6.0 Air Quality

6.1 Introduction

6.1.1 This chapter has been prepared by Brookbanks Limited and should be read in conjunction with the Air Quality chapter 6 of the 2021 ES, which remains extant unless superseded by the content of this addendum chapter. This chapter sets out an amended assessment of potential operational phase impacts on air quality, due to revisions to the operational trip generation associated with the proposed development and other committed and proposed schemes in the area. The assessment has been fully updated to utilise the latest baseline air quality data and vehicle emission factors.

6.1.2 Whilst updated guidance has been produced by the Institute of Air Quality Management regarding the assessment of construction phase dust impacts, the revised methodology would not materially affect the 2021 ES conclusions or the recommended mitigation measures. Therefore, the assessment of significant environmental effects during the construction phase is as reported in the 2021 ES.

6.1.3 In response to the originally submitted planning application, Cherwell District Council's Environmental Health Officer advised on 20 January 2022 'Having read the Air Quality Chapter of the ES I am satisfied with its findings'. Conditions were recommended in respect of the provision of electrical vehicle charging for residential and commercial properties.

6.1.4 This chapter should be read in conjunction with the following appendices:

- 6.1 – Construction dust risk assessment (submitted in 2021)
- 6.2 – Model Input Parameters (replacement to 2021 appendix)
- 6.3 – Model Verification (replacement to 2021 appendix)
- 6.4 – Traffic Data
- 6.5 – Road Links Requiring Detailed Assessment
- 6.6 – Sensitive Receptors
- 6.7 – Monitoring Locations

6.2 Assessment Methodology

6.2.1 The methodology as outlined in the 2021 ES is unchanged, however the assessment has been fully updated using the revised traffic data, incorporating the latest baseline data and vehicle emission factors.

Data sources

6.2.2 The following data sources have been used in the revised assessment:

- Air quality monitoring data, as set out in Cherwell District Council's most recent Air Quality Annual Status Report (Cherwell District Council, 2024).
- Vehicle emission factors from v13.0 of the EFT (Defra, 2025).
- Defra 2021 Reference Year Background Pollutant Maps (https://uk-air.defra.gov.uk/data/laqm-background-home).
- Hourly meteorological data from Brize Norton for 2023.

Assessment approach

6.2.3 The updated traffic data is presented in **Appendix 6.4**. The EPUK/IAQM planning guidance (IAQM/ EPUK, 2017) screening thresholds have been used to identify road links where the operational traffic associated with the completed development has the potential to significantly affect local air quality. The links identified for detailed assessment are shown in **Appendix 6.5**. A reduction in trips is predicted on roads within the Bicester AQMA.

6.2.4 The following scenarios have been assessed:

- Do Nothing – 2031 baseline
- Do Something – 2031 baseline + development

6.2.5 The baseline scenario includes traffic associated with other committed and proposed developments in the area. Cumulative effects are therefore intrinsic to the assessment.

6.2.6 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ in 2031 have been predicted at sensitive receptor locations using 2030 vehicle emission factors, in conjunction with baseline (2023) background concentrations, which is considered to provide a realistic worst-case assessment of post-completion impacts and exposure. The modelled NOx concentrations have been converted to NO_2 using the latest version of the NO_x to NO_2 calculator (v9.1).

6.2.7 A summary of the model input parameters is presented in **Appendix 6.2**.

6.2.8 Pollutant concentrations have been predicted at worst-case (closest to the carriageway) discrete receptors on the road links identified in **Appendix 6.5**. Details of these receptors are presented in **Table 6.2.1**. Concentrations have been predicted at a typical exposure height of 1.5m above ground-level.

6.2.9 Four receptors have also been included within the boundary of the proposed development, representing worst-case exposure for future occupants.

6.2.10 The location of the sensitive receptors is shown in **Appendix 6.6**.

Table 6.2.1: Sensitive Receptors

ID	Location	Type	Easting	Northing
1	Germander Way	Residential	457916	224336
2