local area during the operational stage using the updated traffic flows. The change in peak hour traffic flows as a result of the Proposed Development is shown by comparing the 'Base' (without development) traffic flows with the 'Base + Development' (with development) in Table 10.1 and Table 10.2, with the change in AADT traffic presented in Table 10.3.

Table 10.1 2033 Peak Hour Traffic Flows (Two-way)

Road	2033			
	AM Peak (07:45 - 08:45)		PM Peak (17:00-18:00)	
	Base	Base + Dev	Base	Base + Dev
Whaddon Road (between Bottle Dump Roundabout and Site access)	807	970	753	894
A421 (between Whaddon Crossroads and Bottle Dump Roundabouts)	2853	2972	2719	2845
Whaddon Road through Newton Longville	739	848	699	812
A421 Standing Way (between Bottle Dump and Tattenhoe Roundabouts)	2907	3351	2772	3223
B4034 Buckingham Road	975	1172	1255	1471

Table 10.2 Percentage Change in Peak Hour Traffic Flows (Two-way)

Road	2033	
	AM Peak (07:45 - 08:45)	PM Peak (17:00-18:00)
Whaddon Road (between Bottle Dump Roundabout and Site access	20.2%	18.7%
A421 (between Whaddon Crossroads and Bottle Dump Roundabouts)	4.2%	4.6%
Whaddon Road through Newton Longville	14.7%	16.2%
A421 Standing Way (between Bottle Dump and Tattenhoe Roundabouts)	15.2%	16.3%
B4034 Buckingham Road	20.2%	17.2%

Table 10.3 Change in AADT Traffic Flows (Two-way)

Road	Two-way AADT		
	Base 2033	Base + Dev 2033	% Change
Whaddon Road (between Bottle Dump Roundabout and Site access)	6322	7772	22.9%
A421 (between Whaddon Crossroads and Bottle Dump Roundabouts)	30093	31084	3.3%
Whaddon Road through Newton Longville	6287	7164	13.9%
A421 Standing Way (between Bottle Dump and Tattenhoe Roundabouts)	30491	34006	11.5%
B4034 Buckingham Road	10450	12140	16.2%

10.8 As set out in the ES Chapter 10, the IEMA Guidelines (Ref 10.1) state (paragraph 3.15) that where a predicted increase in traffic flow is lower than 30% (or 10% on specifically sensitive links), the effects can be stated to be low or insignificant. As per the assessment within ES Chapter 10, only the 'Whaddon Road through Newton Longville' link can be considered to be specifically sensitive in regard to Rule 2 of the GEART for determining the extent of the assessment network as a result of the Conservation Area within the village. An increase in traffic flows over 10% on that link has therefore been assessed further within this addendum. None of the other links are accident black-spots, they do not provide access to conservation areas or hospitals, and they do not have high pedestrian flows. None of the other assessed links fall under Rule 2 and should therefore be assessed using the 30% significance criteria contained in Rule 1.

10.9 Table 10.2 and Table 10.3 show that none of the links surrounding the Site are predicted to have an increase in traffic flows at or above 30% in either the Peak Hours or as an AADT. Whaddon Road through Newton Longville has an increase in AADT of 13.9%, an increase in the AM peak hour of 14.7% and an increase in PM peak hour of 16.2%. The effects of the Proposed Development are therefore insignificant on all local roads in the area surrounding the Site with the exception of Whaddon Road through Newton Longville in the PM peak hour. As such, Whaddon Road through Newton Longville is the only link to be 'scoped in' to the study area, with an assessment of the impact of the development included below. The TA contains a wider study area within which all links/junctions, including those that that fall below the 30% IEMA threshold, have been assessed against the NPPF (Ref 10.2) tests of highway safety and congestion severity.

Junction Capacity Assessments

10.10 An assessment of junction capacity at the Newton Longville Crossroads junction using the updated traffic flows and revised calibration of the model has been completed with the results comparing the Base[1] and Base + Development model scenarios[2].

10.11 Operational modelling was undertaken using industry standard software JUNCTIONS9. In 2033, the junction is predicted to operate over capacity with a Ratio of Flow to Capacity (RFC) of over 1, with a queue of 51 vehicles in the AM peak and 33 vehicles in the PM peak on the Stoke Road arm. With the inclusion of the Proposed Development, the queues increase to 80 vehicles in the AM peak and 60 vehicles in the PM peak. On the Whaddon Road arm queues increase from 23 vehicles to 58 vehicles in the AM peak as a result of the

[1] Including committed development and the draft allocation at Shenley Park, Results provided in ES Addendum Appendix 10A

[2] Results provided in TRN2

Proposed Development, and from 12 to 31 in the PM peak. An overall summary of the junction operation assessment is included in Table 10.4**Error! Reference source not found.**.

Table 10.4 Summary of Junction Operation Assessment in 2033 at Newton Longville Crossroads

Arm Description	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 Base + Committed Development + Shenley Park						
A- Bletchley Road	0.1	5.70	0.08	0.2	6.06	0.14
B-Stoke Road	50.5	411.97	1.21	32.7	243.34	1.12
C-Drayton Road	0.1	5.78	0.06	0.0	5.91	0.03
D-Whaddon Road	23.4	198.49	1.07	11.5	110.12	0.97
2033 Base + Committed Development + Shenley Park + Proposed Development						
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	246.80	1.12

10.12 The RFC on the Stoke Road arm of the Newton Longville Crossroads junction increases as a result of the Proposed Development, by 0.11 in the AM peak and 0.13 in the PM peak. The RFC on the Whaddon Road arm increases as a result of the Proposed Development, by 0.19 in the AM peak and 0.16 in the PM peak. The remaining arms operate satisfactorily with an RFC below 0.85. The junction is operating well over capacity (RFC over 1) in the Base scenario such that professional judgement is required to determine the impact of the development in relation to change in RFCs. In this regard as a result of the increase delay on Whaddon Road of 340 seconds in the AM peak and on Stoke Road of 265 seconds in the PM peak, it is considered that the magnitude of the impact on RFC is moderate in both the AM and PM peaks. The receptor is of High sensitivity as a result of the congested nature of the junction, therefore the overall significance of the effect is Moderate.

10.13 This supersedes the professional judgement within ES Chapter 10 which concluded that the magnitude of impact on junction capacity was negligible with a Negligible overall significance of effect. As a result of the increase in traffic distributed through Newton Longville in the updated traffic flows and the alternative methodology for calibrating junction models, the performance of the junction is forecast to reduce compared to the previous assessment.

Driver Delay

10.14 As detailed in the ES Chapter 10, the delay to drivers as a result of the Proposed Development should be assessed. Using the updated traffic flows, the delay will increase at the Newton Longville Crossroads junctions as shown in Table 10.4, with a modelled increase of 261 seconds in the AM peak and 265 seconds in the PM peak on the Stoke Road arm. As described in para 10.13, the junction is operating well over capacity (RFC over 1) in the Base scenario therefore whilst the junction is still able to operate it would be more sensitive to changes in queuing and delay. Based on the increase in delay results, the magnitude of the impact of the development is considered to be Major prior to mitigation at the junction. The sensitivity of the junction is High therefore the significance of the effect is Major prior to mitigation.

Severance

10.15 As detailed in the ES Chapter 10, in accordance with the DMRB criteria (LA112), roads with a Base AADT of between 4,000-8,000 vehicles are of low sensitivity to severance. Whaddon Road through Newton Longville has a 2033 Base AADT of 6,287 vehicles and therefore is of low sensitivity. There is no increase or decrease in pedestrian and cyclist journey length, therefore the magnitude of the effect is Low.

10.16 In accordance with the IEMA guidelines, as the increase in traffic flow is less than 30% through Newton Longville, the magnitude of the effect is negligible (>30% would be slight).

10.17 The sensitivity of Whaddon Road through Newton Longville is High, therefore the overall effect on existing severance in Newton Longville is Negligible and not significant.

Pedestrian and Cyclist Amenity and Delay

10.18 As detailed within the ES Chapter 10, the Proposed Development will generate increases and decreases in the number of vehicle movements on the local road network. In general, increases in traffic levels can also lead to increases in delay to pedestrians seeking to cross roads. The IEMA Guidelines recommend that the effects on pedestrian delay are unlikely to be material if a road has two-way traffic flow of less than 1,400 vehicles per hour.

10.19 As detailed in Table 10.1, three roads within the study area will see an increase in traffic and have a consistent flow of over 1,400 vehicles per hour. These are A421 Standing Way, A421 Buckingham Road and B4034 Buckingham Road. Pedestrian underpasses on the Redway network are provided on A421 Standing Way therefore pedestrian and cyclist delay will not increase as a result of the increase in traffic. A421 Buckingham Road has no footway provision with no pedestrians expected to use the road, hence the increase in traffic will not increase pedestrian delay on A421 Buckingham Road. B4034 Buckingham Road will have two new toucan crossing points to connect the Proposed Development with the existing footways and Redway network, and new footway around the proposed access junction. Using professional judgement, as advised by IEMA Guidelines, it is considered that there will not be a significant impact on pedestrian delay.

10.20 Based upon the analysis set out in Chapter 10 of the ES and above, and with the application of professional judgement, it is considered that there will be a beneficial impact upon pedestrian and cyclist amenity and delay as a consequence of the Proposed Development.

Collisions and Safety

10.21 The TA assesses the most up to date five-year collision records that are available. An assessment has also been completed using COBALT to understand the impacts on collisions as a result of the increase in traffic on the local highway network related to the Proposed Development. The full assessment is presented in Section 7 of the Updated TA. An updated COBALT assessment using the traffic flows from the alternative methodology is provided in TRN2 and summarised below.

10.22 As a result of the increase in traffic flows on the local highway network, there are predicted to be on average an additional 2.4 collisions per year with 3.4 casualties per year, over a 60 year appraisal period[3]. The increase in fatalities is predicted to be 0.03 per year, with 0.04 serious casualties and 3.0 slight casualties per year. This level of increase in collisions and casualties is not considered to be significant.

10.23 Safety on the local highway network will be improved as a result of the Proposed Development in respect of the reduced speed limit along Whaddon Road. Improved facilities for pedestrians and cyclists, including additional off-road routes and controlled crossing points all seek to improve the safety of the network.

10.24 Utilising the PIC analysis set out above and professional judgement, it is considered that there will be a minor beneficial effect from the Proposed Development in relation to enhanced safety around the network.

Fear and Intimidation

10.25 Using the updated traffic flows, there will be an increase in traffic associated with the operational stage of the Proposed Development on Whaddon Road through Newton Longville. Table 10.5 details the impact along with the impact classification of the link in line with the IEMA Guidelines. All roads within the study area have

[3] 60 year appraisal period is set out in the DfT TAG Unit A1.1 guidance as a standard appraisal period for transport schemes

actual speeds over 20mph which are unlikely to reduce to below 20mph as a result of development. Speed has therefore been discounted from this assessment as it will remain a constant impact in all scenarios.

Table 10.5 2033 (18-hour daily) average hourly flow (AM and PM) - Fear and Intimidation

Road	2033					Pedestrian Protection Measures
	Base		Base + Dev		Change	
Whaddon Road through Newton Longville	386	Minor	466	Minor	No Change	None Required

10.26 It can be seen from Table 10.5 that Whaddon Road through Newton Longville will see no change in fear and intimidation as a result of the Proposed Development.

10.27 Based upon the analysis in Chapter 10 of the ES, the updated assessment above and professional judgement, it is considered that there will be no significant adverse effects in relation to fear and intimidation.

Mitigation Measures

10.28 The mitigation proposed as part of the development has been reviewed and updated following the further assessments completed using updated traffic flows. The detail of the mitigation proposed is described and assessed in TRN2 and TRN3, with a summary provided herein.

Operational Stage - Completed Development

10.29 A package of embedded and additional mitigation measures will be provided by the Proposed Development to ensure that the residual cumulative impact will not be severe and that there will be no unacceptable impacts on road safety. The mitigation package proposed within the Updated TA (May 2020) has been reviewed and revised as detailed within TRN2 and TRN3.

10.30 Improvements to the local highway network would be secured by way of either a s278 Agreement or as a financial contribution through a s106 Agreement at the following locations:

- Whaddon Road - new access junction and shared footway/cycleway within the development curtilage;
- Buckingham Road - new access roundabout with associated footway/cycleway and Toucan Crossing link to existing Redway;
- A421 Standing Way - new access junction (left-in only);
- Bottle Dump Roundabout – junction capacity improvements and Pegasus crossing to the south of Pearce Recycling; and
- Resurfacing of a section of the PROW at Weasel Lane throughout the Application Site and to the west of Whaddon Road.
- A421 Whaddon Crossroads;
- A421 Buckingham Road / Warren Road;
- A421 Buckingham Road / Little Horwood Road;
- A421 Buckingham Road / Nash Road / Winslow Road;
- A421 Tattenhoe Roundabout;

- A421 Emerson Roundabout;
- A421 Bleak Hall Roundabout;
- A421 Elfield Park Roundabout;
- A421 Windmill Hill Roundabout;
- B4034 Buckingham Road / Sherwood Drive / Water Eaton Road;
- B4034 Buckingham Road / Newton Road / Shenley Road;
- V1/H7 Kingsmead Roundabout; and
- V3/H7 Furzton Roundabout.

10.31 Financial contributions secured as a s106 planning obligation will also be provided by the Applicant for the following improvements:

- Traffic calming measures through Newton Longville;
- Either a new bus service or extension of existing services, to connect the Application Site to Central Milton Keynes Station; and
- Provision of additional cycle parking at Bletchley Station.

10.32 As detailed within the ES Chapter 10 and as explained within the Updated TA (May 2020), BC considered that it would be preferable to reduce demand through Newton Longville rather than provide additional capacity at the Newton Longville Crossroads junction, hence the inclusion of a traffic calming scheme to increase delay through the village and reduce the attractiveness of the route. As a result of the introduction of traffic calming features along the 'Whaddon Road through Newton Longville' link, it is considered that an increase in delay would provide a beneficial effect by reducing vehicle speeds and discouraging 'through' traffic.

Residual Effects

10.33 The increase in traffic assessed within this addendum is considered to be insignificant in EIA terms. The impact of additional traffic will be mitigated by the provision of the Travel Demand Management Strategy including the implementation, monitoring and maintenance of Travel Plans for various land uses and by the proposed highway/sustainable travel improvements.

10.34 As previously, and as set out in the ES Chapter 10, the impact of the Proposed Development on driver delay, collisions and safety, severance, fear and intimidation, and pedestrian and cyclist amenity assessed within this addendum are not significant following the implementation of the proposed mitigation.

10.35 Therefore, the residual cumulative impact of the Proposed Development (i.e. following the implementation of the proposed mitigation measures), would be minimal and will therefore not be significant in EIA terms.

Cumulative Effects

10.36 The assessment within this addendum includes the cumulative development effects of the scheme in conjunction with the implementation of the East West Rail project and the proposed allocation of land at Shenley Park for 1,150 residential units and new a grid road towards Milton Keynes.

Summary

10.37 A worst case assessment of the transport network using updated traffic flows for the 2033 'Base + Development' scenario has been undertaken within this addendum to consider the impacts of the Proposed Development on all modes during the operational phase, taking account of the updated traffic flows. Due consideration has been given to impacts on surrounding villages, highway safety and the strategic road network, as set out within the Updated TA (May 2020), TRN2 and TRN3.

10.38 A package of ‘off-site’ highway measures has been developed to mitigate the impact of the Proposed Development on the local highway network. At some locations, where there is considerable background traffic growth due to planned development in 2033, the benefit of the proposed mitigation is more limited. However, at those locations, the impact of wider growth in the area must also be considered and an appropriate solution identified.

10.39 Overall, the residual cumulative impacts of the Proposed Development are not considered to be severe, and there would be no unacceptable impacts on highway safety. The assessment of the likely environmental effects of traffic generated by the Proposed Development has demonstrated that overall, effects would be insignificant, both during the construction and operational phases of the Proposed Development.

10.40 In conclusion, this addendum has presented additional assessments using an alternative methodology for calculating the 2033 ‘Base + Development’ scenario traffic flows which show that the results of the previous assessment set out within Chapter 10 of the ES remains accurate and proportionate.

References

Ref. 10.1: Guidance Notes No. 1: Guidelines for the Environmental Assessment of Road Traffic’ (GEART) – Institute of Environmental Assessment, 1993

Ref. 10.2: National Planning Policy Framework – Department for Communities and Local Government, March 2018

11 AIR QUALITY ADDENDUM

Introduction

11.01 This addendum to Chapter 11 (Air Quality) of the Environmental Statement (ES) sets out findings of supplementary air quality impact assessment undertaken for the Proposed Development, which was required due to an update to the traffic flows associated with the operation phase in the future year (2033). Full details of the updated 2033 traffic flow data are provided in the Addendum to Chapter 10 of the ES. This addendum supports the assessments made of the likely significant effects of the Proposed Development in terms of air quality within Chapter 11.

11.02 This addendum to the ES provides an update to the assessment method (operational phase only); baseline conditions at and surrounding the Application Site; the assessment of likely significant environmental (air quality) effects (operational phase only); and associated mitigation measures and residual effects. The assessment of construction phase impacts and associated mitigation and residual effects on air quality reported in Chapter 11 of the ES remain extant and are not updated in any way within this addendum.

11.03 Chapter 11 (Air Quality) of the ES concluded that *"the residual [operational] effects of the Proposed Development on air quality will be negligible (not significant) for all pollutants considered within the assessment."* The further assessment completed for this addendum and reported herein does not alter the conclusions of the ES that there will be no likely significant air quality effects as a result of the Proposed Development.

11.04 This addendum (and associated figures and appendices) is not intended to be read as a standalone assessment and reference should be made to the remainder of the ES, and particularly Chapter 11 in respect of assessment methodologies. However, every effort has been made in this addendum to ensure that it is clear which methodologies and assessment outcomes remain extant or have been updated.

11.05 The main text in this addendum should be read in conjunction with Air Quality Addendum **Appendices 11A and 11B**, which provide updated air quality model verification calculations and details of changes to traffic flows used in the air quality modelling assessment (**Addendum Appendix 11A**); and tabulated revised air quality model results (**Addendum Appendix 11B**).

Assessment Methodology

11.06 This section provides updates, where applicable, to the adopted methodology for assessing and appraising the potential air quality impacts associated with the Proposed Development.

Scope of the assessment

11.07 The scope of the assessment remains unchanged from that set out in Chapter 11 (Air Quality) and has been determined in the following way:

- Review of Aylesbury Vale District Council's (AVDC) and Milton Keynes Council's (MKC) latest review and assessment reports (Ref. 11. 3 and Ref. 11. 4) and air quality data for the area surrounding the Proposed Development, including data from both AVDC and MKC, the Department for Environment, Food and Rural Affairs (Defra), and the Environment Agency (EA);
- Desk study to confirm the locations of nearby existing receptors that may be sensitive to changes in local air quality;
- Review of the masterplan for the Proposed Development to establish the location of new sensitive receptors; and

- Review of the updated 2033 traffic data for the operational phase of the Proposed Development, as detailed in the addendum to Chapter 10 of the ES.

11.08 The addendum assessment includes consideration of the potential impacts on local air quality resulting from:

- Increases in pollutant concentrations as a result of exhaust emissions arising from traffic generated by the Proposed Development once operational in 2033.

11.09 In addition, the potential exposure of future residents of the Proposed Development to air quality has also been considered.

Operational Stage Assessment

11.10 For the prediction of impacts due to emissions arising from road traffic during the operational stage of the Proposed Development, the dispersion model ADMS-Roads (version 5.0.0.1) has been used. This model uses detailed information regarding traffic flows on the local road network, surface roughness, and local meteorological conditions to predict pollutant concentrations at specific receptor locations, as determined by the user. The approach to modelling is unchanged from that reported within Chapter 11 (Air Quality) of the ES. As such, the detailed description of the approach to the modelling provided in **Appendix 11.3** of the ES is extant, with relevant updates reported in **Addendum Appendix 11A** and a summary is provided below.

Model Scenarios and Traffic Data

11.11 The operational stage assessment has focussed on the following scenarios:

- Baseline Year (2019);
- Future Year 'Without' Proposed Development (2033); and
- Future Year 'With' Proposed Development (2033).

11.12 Year 2019 is the air quality model baseline year and the year adopted for the purposes of model verification. The 2019 air quality monitoring data used in the model verification exercise has been updated since the ES was published (see paragraph 11.21). Therefore, for the purposes of this addendum, the 2019 model verification has been revised to account for the update in monitoring data (see **Addendum Appendix 11A**).

11.13 The 'Without' and 'With' Proposed Development scenarios were assessed for year 2026 in Chapter 11 (Air Quality) of the ES. However, this year has not been reassessed as part of this addendum because 2033 is the only future year referenced in the Updated Transport Assessment (May 2020) and the addendum to Chapter 10.

11.14 Year 2033 represents the assessed completion year for the Proposed Development and was adopted to align with the timescales for the AVDC Local Plan, as agreed for the purposes of the Transport Assessment. In reality, it is anticipated that the Proposed Development will be completed by 2031. The 2033 traffic flows include a greater level of background traffic growth compared to 2031 and therefore represent a conservative approach to the assessment, especially since background pollutant concentrations and emissions factors are not available beyond 2030, as described below in paragraph 11.18.

11.15 Traffic flows for the 2033 'With Proposed Development' scenario have been updated since the publication of the ES. As such, the operational air quality impact assessment for 2033 has been revised accordingly and reported within this addendum.

11.16 A summary of the updated traffic data provided by the project transport consultants (WSP) for the 2033 'With Proposed Development' scenario is presented in **Addendum Appendix 11A**. It includes details of the Annual Average Daily Traffic (AADT) flows, vehicle speeds (kph) and the percentage of HDVs applicable to the local road network.

Vehicle Emissions inventories

11.17 The updated 2033 'With Proposed Development' traffic data were used to develop a revised emissions inventory database for each pollutant (NO_x, PM_{10} and $PM_{2.5}$) using Defra's Emissions Factors Toolkits (EFT) v9.0 (**Ref. 11. 5**). The EFT is used to calculate emissions factors arising from road traffic for all years between 2017 and 2030. In doing so, it considers various traffic flow characteristics, including:

- Road type (e.g. urban, rural, motorway);
- Total vehicle flow by link (AADT);
- Percentage of Heavy-Duty Vehicles (HDVs) per link; and
- Average link speed (kph).

11.18 For the prediction of future year emissions, the toolkit considers factors such as anticipated advances in vehicle technology and fleet composition, such that vehicle emissions are assumed to reduce over time. As vehicle emission factors cannot be calculated for a future assessment year of 2033 (2030 being the latest year for which emissions factors are available in the EFT), and to ensure a conservative approach to the assessment, 2026 emissions have been adopted for all future year scenarios. This is the same approach as was adopted for the ES assessment.

11.19 Since the publication of the ES, Defra has released EFT v10.1, which supersedes EFT v9. However, a comparison of both EFT versions was completed by Air Quality Consultants (**Ref. 11. 7**), which confirmed that EFT v10.1 generally predicts lower emissions of NO_x from road traffic compared to EFT v9 in future years. Therefore, by continuing the use of EFT v9 for this addendum, as well as continuing to use 2026 emissions factors for year 2033, the air quality assessment remains conservative with respect to predicting future year vehicle emissions.

Baseline Air Quality

11.20 Information on existing air quality has been obtained by collating the results of monitoring reported in Annual Status Reports published by AVDC and MKC (Ref. 11. 3 and Ref. 11. 4). This covers both the study area and surrounding area; the latter being used to provide context for the assessment. Background concentrations reported in Chapter 11 of the ES were defined using the national pollution maps published by Defra (**Ref. 11. 6**). To ensure consistency with the aforementioned approach to vehicle emission factors, 2026 background concentrations have been adopted for the future year 2033 assessment scenarios and remain unchanged from Chapter 11 (Air Quality) of the ES.

Model Verification

11.21 Verification of the ADMS-Roads model outputs was updated based on a comparison of the annual mean NO_2 base year (2019) model outputs with MKC's NO_2 monitoring results, published in their latest Annual Status Report (**Ref. 11. 4**) at their roadside diffusion tube monitoring site adjacent to Water Eaton Road, Bletchley ('WER'). This enabled an appropriate model adjustment factor, derived with reference to Local Air Quality Management Technical Guidance LAQM.TG16 (**Ref. 11. 1**), to be calculated before being applied to model outputs to ensure the performance of the dispersion model was suitable.

11.22 Further detailed information of the modelling process, input data, and the model verification and adjustment procedure are presented in **Addendum Appendix 11A**.

Assessing the sensitivity of receptors

Operational Stage

11.23 To complete the assessment of operational stage impacts, a number of 'receptors' representative of locations of relevant public exposure were identified at which pollution concentrations were predicted. Receptors have

been identified adjacent to the roads that are likely to experience the greatest change in traffic flows or composition, and therefore the greatest impact in terms of NO_2, PM_{10}, and $PM_{2.5}$ concentrations, as a result of the Proposed Development. Following screening of the updated 2033 traffic data, it was necessary to include an additional five human health receptors (i.e. R24, R25, R26, R27 and R28) for assessment of operational impacts in the 2033 scenarios. All other sensitive receptor locations included in the model remain unchanged from those reported in Chapter 11 of the ES.

11.24 Receptors R1 to R28 represent existing sensitive receptors within the air quality study area, with receptors R101 to R106 representing locations of proposed residential units and community facilities, based on the masterplan for the Proposed Development.

11.25 Details of the identified sensitive human health receptors included in the operational stage assessment are summarised in **Table 11.1** and their locations depicted in **Figure 11A.1**. All receptors were modelled at the standard "breathing height" of 1.5m above the ground level, which is unchanged from the assessment reported in Chapter 11 of the ES.

Table 11.1 Receptor Locations included in the Local Air Quality Assessment

Receptor	Description/Address	Grid Reference	
		X	**Y**
R1	16, 17, 18 Penlee Rise, Tattenhoe, Milton Keynes	483916	233417
R2	Woodpond Farm, Buckingham Road, Whaddon, Milton Keynes	481704	232642
R3	14 Kelsey Close, Tattenhoe, Milton Keynes	482943	233546
R4	Giles Brook Primary School, Holborn Crescent, Tattenhoe, Milton Keynes	483046	233451
R5	34 Thrisk Gardens, West Bletchley, Bletchley, Milton Keynes	484312	232976
R6	89 Windmill Hill Drive, West Bletchley, Bletchley, Milton Keynes	484331	233017
R7	1 Ascot Place, Bletchley, Milton Keynes	484746	233051
R8	11-18 Knaresborough Court, Bletchley, Milton Keynes	484841	233087
R9	New Leys, Newton Longville, Milton Keynes	483941	232908
R10	Dangall House, Bletchley, Milton Keynes	484118	232932
R11	86 Whaddon Road, Newton Longville, Milton Keynes	484167	231584
R12	38 Whaddon Road, Newton Longville, Milton Keynes	484414	231576
R13	1A Church End, Newton Longville, Milton Keynes	484866	231428
R14	2 Newton Road, Bletchley, Milton Keynes	485600	233246
R15	140 Buckingham Road, Milton Keynes	485662	233286
R16	1a Cottingham Grove, West Bletchley, Bletchley, Milton Keynes	486507	233415
R17	31 Cropwell Bishop, Emerson Valley, Milton Keynes	484362	234072

R18	41 Quantock Crescent, Emerson Valley, Milton Keynes	484873	234530
R19	23 Elmhurst Close, Furzton, Milton Keynes	485709	235603
R20	Thrift Farm, Buckingham Road, Milton Keynes	480841	232511
R21	The Bungalow, Bletchley Road, Milton Keynes	479956	232511
R22	Crossroads Bungalow, Buckingham Road, Little Horwood, Milton Keynes	478933	232355
R23	Hillside Cottage, Buckingham Road, Little Horwood, Milton Keynes	477583	232260
R24*	Chapter House, Coffee Hall, Milton Keynes	486078	236321
R25*	38 Darnel Close, Beanhill, Woughton on the Green	486290	236126
R26*	24 Winstanley Lane, Shenley Lodge, Milton Keynes	484012	235638
R27*	Merebrook Infant School, Dulverton Drive, Furzton	484344	235121
R28*	16 Stoke Road, Newton Longville, Milton Keynes	486120	230858
R101	Dev 1 – Future Receptor	483375	231949
R102	Dev 2 – Future Receptor	482661	232452
R103	Dev 3 – Future Receptor	482454	232594
R104	Dev 4 – Future Receptor	482972	232737
R105	Dev 5 – Future Receptor	483834	232603
R106	Dev 6 – Future Receptor	483675	232821

* Additional sensitive receptors identified and included in addendum assessment following screening of 2033 'With Proposed Development' traffic flows versus 2033 "Without Proposed Development' with reference IAQM/EPUK guidance (**Ref. 11. 2**)

Determining the significance of effect

Operational Stage

11.26 The results of the local air quality impact assessment and associated judgement on significance have been evaluated with reference to the guidelines published in the EPUK/IAQM Planning guidance (**Ref. 11. 2**), as detailed in Chapter 11 of the ES.

Limitations and assumptions

11.27 The limitations and assumptions reported in Chapter 11 (Air Quality) of the ES are still applicable, with the exception of the below.

11.28 Model verification was undertaken using one roadside diffusion tube site operated by MKC within the modelled air quality study area. At the time of the air quality assessment reported in Chapter 11 (Air Quality) of the ES, 2019 bias-adjusted data was not available for the MKC administrative area. As such, the 2018 data from the roadside diffusion tube was annualised forward to 2019 to correspond with the assessment base year and meteorological data, following the methodology provided by Defra in LAQM.TG16. However, since the publication of the ES, MKC has published the bias-adjusted 2019 monitoring data within their 2020 Air Quality

Annual Status Report (**Ref. 11. 20**), which has been used to revise the model verification accordingly (see **Addendum Appendix 11A**).

Baseline Conditions

Local Authority Monitoring

11.29 Both AVDC and MKC undertake diffusion tube monitoring at various locations throughout each district. Annual mean concentrations from diffusion tubes within 5km of the Application Site are shown in **Table 11.2**, all of which are operated by MKC. AVDC does not undertake diffusion tube monitoring at any location within 5km of the Application Site. The monitoring data reported in the below table remain unchanged from the data reported in Chapter 11 (Air Quality) of the ES, with the exception of data for year 2019, which was published in MKC's 2020 Annual Status Report (Ref. 11. 4).

Table 11.2 Annual mean NO_2 Data from Diffusion Tubes within 5km of the Application Site

Site ID	Type	OS Grid Reference		Distance from Application Site (km)	Annual Mean NO_2 Concentration (µg/m^3)			
		X	**Y**		**2016**	**2017**	**2018**	**2019**
WER1 WER2	Roadside	487395	233174	3.3	-	20.9	20.0	22.6
MM1 MM2	Urban Background	486332	236228	4.0	24.1	25.7	22.6	25.1
DD1 DD2	Roadside	488118	233814	4.1	22.6	20.7	22.8	23.3
Annual mean objective					**40**			

- Indicates that the monitoring site had not yet been commissioned.

11.30 The data from **Table 11.2** shows that the objective for annual mean NO_2 was not exceeded at any of monitoring sites within 5 km of the Application Site between 2016 and 2019.

Summary of Baseline Conditions

11.31 The Proposed Development is not located within or near any Air Quality Management Areas (AQMA). Both AVDC and MKC operate an extensive network of continuous monitors and passive diffusion tubes, however, few of these are in proximity to the Application Site. Data presented in **Table 11.2** demonstrate that annual mean NO_2 concentrations from monitors closest (within 5km) to the Application Site are all below the respective annual mean health-based objective. This summary is consistent with the baseline conditions reported in Chapter 11 of the ES.

Likely Significant Effects: Operational Stage

11.32 This section presents a summary of the updated assessment results. The predicted pollutant concentrations for the baseline (2019) and future year (2033) 'Without Proposed Development' and 'With Proposed Development' scenarios at all modelled discrete sensitive receptor locations are tabulated in **Addendum Appendix 11B**.

11.33 The summary is presented separately for the existing sensitive receptor locations identified off-site and the receptors identified within the Proposed Development representative of potential future exposure to air pollution.

Existing Sensitive Receptors

Annual Mean NO_2 Concentrations

11.34 The air quality objective for annual mean NO_2 concentrations is 40µg/m^3. The results of the assessment show that in the 2019 baseline year predicted concentrations do not exceed the annual mean objective at any of the modelled receptors. This is consistent with results reported within Chapter 11 (Air Quality) of the ES. Similarly, it remains that the highest predicted concentration (35.1µg/m^3) will occur at receptor R15, which is located at 140 Buckingham Road.

11.35 In 2033, in both the 'With' and 'Without' Proposed Development scenarios, there are predicted to be no exceedances of the annual mean objective for NO_2. This is consistent with results reported within Chapter 11 (Air Quality) of the ES. In each future scenario, the highest annual mean NO_2 concentration is predicted to occur at receptor R25 (38 Darnel Close), with a concentration of 24.8µg/m^3 predicted in the 'Without Development' scenario and 25.5µg/m^3 in the 'With Development' scenario.

11.36 The greatest increase in annual mean NO_2 concentrations, as a result of the Proposed Development being in operation, is predicted to occur at receptor R7 which is located at 1 Ascot Place, Bletchley. This is consistent with results reported within Chapter 11 (Air Quality) of the ES. This increase is 2.0µg/m^3 and equates to a **negligible** impact on local air quality.

11.37 Overall, the predicted impact of the changes in vehicle emissions associated with the operation of the Proposed Development on annual mean NO_2 concentrations at all modelled receptor locations is **negligible**. Therefore, the operation of the Proposed Development on local annual mean NO_2 concentrations **will have no significant environmental effect**. This is consistent with results reported within Chapter 11 (Air Quality) of the ES.

Hourly Mean NO_2 Concentrations

11.38 The annual mean NO_2 concentrations predicted by the model in all scenarios were all below 60µg/m^3, and therefore hourly mean NO_2 concentrations are unlikely to cause a breach of the hourly mean objective (200µg/m^3). This is consistent with results reported within Chapter 11 (Air Quality) of the ES.

11.39 The impact of the Proposed Development on hourly mean NO_2 concentrations at existing sensitive receptors will be **negligible**. Consequently, the effect of the Proposed Development on local hourly mean NO_2 concentrations will be **not significant**. This is consistent with results reported within Chapter 11 (Air Quality) of the ES.

Annual Mean PM_{10} Concentrations

11.40 The air quality objective for annual mean PM_{10} concentrations is 40µg/m^3. The results of the assessment show that in the 2019 baseline scenario, predicted concentrations are well below the annual mean objective at all of the modelled receptors. This is consistent with results reported within Chapter 11 (Air Quality) of the ES. It remains consistent that the highest predicted annual mean PM_{10} concentration will (18.9µg/m^3) occur at receptor R15 (140 Buckingham Road).

11.41 In both the 2033 'With' and 'Without' Proposed Development scenarios, there are predicted to be no exceedances of the annual mean objective for PM_{10}. This is consistent with results reported within Chapter 11 (Air Quality) of the ES. The highest annual mean concentration is predicted to occur at receptor R25 (20.1µg/m^3), located at 38 Darnel Close, in the 'With Development' scenario.

11.42 The maximum increase in annual mean PM_{10} concentrations in 2033 as a result of the Proposed Development in operation is 0.7µg/m^3 and is predicted to occur at receptor R7 (1 Ascot Place, Bletchley), which equates to a

negligible local air quality impact. This is consistent with results reported within Chapter 11 (Air Quality) of the ES.

11.43 Overall, the predicted impact of the operation of the Proposed Development on annual mean PM_{10} concentrations is **negligible**. Consequently, the predicted effect of the Proposed Development on local annual mean PM_{10} concentrations will be **not significant**. This is consistent with results reported within Chapter 11 (Air Quality) of the ES.

Daily Mean PM_{10} Concentrations

11.44 The air quality objective for daily mean PM_{10} concentrations is 50µg/m^3 to be exceeded no more than 35 times a year. The results of the dispersion modelling indicate that the highest number of exceedance days occur at receptor R25 (38 Darnel Close) where 3.5 exceedance days are predicted in the 2033 'With Development' scenario, which is well within the number of allowed exceedances.

11.45 The increased vehicle emissions associated with the Proposed Development result in an, at worst, increase of 0.5 days to the number of days experiencing concentrations greater than 50µg/m^3 in 2033. As such, the impact on daily mean PM_{10} concentrations is **negligible**. Consequently, the predicted effect of the Proposed Development on local daily mean PM_{10} concentrations will be **not significant**. This conclusion is consistent with results reported within Chapter 11 (Air Quality) of the ES.

Annual Mean $PM_{2.5}$ Concentrations

11.46 Predicted annual mean concentrations of $PM_{2.5}$ are all well below the objective of 25µg/m^3 in all modelled scenarios. The highest predicted concentration is 12.7µg/m^3, which is predicted at receptor R15 (140 Buckingham Road) in the 2019 baseline scenario.

11.47 The greatest increase in annual mean $PM_{2.5}$ concentrations (0.4µg/m^3), as a result of the Proposed Development being in operation, is predicted to occur at receptor R7 (1 Ascot Place, Bletchley) in 2033. The magnitude of the predicted increases equates to a **negligible** impact on local air quality.

11.48 Overall, the predicted impact of the changes in vehicle emissions associated with the operation of the Proposed Development on annual mean $PM_{2.5}$ concentrations at all selected sensitive receptors is **negligible** and the effect on local air quality is **not significant**. This is consistent with results reported within Chapter 11 (Air Quality) of the ES.

Sensitive Receptors within the Proposed Development Site

11.49 The predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ are all well below the relevant air quality objectives at each of the proposed receptors located within the Application Site boundary in 2033. This is consistent with results reported within Chapter 11 (Air Quality) of the ES.

11.50 The highest predicted annual mean NO_2 concentration within the Site in the 2033 'With Development' scenario of 10.7µg/m^3 is predicted to occur at R104, with the highest annual mean PM_{10} and $PM_{2.5}$ concentrations predicted to be 15.1µg/m^3 and 9.3µg/m^3, respectively at the same location.

Potential impacts on nearby committed developments

11.51 Receptor R2 (Woodpond Farm) is located on the southern boundary of the Shenley Park development and is therefore representative of a worst-case location for future receptors.

11.52 Predicted concentrations at receptors R3 (14 Kelsey Close) and R4 (Giles Brook Primary School) will be indicative of those that can be expected to occur on the eastern boundary of the Tattenhoe Park and Kingsmead South development. Since the publication of the ES, these developments are now understood to be due for completion in 2028/9 and 2022/3, respectively.

11.53 The predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ are all well below the relevant air quality objectives at each of these receptor locations in all modelled scenarios. In addition, the magnitudes of change at these receptors between the 'With' and 'Without Proposed Development' scenarios in 2033 are **negligible**. Consequently, it is expected that the effect of the Proposed Development on nearby committed developments will be **not significant**. This is consistent with results reported within Chapter 11 (Air Quality) of the ES.

Mitigation Measures

Operational

11.54 The change in pollutant concentrations attributable to traffic emissions associated with the operational stage of the Proposed Development (i.e. impacts on local air quality) is **negligible**. Furthermore, the modelled pollutant concentrations representative of future exposure within the Application Site are well below the relevant objectives for NO_2, PM_{10} and $PM_{2.5}$. As such, future residents will not be exposed to unacceptable air quality and no operational stage mitigation measures are proposed. This is consistent with recommendations given within Chapter 11 (Air Quality) of the ES.

Residual Effects

Operational

11.55 The residual effects of the Proposed Development on air quality will be **negligible** (**not significant**) for all pollutants considered within the assessment. This is identical to the conclusions reported within Chapter 11 (Air Quality) of the ES.

Cumulative Effects

Operational

11.56 Traffic flows from other committed developments were included in the 'With Proposed Development' scenario in 2033. As such, the potential cumulative air quality effects associated with additional vehicle flows generated by other developments, combined with the Proposed Development, have been accounted for in this assessment. Based on the results of the assessment, the cumulative effects on local air quality will be **negligible** (**not significant**). This is consistent with conclusions reported within Chapter 11 (Air Quality) of the ES.

Summary

11.57 This ES addendum to the air quality chapter provides a revised quantitative assessment of the local air quality impacts attributed to the operational stage of the Proposed Development, following the provision of updated traffic data for the 2033 'With Proposed Development' assessment year scenario. The revised air quality assessment was completed using the same approach as described within Chapter 11 (Air Quality) of the ES. The ADMS-Roads atmospheric dispersion model was used to predict the changes in ambient concentrations of NO_2, PM_{10} and $PM_{2.5}$ at relevant sensitive receptors, resulting from changes to traffic emissions associated with the Proposed Development.

11.58 The results show that the Proposed Development would cause **negligible** increases in pollutant concentrations at all identified sensitive receptors in the local area and would not cause any exceedances of the statutory health-based air quality objectives. Furthermore, the results reported at receptors within the Application Site demonstrate that future occupants will not be exposed to elevated levels of air pollution. Thus, the Proposed Development is considered suitable for the proposed land uses.

11.59 Based on the assessment significance criteria, the residual effects of the Proposed Development are predicted to be negligible for all pollutants assessed and the environmental impact is **not significant**. This is consistent with results and conclusions reported within Chapter 11 (Air Quality) of the ES.

11.60 It remains therefore that the Proposed Development complies with national and local policy for air quality.

References

Ref. 11. 1 – Defra (2018). *Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management Technical Guidance (TG16)* [online]. Available at: https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf [Accessed April 2020].

Ref. 11. 2 – Environmental Protection UK and Institute of Air Quality Management (2017). *Land-Use Planning & Development Control: Planning for Air Quality version 1.2* [online]. Available at https://iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf [Accessed April 2020].

Ref. 11. 3 - Aylesbury Vale District Council (2020) *Air Quality Annual Status Report (ASR)* [online]. Available at: https://www.aylesburyvaledc.gov.uk/section/air-quality [Accessed January 2021].

Ref. 11. 4 – Milton Keynes Council (2020) *Air Quality Annual Status Report (ASR)* [online]. Available at: https://www.milton-keynes.gov.uk/environmental-health-and-trading-standards/pollution/local-air-quality-management [Accessed January 2021].

Ref. 11. 5 – Defra (2019) *Emissions Factors Toolkit (version 9.0)* [online]. Available at: http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html [Accessed January 2021].

Ref. 11. 6 – Defra (2017) *UK AIR Air Information Resource: Background Mapping data for local authorities* [online]. Available at: https://uk-air.defra.gov.uk/data/laqm-background-home [Accessed April 2020].

Ref. 11. 7 – Air Quality Consultants (2020) *Comparison of EFT v10 with EFT v9* [online] Available at: https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=9d6b50e1-3897-46cf-90f1-3669c6814f1d [Accessed January 2021].

12. NOISE AND VIBRATION ADDENDUM

Introduction

12.01 This addendum to Chapter 12 (Noise and Vibration) of the Environmental Statement sets out findings of supplementary operational road traffic noise assessments following updates to the operational 'with development' 2033 road traffic flows as outlined in the Chapter 10 Addendum. This addendum supports the assessments made of the likely significant effects of the Proposed Development in terms of road traffic noise within Chapter 12.

12.02 The addendum presents an update to the operational phase road traffic assessments described within Chapter 12 of the ES; affirms assessment of likely significant environmental (noise) effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed. This addendum has been prepared by WSP.

12.03 This further assessment has not altered the conclusions presented in Chapter 12 and therefore significant effects as a result of the Proposed Development are not likely to occur. This addendum is not intended to be read as a standalone assessment and reference should be made to the remainder of the ES, and particularly Chapter 12 in respect of assessment methodologies.

Assessment Methodology

Scope of the assessment

12.04 A review of the operational phase assessments presented as likely significant effects in Chapter 12 has been undertaken with consideration to the updated operational road traffic flows:

- Increase in noise from development generated road traffic movements on the local road network immediately surrounding the Proposed Development attributable to the Proposed Development.
- Disturbance to the future users of the Proposed Development from existing noise and vibration sources i.e. road, rail and any existing commercial/industrial uses.

12.05 The extent of the study area remains the same as that presented in Chapter 12, i.e. the Application Site itself (within the red line boundary) and sensitive receptors located adjacent to the local road traffic network immediately surrounding the Site (i.e. that applied within the Transport Assessment).

Significance Criteria

12.06 The update to the operational phase assessments in this addendum adopts the significance criteria presented in Chapter 12, Road Traffic Noise Assessment Methodology and Site Suitability Methodology – Residential Development. This considers the change in road traffic noise levels following the opening of the proposed development in the future year 2033 and the absolute noise levels at the noise sensitive aspects of the proposed development.

12.07 The sensitivity of the receptors and the matrix for determining significance of effects references those adopted in Chapter 12 of the ES.

Revised 2033 Operational Traffic Data

12.08 Chapter 12 considers the road traffic flows on a number of road links in the vicinity of the Proposed Development. The Chapter 10 Addendum has identified a minor increase of road traffic flow numbers for a small number of these links in the 2033 (year of completion +7 years) with Proposed Development and with committed developments. Any predicted increase in the 2026 year of completion with Proposed Development and with committed development flows is unlikely to be greater than the increases in the 2033 data. Therefore,

to present a robust assessment it has been assumed that any change in the 2033 data will apply to the 2026 road traffic flow data.

12.09 Table 1 below summarises the traffic flows for the existing roads used in the assessment in Chapter 12 and the updated traffic flows for the 2033 with Proposed Development and with committed developments only.

Table 1 Road Traffic flows for links adopted in Chapter 12 compared to updated traffic modelling

RECEPTOR	LINK ID	Chapter 12 ES data - 2033 with development road traffic flows, AAWT	ES Addendum - 2033 with development road traffic flows, AAWT	Comparison in road traffic flows for 2033 with development scenario from Chapter 12 ES traffic flows against updated data, AAWT	Percentage change %
Buckingham Road	001 Buckingham Road, west of Weasel Lane	16049	16406	356	2.2
Bletchley Road	003 Bletchley Road	4865	4865	0	0.0
Whaddon Road	006 Whaddon Road (south of Weasel Lane)	7514	7820	306	4.1
Whaddon Road	007 Whaddon Road (north of Weasel Lane)	8428	8391	-37	-0.4
A421	008 A421 adjacent to Buckingham Road	32841	32906	64	0.2
Whaddon Road	023 Whaddon Road	7515	7821	306	4.1
Snelshall Street	029 Snelshall Street, SE of Anderson Gate	17226	17350	123	0.7
Standing Way	051 A421 Standing Way	35498	35765	267	0.8
Standing Way	053 A421 Standing Way near Rhoscolin Drive	33913	34087	174	0.5

12.10 With the updated road traffic flow data, it is evident that an increase no greater than 4.1% is predicted for two road links in the vicinity of the Proposed Development when comparing the updated data with that presented in Chapter 12. The largest differences in predicted traffic flows occur on two segments of Whaddon Road extending from the south corner of the Proposed Development to the village of Newton Longville (link ID 006 & 023).

12.11 The following section presents an assessment of the predicted changes in road traffic noise for the road links in Table 1 as presented in Chapter 12 and for the updated road traffic data.

Likely Significant Effects

Operational Phase

Development Related Traffic Noise

12.12 The predicted changes in road traffic noise for existing roads are shown in Table 2 for the road links as presented in Chapter 12 alongside the updated road traffic data for the long-term traffic noise assessment. The table considers the following comparison / assessment and includes for committed developments.

- year of completion +7 years (2033) with Proposed Development (with committed development) vs completion year (2026) without the Proposed Development (with committed development).

Table 2 Comparison of predicted changes in road traffic noise levels at existing receptors in the long-term, from Chapter 12 with the ES Addendum, dB

RECEPTOR	LINK ID	[A] Chapter 12 ES - 2033 with development – 2026 without development	[B] ES Addendum - 2033 with development – 2026 without development	[C] Difference in predicted road traffic noise change [B-A], dB
Buckingham Road	001 Buckingham Road, west of Weasel Lane	1.8	1.9	0.1
Bletchley Road	003 Bletchley Road	0.3	0.3	0.0
Whaddon Road	006 Whaddon Road (south of Weasel Lane)	0.6	0.8	0.2
Whaddon Road	007 Whaddon Road (north of Weasel Lane)	1.2	1.2	0.0
A421	008 A421 adjacent to Buckingham Road	0.4	0.4	0.0
Whaddon Road	023 Whaddon Road	0.6	0.8	0.2
Snelshall Street	029 Snelshall Street, SE of Anderson Gate	0.8	0.8	0.0
Standing Way	051 A421 Standing Way	0.7	0.7	0.0
Standing Way	053 A421 Standing Way near Rhoscolin Drive	1.1	1.1	0.0

12.13 When accounting for the updated road traffic data, Table 2 indicates a road traffic noise level difference of no greater than 0.2dB for two road links for the scenario year of completion +7 years (2033) with Proposed Development.

12.14 With reference to column A of Table 2, the data presented in Chapter 12 stated that for all routes, noise level changes of less than +3dB in the long-term are predicted to arise as a result of the Proposed Development in the future assessment year.

12.15 With reference to column B of Table 2, the data presented in this Addendum indicates that for all routes, noise level changes of less than +3dB in the long-term are predicted to occur as a result of the Proposed Development in the future assessment year.

12.16 Drawing upon the criteria presented in Chapter 12 for the year of completion + 7 years (2033), for all dwellings fronting local road traffic routes, the impact magnitude is predicted to be negligible and the sensitivity of dwellings fronting these local road traffic routes is considered to be high. Therefore, there is likely to be a direct, permanent, long-term effect on dwellings of negligible significance prior to the implementation of mitigation measures.

12.17 Updated traffic data is not available for the scenario 'year of completion 2026 with Proposed Development (with committed development)'. Therefore, to present road traffic noise level changes in the short-term a conservative approach has been taken by adopting the same percentage change in road traffic flows in Table 1 and applying this change to the road traffic flows for the with development year of opening traffic flow data presented in Chapter 12. For the short-term road traffic noise level change, the following scenario presented in Chapter 12 has been re-assessed and the results presented in Table 3:

- year of completion (2026) with Proposed Development (with committed development) vs year of completion (2026) without the Proposed Development (with committed development).

Table 3 Comparison of predicted changes in road traffic noise levels at existing receptors in the short term, from Chapter 12 with the ES Addendum, dB

RECEPTOR	LINK ID	[A] Chapter 12 ES - 2026 with development – 2026 without development	[B] ES Addendum - 2026 with development – 2026 without development	[C] Difference in predicted road traffic noise change [B-A], dB
Buckingham Road	001 Buckingham Road, west of Weasel Lane	1.6	1.7	0.1
Bletchley Road	003 Bletchley Road	0.0	0.0	0.0
Whaddon Road	006 Whaddon Road (south of Weasel Lane)	0.4	0.6	0.2
Whaddon Road	007 Whaddon Road (north of Weasel Lane)	0.9	0.9	0.0
A421	008 A421 adjacent to Buckingham Road	0.1	0.1	0.0

Whaddon Road	023 Whaddon Road	0.4	0.6	0.2
Snelshall Street	029 Snelshall Street, SE of Anderson Gate	0.5	0.6	0.1
Standing Way	051 A421 Standing Way	0.5	0.5	0.0
Standing Way	053 A421 Standing Way near Rhoscolin Drive	0.9	0.9	0.0

12.18 Drawing upon the short-term criteria presented in Chapter 12 in the year of completion, for links other than Buckingham Road (west of Weasel Lane) the impact magnitude is predicted to be negligible and the sensitivity of dwellings fronting these local road traffic routes is considered to be high. Therefore, there is likely to be a direct, permanent, short-term effect on dwellings of Negligible significance prior to the implementation of mitigation measures. For dwellings immediately adjacent to Buckingham Road (west of Weasel Lane) the sensitivity of dwellings is high and the impact prior to mitigation is predicted to be minor. Therefore, there is likely to be a direct, permanent, short-term effect on existing dwellings immediately adjacent to these links of minor adverse significance prior to the implementation of mitigation measures.

Absolute Noise levels

12.19 In Chapter 12 this part of the assessment considered absolute noise levels at the sensitive aspects of the proposed development. The assessment considered both daytime and night-time noise levels from future railway traffic and road traffic flows for the assessment year 2026 with Cumulative Scheme.

12.20 As presented in the previous section, the road links with the largest increase in traffic flow and therefore the greatest increase in noise level when compared to previous assessments in Chapter 12 are on Whaddon Road extending from the southern corner of the Proposed Development to the village of Newton Longville (link ID 006 & 023). This addendum finds that for these road links an increase no greater than 0.2dB in the Basic Noise Level (BNL) is predicted as a result of the updated road traffic modelling. For the remaining road links increases of up to 0.1dB are predicted. Additionally, these links are at a greater distance from the noise sensitive aspects of the Proposed Development than link 006 Whaddon Road (south of Weasel Lane).

12.21 In terms of absolute noise levels, the closest noise sensitive aspects of the Proposed Development to the link 006 Whaddon Road (south of Weasel Lane) will experience a 0.2dB increase in absolute noise level when compared to the levels predicted in Chapter 12. This additional modelling therefore does not alter the findings presented in Chapter 12 when considering absolute noise levels whereby the external ambient daytime noise level at amenity areas fronting Whaddon Road will meet the upper guideline value of 55dB $L_{Aeq,T}$. By extension all other absolute noise level assessments incorporating road traffic noise presented in Chapter 12 will remain unchanged when considering the updated traffic flow data.

12.22 The sensitivity of the receptor (residential) in external amenity areas is considered to be high and drawing upon the predicted impact magnitude presented in Chapter 12, the impact prior to mitigation is considered to be moderate at the closest proposed residential receptors to Standing Way. Therefore, there is potential for a direct, permanent, long-term effect on proposed noise sensitive receptors of moderate adverse significance to arise prior to the implementation of mitigation measures.

12.23 For proposed amenity areas fronting Whaddon Road, Buckingham Road and the rail line, the sensitivity of the receptor (residential and extra care) is considered to be high and drawing upon the predicted impact magnitude presented in Chapter 12, the impact prior to mitigation is considered to be minor. Therefore, there is potential for a direct, permanent, long-term effect on proposed noise sensitive receptors of minor adverse significance to arise prior to the implementation of mitigation measures.

12.24 For the closest proposed educational aspects to the road network and rail line it is evident that worst case free-field noise levels during the daytime are not expected to exceed 50dB $L_{Aeq,T}$. The sensitivity of the receptor (educational) is considered to be high and drawing upon the predicted impact magnitude for education uses, the impact prior to mitigation is considered to be negligible. Therefore, there is potential for a direct, permanent, long-term effect on proposed noise sensitive receptors of negligible significance to arise prior to the implementation of mitigation measures.

Mitigation Measures

Operational Phase Mitigation

12.25 Mitigation measures set out herein are in addition to, or clarify those which are set out within Chapter 12 of the ES. On the basis of the updated road traffic noise assessments it is not necessary to set out mitigation measures in addition to those presented in Chapter 12.

12.26 The updated predicted significance of effects is minor at worst in the short-term; no further mitigation is required.

Residual Effects

Operational Phase Residual Effects

12.27 The residual effects in relation to the assessments that consider development generated road traffic will remain unchanged to those presented within Chapter 12.

Development Related Traffic

12.28 The sensitivity of existing noise sensitive receptors is high, and the predicted impact magnitude, remains minor at worst in the short term for dwellings immediately adjacent to Buckingham Road (west of Weasel Lane). Therefore, there is likely to be a direct, temporary, short-term residual effect on existing sensitive receptors of minor adverse significance.

Absolute Noise levels

12.29 Accounting for updated road traffic flows in the modelled assessment year 2026 with cumulative development and the proposed mitigation measures presented in Chapter 12, the predicted impact magnitude will remain unchanged.

Summary

12.30 In summary, this addendum has, via presentation of confirmatory predictions, and clarifications with regard to development generated road traffic and the assessment of effects, shown how the previous assessment set out within Chapter 12 of the ES remains unchanged as a result of the updated operational road traffic flows.

12.31 The results indicate that the Proposed Development traffic would result in a minor increase in the short-term and negligible increase in the long-term road traffic noise level at existing dwellings immediately adjacent to the local road network. Furthermore, the results reported at receptors within the Application Site demonstrate that when accounting for the updated traffic flows and the mitigation presented in Chapter 12, the predicted residual impact magnitude will be negligible. Thus, the Proposed Development is considered suitable for the proposed land uses.

12.32 Based on the assessment significance criteria, the residual effects of the Proposed Development are predicted to be negligible to minor for the operational road traffic assessment, and the environmental impact is **not significant**.

FIGURE 11A.1:

RECEPTOR LOCATIONS

Date Modified: January 2021

Drawn By: RR

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Legend

- Receptors
- Application Site
- Local Authority Boundary

Milton Keynes Council

Aylesbury Vale District Council

BLETCHLEY

R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17 R18 R19 R20 R21 R22 R23 R24 R25 R26 R27 R28 R101 R102 R103 R104 R105 R106

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0 0.2 0.4 0.8 1.2 1.6 2 Kilometres

wsp

TITLE:

SOUTH WEST MILTON KEYNES

FIGURE No:

FIGURE 11A.1 - RECEPTOR LOCATIONS

APPENDIX 10A:

JUNCTIONS 9 MODELLING OUTPUT FOR ‘BASE 2033 + SHENLEY PARK’ SCENARIO

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.5.1.7462

For sales and distribution information, program advice and maintenance, contact TRL:
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Filename: J3 - Post Calibration Adjustment.j9
Path: \\uk.wspgroup.com\central data\Projects\700694xx\70069442 - SWMK - 2020\03 WIP\TP Transport Planning\Analysis\September 2020 Junction Modelling\Base\J3
Report generation date: 25/01/2021 14:11:17

Summary of junction performance

	AM					PM				
	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Set ID	Queue (Veh)	Delay (s)	RFC	LOS
	2033 Base + CD + SP									
Stream B-ACD	D23	50.5	411.97	1.21	F	D24	32.7	243.34	1.12	F
Stream A-BCD		0.1	5.70	0.08	A		0.2	6.06	0.14	A
Stream D-ABC		23.4	198.49	1.07	F		11.5	110.12	0.97	F
Stream C-ABD		0.1	5.78	0.06	A		0.0	5.91	0.03	A

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

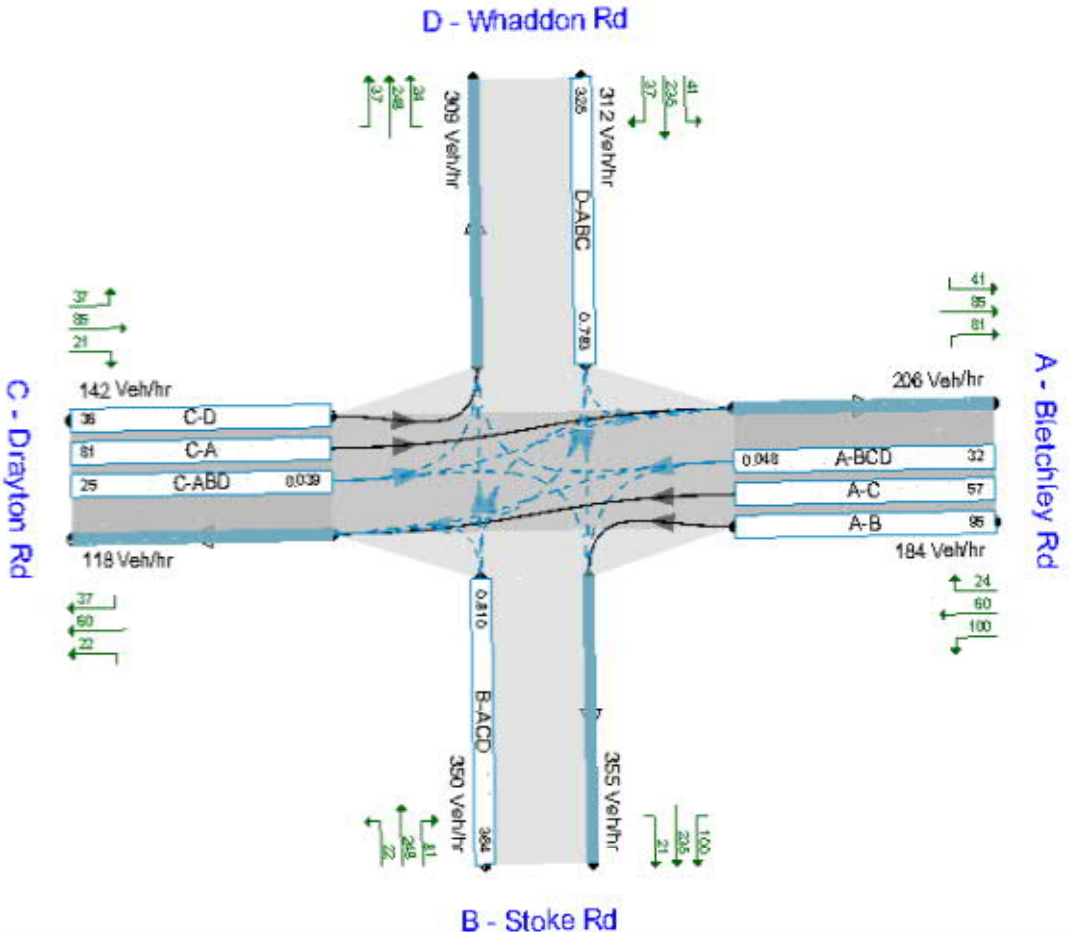
File summary

File Description

Title	Bletchley Road/ Stoke Road/ Drayton Road/ Whaddon Road
Location	51°58'28.41"N, 0°45'57.62"W
Site number	3
Date	03/12/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	Will Forster
Description	Whaddon Road arm modelled as one lane and reduced width of 2.5m to calibrate against queue lengths

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2020 Base	AM	ONE HOUR	07:30	09:00	15	✓
D2	2020 Base	PM	ONE HOUR	16:45	18:15	15	✓
D13	2033 Base	AM	ONE HOUR	07:30	09:00	15	✓
D14	2033 Base	PM	ONE HOUR	16:45	18:15	15	✓
D15	2033 Base + CD + D	AM	ONE HOUR	07:30	09:00	15	✓
D16	2033 Base + CD + D	PM	ONE HOUR	16:45	18:15	15	✓
D17	2033 Base + CD + D with TP	AM	ONE HOUR	07:30	09:00	15	✓
D18	2033 Base + CD + D with TP	PM	ONE HOUR	16:45	18:15	15	✓
D19	2033 Base + CD + D - ST	AM	ONE HOUR	07:30	09:00	15	✓
D20	2033 Base + CD + D - ST	PM	ONE HOUR	16:45	18:15	15	✓
D21	2033 Base + CD + D + SP (ST)	AM	ONE HOUR	07:30	09:00	15	✓
D22	2033 Base + CD + D + SP (ST)	PM	ONE HOUR	16:45	18:15	15	✓
D23	2033 Base + CD + SP	AM	ONE HOUR	07:30	09:00	15	✓
D24	2033 Base + CD + SP	PM	ONE HOUR	16:45	18:15	15	✓

Analysis Set Details

ID	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	✓	D23,D24	100.000	100.000

2033 Base + CD + SP, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
J3	Bletchley Road/ Stoke Road/ Drayton Road/ Whaddon Road	Crossroads	Two-way		208.88	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Bletchley Rd		Major
B	Stoke Rd		Minor
C	Drayton Rd		Major
D	Whaddon Rd		Minor

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
A - Bletchley Rd	6.00			59.0	✓	0.00
C - Drayton Rd	6.00			79.3	✓	0.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B - Stoke Rd	One lane	3.40	16	41
D - Whaddon Rd	One lane	2.50	30	33

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Stream	Intercept (Veh/hr)	Slope for A-B	Slope for A-C	Slope for A-D	Slope for B-A	Slope for B-C	Slope for B-D	Slope for C-A	Slope for C-B	Slope for C-D	Slope for D-A	Slope for D-B	Slope for D-C
A-D	608	-	-	-	-	-	-	0.236	0.337	0.236	-	-	-
B-A	523	0.095	0.241	0.241	-	-	-	0.151	0.344	-	0.241	0.241	0.120
B-C	676	0.104	0.262	-	-	-	-	-	-	-	-	-	-
B-D, nearside lane	523	0.095	0.241	0.241	-	-	-	0.151	0.344	0.151	-	-	-
B-D, offside lane	523	0.095	0.241	0.241	-	-	-	0.151	0.344	0.151	-	-	-
C-B	620	0.240	0.240	0.343	-	-	-	-	-	-	-	-	-
D-A	612	-	-	-	-	-	-	0.237	-	0.094	-	-	-
D-B, nearside lane	478	0.139	0.139	0.315	-	-	-	0.220	0.220	0.087	-	-	-
D-B, offside lane	478	0.139	0.139	0.315	-	-	-	0.220	0.220	0.087	-	-	-
D-C	478	-	0.139	0.315	0.110	0.220	0.220	0.220	0.220	0.087	-	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically

D23	2033 Base + CD + SP	AM	ONE HOUR	07:30	09:00	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - Bletchley Rd		ONE HOUR	✓	244	100.000
B - Stoke Rd		ONE HOUR	✓	452	100.000
C - Drayton Rd		ONE HOUR	✓	178	100.000
D - Whaddon Rd		ONE HOUR	✓	378	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		A - Bletchley Rd	**B - Stoke Rd**	**C - Drayton Rd**	**D - Whaddon Rd**
From	**A - Bletchley Rd**	0	133	79	32
	B - Stoke Rd	111	0	30	311
	C - Drayton Rd	112	28	0	38
	D - Whaddon Rd	56	284	38	0

Proportions

		To			
		A - Bletchley Rd	**B - Stoke Rd**	**C - Drayton Rd**	**D - Whaddon Rd**
From	**A - Bletchley Rd**	0.00	0.54	0.32	0.13
	B - Stoke Rd	0.25	0.00	0.07	0.69
	C - Drayton Rd	0.63	0.15	0.00	0.21
	D - Whaddon Rd	0.15	0.75	0.10	0.00

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Bletchley Rd	**B - Stoke Rd**	**C - Drayton Rd**	**D - Whaddon Rd**
From	**A - Bletchley Rd**	0	2	1	4
	B - Stoke Rd	2	0	0	2
	C - Drayton Rd	1	0	0	3
	D - Whaddon Rd	0	3	11	0

Average PCU Per Veh

		To			
		A - Bletchley Rd	**B - Stoke Rd**	**C - Drayton Rd**	**D - Whaddon Rd**
From	**A - Bletchley Rd**	1.000	1.017	1.014	1.036
	B - Stoke Rd	1.021	1.000	1.000	1.015
	C - Drayton Rd	1.010	1.000	1.000	1.033
	D - Whaddon Rd	1.000	1.026	1.107	1.000

Detailed Demand Data

Demand for each time segment

Arm	Time Segment	Demand (Veh/hr)	Demand in PCU (PCU/hr)
A - Bletchley Rd	**07:30-07:45**	184	187
	07:45-08:00	220	224
	08:00-08:15	269	274
	08:15-08:30	269	274
	08:30-08:45	220	224
	08:45-09:00	184	187
B - Stoke Rd	**07:30-07:45**	340	346
	07:45-08:00	406	413
	08:00-08:15	498	505
	08:15-08:30	498	505
	08:30-08:45	406	413
	08:45-09:00	340	346
C - Drayton Rd	**07:30-07:45**	134	136
	07:45-08:00	160	162
	08:00-08:15	196	199
	08:15-08:30	196	199
	08:30-08:45	160	162
	08:45-09:00	134	136
D - Whaddon Rd	**07:30-07:45**	285	293
	07:45-08:00	340	350
	08:00-08:15	416	429
	08:15-08:30	416	429
	08:30-08:45	340	350
	08:45-09:00	285	293

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-ACD	1.21	411.97	50.5	F	415	622
A-BCD	0.08	5.70	0.1	A	42	63
A-B					114	172
A-C					68	102
D-ABC	1.07	198.49	23.4	F	347	521
C-ABD	0.06	5.78	0.1	A	32	48
C-D					33	50
C-A					98	147

Main Results for each time segment

07:30 - 07:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-ACD	340	85	452	0.753	330	0.0	2.7	27.432	D
A-BCD	32	8	664	0.048	32	0.0	0.1	5.691	A
A-B	95	24			95				
A-C	57	14			57				
D-ABC	285	71	420	0.678	277	0.0	1.9	24.023	C
C-ABD	25	6	649	0.039	25	0.0	0.1	5.767	A
C-D	28	7			28				
C-A	81	20			81				

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-ACD	406	102	437	0.930	390	2.7	6.9	60.342	F
A-BCD	40	10	680	0.059	40	0.1	0.1	5.632	A
A-B	112	28			112				
A-C	67	17			67				
D-ABC	340	85	408	0.834	332	1.9	4.0	43.109	E
C-ABD	31	8	655	0.048	31	0.1	0.1	5.769	A
C-D	33	8			33				
C-A	96	24			96				

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-ACD	498	124	416	1.196	410	6.9	28.8	178.960	F
A-BCD	53	13	702	0.076	53	0.1	0.1	5.556	A
A-B	135	34			135				
A-C	81	20			81				
D-ABC	416	104	391	1.066	374	4.0	14.6	112.360	F
C-ABD	40	10	664	0.061	40	0.1	0.1	5.767	A
C-D	39	10			39				
C-A	116	29			116				

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-ACD	498	124	412	1.207	411	28.8	50.5	360.608	F
A-BCD	53	13	702	0.076	53	0.1	0.1	5.556	A
A-B	135	34			135				
A-C	80	20			80				
D-ABC	416	104	388	1.075	381	14.6	23.4	198.485	F
C-ABD	40	10	664	0.061	40	0.1	0.1	5.771	A
C-D	39	10			39				
C-A	116	29			116				

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-ACD	406	102	430	0.945	422	50.5	46.7	411.971	F
A-BCD	40	10	680	0.059	40	0.1	0.1	5.631	A
A-B	112	28			112				
A-C	67	17			67				

D-ABC	340	85	401	0.847	385	23.4	12.1	172.774	F
C-ABD	31	8	655	0.048	31	0.1	0.1	5.774	A
C-D	33	8			33				
C-A	96	24			96				

08:45 - 09:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-ACD	340	85	448	0.759	439	46.7	22.1	287.378	F
A-BCD	32	8	664	0.048	32	0.1	0.1	5.697	A
A-B	95	24			95				
A-C	57	14			57				
D-ABC	285	71	414	0.687	323	12.1	2.5	50.661	F
C-ABD	25	6	649	0.039	25	0.1	0.1	5.777	A
C-D	27	7			27				
C-A	81	20			81				

2033 Base + CD + SP, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
J3	Bletchley Road/ Stoke Road/ Drayton Road/ Whaddon Road	Crossroads	Two-way		125.51	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D24	2033 Base + CD + SP	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - Bletchley Rd		ONE HOUR	✓	239	100.000
B - Stoke Rd		ONE HOUR	✓	425	100.000
C - Drayton Rd		ONE HOUR	✓	122	100.000
D - Whaddon Rd		ONE HOUR	✓	358	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		A - Bletchley Rd	B - Stoke Rd	C - Drayton Rd	D - Whaddon Rd
From	A - Bletchley Rd	0	81	92	66
	B - Stoke Rd	123	0	31	270
	C - Drayton Rd	72	15	0	35
	D - Whaddon Rd	42	289	27	0

Proportions

		To			
		A - Bletchley Rd	B - Stoke Rd	C - Drayton Rd	D - Whaddon Rd
From	A - Bletchley Rd	0.00	0.34	0.39	0.28
	B - Stoke Rd	0.29	0.00	0.07	0.64
	C - Drayton Rd	0.59	0.12	0.00	0.29
	D - Whaddon Rd	0.12	0.81	0.08	0.00

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Bletchley Rd	B - Stoke Rd	C - Drayton Rd	D - Whaddon Rd
From	A - Bletchley Rd	0	3	0	2
	B - Stoke Rd	1	0	0	2
	C - Drayton Rd	2	0	0	0
	D - Whaddon Rd	0	2	0	0

Average PCU Per Veh

		To			
		A - Bletchley Rd	B - Stoke Rd	C - Drayton Rd	D - Whaddon Rd
From	A - Bletchley Rd	1.000	1.029	1.000	1.018
	B - Stoke Rd	1.009	1.000	1.000	1.019
	C - Drayton Rd	1.016	1.000	1.000	1.000
	D - Whaddon Rd	1.000	1.017	1.000	1.000

Detailed Demand Data

Demand for each time segment

Arm	Time Segment	Demand (Veh/hr)	Demand in PCU (PCU/hr)
A - Bletchley Rd	16:45-17:00	180	182
	17:00-17:15	215	218
	17:15-17:30	263	267
	17:30-17:45	263	267
	17:45-18:00	215	218
	18:00-18:15	180	182
B - Stoke Rd	16:45-17:00	320	324
	17:00-17:15	382	387
	17:15-17:30	468	474
	17:30-17:45	468	474
	17:45-18:00	382	387
	18:00-18:15	320	324
C - Drayton Rd	16:45-17:00	92	92
	17:00-17:15	109	110
	17:15-17:30	134	135
	17:30-17:45	134	135
	17:45-18:00	109	110
	18:00-18:15	92	92
D - Whaddon Rd	16:45-17:00	269	273
	17:00-17:15	321	326
	17:15-17:30	394	399
	17:30-17:45	394	399
	17:45-18:00	321	326
	18:00-18:15	269	273

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-ACD	1.12	243.34	32.7	F	390	584
A-BCD	0.14	6.06	0.2	A	80	119
A-B					65	98
A-C					74	112
D-ABC	0.97	110.12	11.5	F	328	492
C-ABD	0.03	5.91	0.0	A	16	25
C-D					31	47
C-A					64	96

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-ACD	320	80	455	0.702	311	0.0	2.2	23.724	C
A-BCD	62	15	663	0.093	61	0.0	0.1	5.976	A
A-B	55	14			55				
A-C	63	16			63				
D-ABC	269	67	431	0.624	263	0.0	1.6	20.705	C
C-ABD	13	3	625	0.021	13	0.0	0.0	5.877	A
C-D	26	6			26				
C-A	53	13			53				

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-ACD	382	95	441	0.866	371	2.2	4.8	45.755	E
A-BCD	77	19	676	0.114	77	0.1	0.2	6.005	A
A-B	64	16			64				
A-C	74	18			74				
D-ABC	321	80	420	0.765	316	1.6	2.8	32.961	D
C-ABD	16	4	627	0.025	16	0.0	0.0	5.891	A
C-D	31	8			31				
C-A	63	16			63				

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-ACD	468	117	421	1.111	409	4.8	19.5	129.425	F
A-BCD	100	25	695	0.144	100	0.2	0.2	6.052	A
A-B	76	19			76				
A-C	87	22			87				
D-ABC	394	98	405	0.971	371	2.8	8.6	74.704	F
C-ABD	20	5	629	0.032	20	0.0	0.0	5.910	A
C-D	37	9			37				
C-A	76	19			76				

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-ACD	468	117	418	1.117	415	19.5	32.7	243.336	F
A-BCD	100	25	695	0.144	100	0.2	0.2	6.056	A
A-B	76	19			76				
A-C	87	22			87				
D-ABC	394	98	404	0.975	382	8.6	11.5	110.116	F
C-ABD	20	5	629	0.032	20	0.0	0.0	5.913	A
C-D	37	9			37				
C-A	76	19			76				

17:45 - 18:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-ACD	382	95	437	0.873	424	32.7	22.1	235.191	F
A-BCD	77	19	677	0.114	77	0.2	0.2	6.013	A
A-B	64	16			64				
A-C	73	18			73				
D-ABC	321	80	418	0.770	352	11.5	4.0	64.301	F
C-ABD	16	4	627	0.025	16	0.0	0.0	5.898	A
C-D	31	8			31				
C-A	63	16			63				

18:00 - 18:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-ACD	320	80	454	0.704	397	22.1	2.8	89.690	F
A-BCD	62	15	663	0.093	62	0.2	0.1	5.990	A
A-B	55	14			55				
A-C	63	16			63				
D-ABC	269	67	429	0.627	278	4.0	1.8	24.959	C
C-ABD	13	3	625	0.021	13	0.0	0.0	5.881	A
C-D	26	6			26				
C-A	53	13			53				

APPENDIX 11A:

AIR QUALITY ADDENDUM APPENDIX

11 AIR QUALITY ADDENDUM APPENDIX

11A Dispersion Model Approach and Verification

Introduction

This addendum appendix provides an update to Appendix 11.2 of the ES Air Quality Chapter. This addendum appendix is not intended to be read as a standalone document. Reference should be made to the ES Air Quality Chapter Appendix 11.2, with this addendum appendix providing relevant updates. For clarity, the results of the air quality model verification exercise reported in Appendix 11.2 of the ES have been updated by this document and the traffic flow data reported in Appendix 11.4 of the ES for the 2033 'with Proposed Development' scenario have been updated by this document.

The operation of the Proposed Development has the potential to change the total flow, distribution and characteristics of traffic movements on the affected road links, which would result in changes to emissions of the aforementioned pollutants. This local air quality assessment was completed to predict the potential impacts of these changes on ambient pollutant concentrations at identified sensitive receptors within 200m of affected roads.

As was done for the assessment reported within Chapter 11 (Air Quality) of the ES, the local traffic related pollution levels predicted at the receptor locations were assessed by comparing the total predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ with the current air quality objectives and considering the change (improvement or worsening) in concentrations between the 'Without' and 'With' Proposed Development scenarios.

Modelling Methodology

The procedures involved in undertaking the dispersion modelling assessment are outlined below and remain unchanged from the ES Air Quality Chapter and Appendix 11.2:

- Collation of input data – traffic data including AADT flows, speeds (kph), percentage of HDVs, road network mapping, sensitive receptor coordinates and meteorological data;
- Input of data in to the ADMS-Roads model for the scenarios to be modelled;
- Development of emissions inventories for each pollutant to be assessed, using Defra's emission factor toolkit (EFT v9.0);
- Running the ADMS-Roads model for each considered scenario;
- Conversion of modelled NO_x concentrations to NO_2 concentrations using Defra's NO_x-NO_2 calculator v7.1;
- Addition of sector removed Defra background concentrations to the modelled concentrations;
- Verification and adjustment of modelled road-NO_x contributions from the assessed road network through analysing the ADMS-Roads modelled road-NO_x outputs versus monitoring data. One roadside diffusion tube monitoring site managed by MKC was identified within the air quality study area for use in the model verification process[4];
- Comparison of predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations at all receptors to the relevant air quality objectives in each scenario; and

[4] As reported in ES Appendix 11.2, 2019 air quality monitoring data was unavailable from MKC at the time of the assessment. It was agreed with the Environmental Health Officer that monthly 2018 diffusion tube monitoring data and 2019 continuous monitor data, obtained from the Automatic Urban and Rural Network, would be used for forward annualise and calculate annual mean 2019 diffusion tube data. **Update for Addendum Air Quality Assessment**: MKC published the 2019 monitoring data within the 2020 Air Quality Annual Status Report, which was used to update the model verification reported in this addendum appendix.

- Analysis of changes in pollutant concentrations between the 'Without development' and 'With development' scenarios to assess the significance of impacts associated with the Proposed Development on local air quality.

Traffic Data

Traffic data were derived from a static spreadsheet-based model and provided by WSP Transport Modellers. Full details of the traffic data provided for this assessment can be found in Chapter 10 and its associated addendum and appendices. The traffic data provided for the assessed road network comprised AADT flows, percentage HDVs and average vehicle speeds (kph). Appropriate assumptions were made with respect to traffic speeds on approach to and progress through roundabout junctions (i.e. lower speeds on approach and progress through junction).

Traffic flows at roundabouts and roundabout approaches (up to a distance of 50m from the junction) were reduced to 20kph, in line with guidance provided within LAQM.TG16. **Table 11.A.1** summarises the model inputs used in all scenarios for this air quality assessment which is identical to the approach reported within Chapter 11 (Air Quality) of the ES. A detailed summary of the traffic data used within the air quality assessment is provided in **Appendix 11B**.

Table 11.A.1 – Model Inputs

Input	Notes
Traffic data and emission rates	NO_x, PM_{10} and $PM_{2.5}$ emissions data for 2019 and 2026 were obtained from Defra's Emissions Factors Toolkit (EFT), version 9.0 *(Unchanged from Chapter 11 of ES).* EFT settings: area ='England (not London)'; traffic format = 'Basic Split'; road type = 'Rural (not London)' for links within the AVDC administrative area and 'Urban (not London)' for links within the MKC administrative area. *(Unchanged from Chapter 11 of ES).* Emissions from 2026 were used for the future year scenario 2033 to ensure a conservative approach to the assessment. *(Unchanged from Chapter 11 of ES).*
Road geometry	All model links aligned to carriageway centreline, set to true road width (kerb to kerb/edge of travelled lanes), road heights set to zero. *(Unchanged from Chapter 11 of ES).*
Background concentrations	From Defra 1 x 1km mapped datasets for 2019 and 2026. The pollutant contribution of A-roads inside the 1 x 1km grid square was removed. The NO_2 contribution was removed using the NO_x sector removal tool (v7.0) published by Defra. Sector removed Defra backgrounds from 2026 were used for the future year scenario 2033 to ensure a conservative approach to the assessment. *(Unchanged from Chapter 11 of ES).*
Receptors	Discrete human receptors identified in **Table 11.3**. (*Five (5no) human health receptors added based on review of updated traffic data for 2033 'with Proposed Development' scenario)*.
Model outputs	Annual mean NO_x, PM_{10} and $PM_{2.5}$ concentrations at receptor points.

Post-processing	Verification (discussed below) with adjustment of road source contributions of annual mean NO_x, PM_{10} and $PM_{2.5}$ (to address systematic model error). *(Approach unchanged from Chapter 11 of ES).*
	NO_x to NO_2 conversion using Defra's calculator version 7.1 (NO_x_to_NO_2_Calculator_v7.1) *(Unchanged from Chapter 11 of ES).*

Assessment Verification Methodology

The verification process involves a review of the modelled pollutant concentrations against corresponding monitoring data to determine how well the air quality model has performed. Depending on the outcome it may be considered that the model has performed adequately and that there is no need to adjust any of the modelled results LAQM.TG16.

Alternatively, the model may perform outside of the ideal performance limits as stated by LAQM.TG16 (i.e. model agrees within +/-25% of monitored equivalent, but ideally within +/-10%). There is then a need to check all the input data to ensure that it is reasonable and accurately represented in the air quality modelling process.

Where all input data, such as traffic data, emissions rates, and background concentrations have been checked and considered as reasonable, then the modelled results require adjustment to best align with the monitoring data. This may either be a single verification adjustment factor applied to the modelled concentrations across the study area, or a range of different adjustment factors to account for different zones in the study area (e.g. major roads and local roads).

The verification methodology applied to the addendum assessment is consistent with that reported in Chapter 11 of the ES.

The data in **Table 11.A.2** compares the 2019 modelled NO_2 with the monitored NO_2 annual mean concentration at the single monitoring site within the study area, which has been used for verification. The data demonstrate that the model is under predicting. Therefore, a road-NO_x adjustment factor was determined by dividing the measured road-NO_x by the modelled equivalent, given that only one location was used for verification.

The adjustment factor (2.98) was applied to the modelled road-NO_x concentration to provide an adjusted modelled road-NO_x concentration (as shown in **Table 11.A.3**). The total NO_2 concentration was determined by inputting the adjusted modelled road-NO_x concentration and the sector removed background NO_2 concentration into the NO_x to NO_2 calculator.

Table 11.A.2 – Data Used in Model Verification before Adjustment

Monitoring Site	2019 Measured NO_2 Data (µg/m^3)*	Modelled Road-NO_x (µg/m^3) – before adjustment	Measured Road-NOx (µg/m^3) – from NO_x:NO_2 calculator	Modelled Annual Mean NO_2 Concentration (µg/m^3) – before adjustment	Difference % ([Modelled NO_2 – Measured NO_2]/Measured NO_2)
WER	22.6	5.9	17.5	16.7	-26.2%

*Source: MKC *2020 Air Quality Annual Status Report* (this represents updated data since Chapter 11 of ES was published)

Table 11.A.3 – Model Results After Adjustment

Monitoring Site	2019 Measured NO_2 Data (µg/m^3)	Modelled Annual Mean NO_2 Concentration (µg/m^3) – after adjustment	Difference %
WER	22.6	22.6	0.0

Whilst the air quality model has been adjusted to ensure that model performance aligns with monitored data at the single monitoring site, given the availability of only one monitoring location within the study area for use in model verification, the statistical analysis of model uncertainty cannot be calculated.

To provide additional assurance to the air quality modelling study and to account for any uncertainty in the model outputs, a conservative approach to both vehicle emissions and background pollutant levels in the future assessment year (2033) has been adopted. For the prediction of future year emissions, Defra's EFT considers factors such as anticipated advances in vehicle technology and fleet composition, such that vehicle emissions are assumed to reduce over time. Similarly, Defra's background pollutant concentrations tend to decrease in each future year. Therefore, the air quality assessment for each scenario in 2033 has assumed that vehicle emissions factors and background NO_x/NO_2 concentrations will be held at 2026 levels (i.e. no improvement in vehicle emissions or background levels after 2026). This approach is consistent with that reported in Chapter 11 of the ES.

PM_{10} & $PM_{2.5}$

There are no local PM_{10} or $PM_{2.5}$ monitoring data against which the model could be verified. Consequently, the verification factor determined above for adjusting the road-NO_x contribution has been applied to the predicted road-PM_{10} and road-$PM_{2.5}$ contributions, consistent with guidance set out in LAQM.TG16. Emissions factors and background levels for both PM_{10} and $PM_{2.5}$ in the future year (2033) assessment scenarios were also conservatively modelled at 2026 levels. This is consistent with the approach reported in Chapter 11 of the ES.

Traffic Data

Table 11.A.4 below summarises the updated traffic data used within the revised air quality modelling assessment for the 2033 'With Proposed Development' scenario.

Table 11.A.4 – 2033 'With Proposed Development' Traffic Flows (updated for addendum assessment)

ID	Road	HGV (%)	Speed (kph)	AADT
1_2	Buckingham Road	4.5	39.0	6779
2_1	Buckingham Road	3.9	40.5	8640
3_4	Buckingham Road	5.3	27.3	5835
4_3	Buckingham Road	6.6	28.5	6305
5_6	Bletchley Road	5.8	36.7	2169
6_5	Bletchley Road	6.5	35.6	2246
7_8	Stoke Road	6.6	32.0	3553
8_7	Stoke Road	7.0	27.9	3585
9_10	Drayton Road	7.4	27.1	1590
10_9	Drayton Road	5.4	26.5	1513
11_12	Whaddon Road	7.8	41.4	3497
12_11	Whaddon Road	6.5	38.4	3667
13_14	Whaddon Road	7.0	43.5	4360
14_13	Whaddon Road	6.7	44.3	3413
15_16	A421	8.1	40.0	15506
16_15	A421	7.4	40.4	15579
17_18	Whaddon Road	5.3	44.5	2780
18_17	Whaddon Road	6.1	46.1	2660

ID	Road	HGV (%)	Speed (kph)	AADT
19_20	Unnamed Road Adjacent to A421 and Warren Road	11.8	36.3	535
20_19	Unnamed Road Adjacent to A421 and Warren Road	10.5	35.1	403
21_22	Nash Road	9.2	35.1	2912
22_21	Nash Road	8.4	36.5	2556
23_24	A421	10.6	41.0	10726
24_23	A421	10.3	46.9	11051
25_26	Winslow Road	9.3	43.7	751
26_25	Winslow Road	8.3	39.8	760
27_28	Coddimoor Lane	8.4	47.1	809
28_27	Coddimoor Lane	6.7	44.0	846
29_30	V1 Snelshall Street	4.9	42.5	5900
30_29	V1 Snelshall Street	4.9	43.3	6414
33_34	Little Horwood Road	10.0	44.6	375
34_33	Little Horwood Road	9.5	43.2	374
35_36	Warren Road	9.6	39.5	611
36_35	Warren Road	7.9	37.3	1024
37_38	A421	8.7	40.9	12921
38_37	A421	7.0	37.6	12681
39_40	A421	9.4	42.2	12511
40_39	A421	9.0	46.0	12511
43_44	Westbrook End	5.5	23.1	624
44_43	Westbrook End	6.0	21.8	647
45_46	Whaddon Road	6.2	24.3	3490
46_45	Whaddon Road	6.3	23.0	3724

ID	Road	HGV (%)	Speed (kph)	AADT
47_48	Hayton Way	1.8	28.1	3183
48_47	Hayton Way	2.9	28.7	3183
49_50	Snelshall Street	5.9	43.6	7786
50_49	Snelshall Street	4.2	43.4	8364
51_52	Chaffron Way	5.1	35.6	8614
52_51	Chaffron Way	5.7	34.5	7309
57_58	Snelshall Street	6.4	42.0	7302
58_57	Snelshall Street	6.3	39.6	7543
59_60	Tattenhoe Street	5.3	39.2	6391
60_59	Tattenhoe Street	5.5	37.1	6923
61_62	Tattenhoe Lane	4.7	29.5	4131
62_61	Tattenhoe Lane	7.3	29.7	4289
63_64	Fulmer Street	5.4	37.7	7010
64_63	Fulmer Street	7.6	33.9	6154
65_66	Watling Street	6.7	43.9	7491
66_65	Watling Street	8.8	42.4	7266
67_68	Watling Street	4.2	33.7	10389
68_67	Watling Street	10.0	30.9	14084
69_70	Sherwood Drive	3.8	24.5	5986
70_69	Sherwood Drive	4.2	22.9	7557
71_72	Buckingham Road	7.5	26.9	12498
72_71	Buckingham Road	5.5	25.9	12784
73_74	Buckingham Road	5.4	25.4	8487
74_73	Buckingham Road	5.9	26.2	8909

ID	Road	HGV (%)	Speed (kph)	AADT
79_80	Shenley Road	7.0	25.3	3915
80_79	Shenley Road	8.9	27.6	3823
81_82	Queensway	5.5	28.1	11818
82_81	Queensway	6.1	26.8	10925
83_84	Water Eaton Road	5.8	25.3	4128
84_83	Water Eaton Road	7.8	26.7	3754
89_90	Shenley Road	2.9	15.0	6706
90_89	Shenley Road	6.7	16.0	6197
91_92	Buckingham Road	10.3	112.0	20614
92_91	Buckingham Road	10.6	112.0	18717
93_94	Standing Way	11.0	112.0	22587
94_93	Standing Way	11.2	112.0	22736
95_96	V6 Grafton Street	8.8	112.0	12796
96_95	V6 Grafton Street	10.5	112.0	12517
97_98	Standing Way	10.9	112.0	18977
98_97	Standing Way	11.1	112.0	19433
99_100	V6 Grafton Street	11.6	112.0	13001
100_99	V6 Grafton Street	9.7	112.0	13472
101_102	A421	6.3	48.8	15945
102_101	A421	6.2	54.3	18061
103_104	A421	6.9	47.3	22066
104_103	A421	9.3	43.9	23044
105_106	A421	6.2	49.6	17147
106_105	A421	6.2	52.4	15867

ID	Road	HGV (%)	Speed (kph)	AADT
107_108	A421	9.4	42.2	12511
108_107	A421	9.0	46.0	12570
13_15R	Roundabout between A421 and Whaddon Road	6.5	20.0	17488
15_101R	Roundabout between A421 and Whaddon Road	7.5	20.0	17572
13_101R	Roundabout between A421 and Whaddon Road	6.6	20.0	19894
105_1R	Roundabout between A421, B4034 and Snelshall Street	5.9	20.0	25100
1_101R	Roundabout between A421, B4034 and Snelshall Street	5.9	20.0	23318
101_57R	Roundabout between A421, B4034 and Snelshall Street	6.0	20.0	25322
57_105R	Roundabout between A421, B4034 and Snelshall Street	5.9	20.0	23545
97_99R	Roundabout between A421 and Grafton Street	10.7	20.0	34101
99_93R	Roundabout between A421 and Grafton Street	10.6	20.0	32411
95_97R	Roundabout between A421 and Grafton Street	10.7	20.0	33620
93_95R	Roundabout between A421 and Grafton Street	10.8	20.0	35402
24_25R	Roundabout between A421, B4033 and Winslow Road	10.1	20.0	13050
21_23R	Roundabout between A421, B4033 and Winslow Road	9.3	20.0	13204
25_107R	Roundabout between A421, B4033 and Winslow Road	10.1	20.0	12548
107_21R	Roundabout between A421, B4033 and Winslow Road	9.3	20.0	14791
15_17R	Roundabout between A421, Coddimoor Lane and Whaddon Road	7.5	20.0	17780
27_15R	Roundabout between A421, Coddimoor Lane and Whaddon Road	7.6	20.0	14522
37_27R	Roundabout between A421, Coddimoor Lane and Whaddon Road	7.6	20.0	15114
17_37R	Roundabout between A421, Coddimoor Lane and Whaddon Road	7.7	20.0	16017
65_93R	Roundabout between A421 and Watling Street	8.3	20.0	31269
93_66R	Roundabout between A421 and Watling Street	9.6	20.0	33658
66_103R	Roundabout between A421 and Watling Street	9.4	20.0	31219

ID	Road	HGV (%)	Speed (kph)	AADT
103_65R	Roundabout between A421 and Watling Street	8.5	20.0	33509
89_91R	Roundabout between A421, Fulmer Street and Shenley Road	7.9	20.0	27216
91_63R	Roundabout between A421, Fulmer Street and Shenley Road	8.9	20.0	28057
63_103R	Roundabout between A421, Fulmer Street and Shenley Road	8.8	20.0	25592
103_89R	Roundabout between A421, Fulmer Street and Shenley Road	7.8	20.0	29652
61_105R	Roundabout between A421, Tattenhoe Street and Tattenhoe Lane	8.9	20.0	23572
91_61R	Roundabout between A421, Tattenhoe Street and Tattenhoe Lane	9.0	20.0	25357
59_91R	Roundabout between A421, Tattenhoe Street and Tattenhoe Lane	6.5	20.0	21498
105_59R	Roundabout between A421, Tattenhoe Street and Tattenhoe Lane	6.9	20.0	23877
29_51R	Rounadbout between V1 Snelshall Street and Hayton Way	4.7	20.0	12173
51_49R	Rounadbout between V1 Snelshall Street and Hayton Way	4.8	20.0	12726
47_29R	Rounadbout between V1 Snelshall Street and Hayton Way	4.8	20.0	12587
49_47R	Rounadbout between V1 Snelshall Street and Hayton Way	4.8	20.0	13365
13_14Q	Whaddon Road	7.0	20.0	4360
14_13Q	Whaddon Road	6.7	20.0	3413
101_102Q	A421 Standing Way	6.3	20.0	15945
102_101Q	A421 Standing Way	6.2	20.0	18061
106_105Q	A421 Standing Way	7.4	20.0	15579
105_106Q	A421 Standing Way	8.1	20.0	15506
95_96Q	V6 Grafton Street	6.3	20.0	15945
96_95Q	V6 Grafton Street	6.2	20.0	18061
101_102QQ	A421 Standing Way	6.4	20.0	7302
102_101QQ	A421 Standing Way	6.3	20.0	7543
107_108Q	A421 Standing Way	6.2	20.0	15867

ID	Road	HGV (%)	Speed (kph)	AADT
108_107Q	A421 Standing Way	6.2	20.0	17147
25_26Q	Winslow Road	4.5	20.0	6779
26_25Q	Winslow Road	3.9	20.0	8640
21_22Q	Nash Road	5.3	20.0	6391
22_21Q	Nash Road	5.5	20.0	6923
23_24Q	A421	10.3	20.0	20614
24_23Q	A421	10.6	20.0	18717
17_18Q	Whaddon Road	4.7	20.0	4131
18_17Q	Whaddon Road	7.3	20.0	4289
27_28Q	Coddimoor Lane	6.2	20.0	17147
28_27Q	Coddimoor Lane	6.2	20.0	15867
37_38Q	A421	2.9	20.0	6706
38_37Q	A421	6.7	20.0	6197
15_16QQ	A421	6.9	20.0	22066
16_15QQ	A421	9.3	20.0	23044
16_15Q	A421	5.4	20.0	7010
15_16Q	A421	7.6	20.0	6154
57_58Q	Snelshall Street	10.3	20.0	20614
58_57Q	Snelshall Street	10.6	20.0	18717
1_2Q	Buckingham Road	4.2	20.0	10389
2_1Q	Buckingham Road	10.0	20.0	14084
49_50Q	Snelshall Street	11.0	20.0	22587
50_49Q	Snelshall Street	11.2	20.0	22736
51_52Q	Chaffron Way	6.7	20.0	7491

ID	Road	HGV (%)	Speed (kph)	AADT
52_51Q	Chaffron Way	8.8	20.0	7266
29_30Q	V1 Snelshall Street	9.3	20.0	23044
30_29Q	V1 Snelshall Street	6.9	20.0	22066
47_48Q	Hayton Way	11.6	20.0	13001
48_47Q	Hayton Way	9.7	20.0	13472
92_91Q	Buckingham Road	11.0	20.0	22587
91_92Q	Buckingham Road	11.2	20.0	22736
61_62Q	Tattenhoe Lane	10.9	20.0	18977
62_61Q	Tattenhoe Lane	11.1	20.0	19433
59_60Q	Tattenhoe Street	8.8	20.0	12796
60_59Q	Tattenhoe Street	10.5	20.0	12517
106_105QQ	A421 Standing Way	5.3	20.0	2780
105_106QQ	A421 Standing Way	6.1	20.0	2660
92_91QQ	Buckingham Road	8.1	20.0	15506
91_92QQ	Buckingham Road	7.4	20.0	15579
89_90Q	Shenley Road	7.0	20.0	12681
90_89Q	Shenley Road	8.7	20.0	12921
63_64Q	Fulmer Street	9.3	20.0	751
64_63Q	Fulmer Street	8.3	20.0	760
103_104Q	A421 Standing Way	9.2	20.0	2912
104_103Q	A421 Standing Way	8.4	20.0	2556
103_104QQ	A421 Standing Way	9.4	20.0	12511
104_103QQ	A421 Standing Way	9.0	20.0	12570
67_68Q	Watling Street	10.6	20.0	10726

ID	Road	HGV (%)	Speed (kph)	AADT
68_67Q	Watling Street	10.3	20.0	11051
94_93Q	Standing Way	5.1	20.0	8614
93_94Q	Standing Way	5.7	20.0	7309
65_66Q	Watling Street	5.9	20.0	7786
66_65Q	Watling Street	4.2	20.0	8364
99_100Q	V6 Grafton Street	1.8	20.0	3183
100_99Q	V6 Grafton Street	2.9	20.0	3183
94_93QQ	Standing Way	4.9	20.0	5900
93_94QQ	Standing Way	4.9	20.0	6414
97_98Q	Standing Way	10.9	20.0	18977
98_97Q	Standing Way	11.1	20.0	19433
87_88	Fulmer Street south	5.1	33.7	7598
88_87	Fulmer Street south	5.0	36.4	6872
31_32	Chaffron Way west	3.8	44.1	7284
32_31	Chaffron Way west	4.1	41.8	8272
55_56	Fulmer Street north	6.6	43.1	7232
56_55	Fulmer Street north	10.6	46.4	6824
85_86	Chaffron Way east	6.5	41.0	8644
86_85	Chaffron Way east	8.6	39.6	9303
87_88R	Fulmer Street west roundabout	6.4	20.0	15542
85_86R	Chaffron Way east roundabout	6.6	20.0	15794
55_56R	Fulmer Street north roundabout	6.3	20.0	15184
31_32R	Chaffron Way south roundabout	6.0	20.0	15508
87_88Q	Fulmer Street west roundabout approach	5.1	20.0	7598

ID	Road	HGV (%)	Speed (kph)	AADT
88_87Q	Fulmer Street west roundabout approach	5.0	20.0	6872
31_32Q	Chaffron Way south roundabout approach	3.8	20.0	7284
32_31Q	Chaffron Way south roundabout approach	4.1	20.0	8272
55_56Q	Fulmer Street north roundabout approach	6.6	20.0	7232
56_55Q	Fulmer Street north roundabout approach	10.6	20.0	6824
85_86Q	Chaffron Way east roundabout approach	6.5	20.0	8644
86_85Q	Chaffron Way east roundabout approach	8.6	20.0	9303

11B Atmospheric Dispersion Modelling Results

Table 11.B.1 – Predicted Annual Mean NO_2 Concentrations

Receptor	2019 Base (µg/m^3)	2033 Without Dev (µg/m^3)	2033 With Dev (µg/m^3)	Change (µg/m^3)	%Change relative to objective	Impact
R1	18.6	13.0	13.7	0.7	2%	Negligible
R2	29.7	20.0	20.4	0.4	1%	Negligible
R3	16.7	12.1	12.5	0.4	1%	Negligible
R4	17.0	12.2	12.6	0.4	1%	Negligible
R5	18.1	13.0	14.6	1.6	4%	Negligible
R6	17.6	12.8	14.0	1.2	3%	Negligible
R7	21.4	15.2	17.2	2.0	5%	Negligible
R8	23.5	16.3	17.4	1.1	3%	Negligible
R9	14.5	10.7	11.4	0.7	2%	Negligible
R10	16.8	12.2	13.4	1.2	3%	Negligible
R11	14.5	10.7	11.0	0.3	1%	Negligible
R12	17.5	12.5	13.0	0.5	1%	Negligible

Receptor	2019 Base (µg/m^3)	2033 Without Dev (µg/m^3)	2033 With Dev (µg/m^3)	Change (µg/m^3)	%Change relative to objective	Impact
R13	17.5	12.5	12.8	0.3	1%	Negligible
R14	22.6	15.8	16.2	0.4	1%	Negligible
R15	35.1	23.1	23.6	0.5	1%	Negligible
R16	25.8	17.8	18.2	0.4	1%	Negligible
R17	30.3	21.2	22.1	0.9	2%	Negligible
R18	29.3	18.3	19.2	0.9	2%	Negligible
R19	25.0	16.3	16.8	0.5	1%	Negligible
R20	25.5	17.4	17.8	0.4	1%	Negligible
R21	20.5	13.9	14.1	0.2	1%	Negligible
R22	22.6	15.1	15.3	0.2	1%	Negligible
R23	24.5	16.2	16.4	0.2	1%	Negligible
R24	-	17.8	18.1	0.3	1%	Negligible
R25	-	24.8	25.5	0.7	2%	Negligible
R26	-	15.6	15.7	0.1	0%	Negligible
R27	-	13.8	14.1	0.3	1%	Negligible
R28	-	9.7	9.9	0.2	1%	Negligible
R101	11.1	8.5	8.7	0.2	1%	N/A
R102	12.4	9.5	9.7	0.2	1%	N/A
R103	13.9	10.3	10.5	0.2	1%	N/A
R104	14.1	10.4	10.7	0.3	1%	N/A
R105	11.4	8.7	8.9	0.2	1%	N/A
R106	12.8	9.6	9.9	0.3	1%	N/A

- Only included in 2033 scenarios

Table 11.B.2 – Predicted Annual Mean PM_{10} Concentrations ($\mu g/m^3$)

Receptor	2019 Base ($\mu g/m^3$)	2033 Without Dev ($\mu g/m^3$)	2033 With Dev ($\mu g/m^3$)	Change ($\mu g/m^3$)	%Change relative to objective	Impact
R1	17.5	17.6	17.9	0.3	1%	Negligible
R2	17.8	17.1	17.2	0.1	0%	Negligible
R3	16.1	16.3	16.4	0.1	0%	Negligible
R4	17.1	17.3	17.4	0.1	0%	Negligible
R5	16.3	15.5	16.0	0.5	1%	Negligible
R6	16.6	16.8	17.2	0.4	1%	Negligible
R7	17.3	17.6	18.3	0.7	2%	Negligible
R8	17.4	17.7	18.1	0.4	1%	Negligible
R9	15.8	15.0	15.2	0.2	1%	Negligible
R10	16.0	15.2	15.6	0.4	1%	Negligible
R11	16.0	15.1	15.1	0.0	0%	Negligible
R12	16.2	15.3	15.4	0.1	0%	Negligible
R13	16.3	15.3	15.4	0.1	0%	Negligible
R14	16.8	17.0	17.1	0.1	0%	Negligible
R15	18.9	19.2	19.3	0.1	0%	Negligible
R16	16.9	17.1	17.2	0.1	0%	Negligible
R17	18.0	18.6	18.9	0.3	1%	Negligible
R18	18.1	18.0	18.2	0.2	1%	Negligible
R19	17.7	17.7	17.8	0.1	0%	Negligible

Receptor	2019 Base (µg/m^3)	2033 Without Dev (µg/m^3)	2033 With Dev (µg/m^3)	Change (µg/m^3)	%Change relative to objective	Impact
R20	17.0	16.3	16.3	0.0	0%	Negligible
R21	15.3	14.4	14.5	0.1	0%	Negligible
R22	16.5	15.6	15.7	0.1	0%	Negligible
R23	16.8	16.0	16.1	0.1	0%	Negligible
R24	-	18.0	18.1	0.1	0%	Negligible
R25	-	19.9	20.1	0.2	0%	Negligible
R26	-	17.0	17.0	0.0	0%	Negligible
R27	-	16.6	16.6	0.0	0%	Negligible
R28	-	14.5	14.5	0.0	0%	Negligible
R101	14.7	13.8	13.8	0.0	0%	N/A
R102	15.5	14.6	14.7	0.1	0%	N/A
R103	15.8	14.9	14.9	0.0	0%	N/A
R104	15.9	15.0	15.1	0.1	0%	N/A
R105	15.3	14.3	14.4	0.1	1%	N/A
R106	15.5	14.6	14.7	0.1	0%	N/A

- Only included in 2033 scenarios

Table 11.B.3 – Predicted **24-hour Mean PM_{10} Exceedances (No. Days PM_{10} >50µg/m^3 throughout calendar year)**

Receptor	2019 Base (No. Days)	2033 Without Dev (No. Days)	2033 With Dev (No. Days)
R1	1.0	1.1	1.3
R2	1.3	0.8	0.8
R3	0.3	0.4	0.5
R4	0.8	0.9	1.0
R5	0.4	0.2	0.3
R6	0.5	0.6	0.8
R7	0.9	1.1	1.6
R8	1.0	1.2	1.5
R9	0.3	0.1	0.1
R10	0.3	0.1	0.2
R11	0.3	0.1	0.1
R12	0.4	0.2	0.2
R13	0.4	0.2	0.2
R14	0.6	0.7	0.8
R15	2.2	2.5	2.6
R16	0.7	0.8	0.9
R17	1.4	1.9	2.2
R18	1.5	1.4	1.6
R19	1.2	1.2	1.3
R20	0.8	0.4	0.4
R21	0.2	0.1	0.1

Receptor	2019 Base (No. Days)	2033 Without Dev (No. Days)	2033 With Dev (No. Days)
R22	0.5	0.2	0.2
R23	0.7	0.3	0.3
R24	-	1.4	1.5
R25	-	3.2	3.5
R26	-	0.7	0.7
R27	-	0.5	0.6
R28	-	0.1	0.1
R101	0.1	0.2	0.2
R102	0.2	1.1	1.3
R103	0.2	0.8	0.8
R104	0.3	0.4	0.5
R105	0.2	0.9	1.0
R106	0.2	0.2	0.3

- Only included in 2033 scenarios

Table 11.B.4 – Predicted Annual Mean $PM_{2.5}$ concentrations ($\mu g/m^3$)

Receptor	2019 Base ($\mu g/m^3$)	2033 Without Dev ($\mu g/m^3$)	2033 With Dev ($\mu g/m^3$)	Change ($\mu g/m^3$)	%Change relative to objective	Impact
R1	11.0	10.2	10.4	0.2	1%	Negligible
R2	11.3	10.5	10.6	0.1	0%	Negligible
R3	10.3	9.5	9.6	0.1	0%	Negligible
R4	10.8	10.0	10.1	0.1	0%	Negligible
R5	10.7	9.9	10.2	0.3	1%	Negligible
R6	10.9	10.1	10.4	0.3	1%	Negligible
R7	11.3	10.6	11.0	0.4	2%	Negligible
R8	11.4	10.7	10.9	0.2	1%	Negligible
R9	10.1	9.3	9.4	0.1	0%	Negligible
R10	10.5	9.8	10.0	0.2	1%	Negligible
R11	10.3	9.4	9.5	0.1	0%	Negligible
R12	10.4	9.6	9.7	0.1	0%	Negligible
R13	10.4	9.6	9.6	0.0	0%	Negligible
R14	11.5	10.7	10.8	0.1	0%	Negligible
R15	12.7	11.9	12.0	0.1	0%	Negligible
R16	11.5	10.7	10.8	0.1	0%	Negligible
R17	12.2	11.6	11.8	0.2	1%	Negligible
R18	12.3	11.3	11.4	0.1	0%	Negligible
R19	12.0	11.2	11.2	0.0	0%	Negligible
R20	10.9	10.1	10.1	0.0	0%	Negligible
R21	10.2	9.4	9.4	0.0	0%	Negligible

Receptor	2019 Base (µg/m^3)	2033 Without Dev (µg/m^3)	2033 With Dev (µg/m^3)	Change (µg/m^3)	%Change relative to objective	Impact
R22	10.6	9.8	9.8	0.0	0%	Negligible
R23	10.8	10.0	10.0	0.0	0%	Negligible
R24		11.2	11.3	0.1	0%	Negligible
R25		12.3	12.4	0.1	0%	Negligible
R26		10.7	10.7	0.0	0%	Negligible
R27		10.5	10.5	0.0	0%	Negligible
R28		9.0	9.0	0.0	0%	Negligible
R101	9.5	8.7	8.7	0.0	0%	N/A
R102	9.9	9.1	9.1	0.0	0%	N/A
R103	10.0	9.2	9.3	0.1	0%	N/A
R104	10.1	9.3	9.3	0.0	0%	N/A
R105	9.8	9.0	9.0	0.0	0%	N/A
R106	9.9	9.1	9.2	0.1	0%	N/A

- Only included in 2033 scenario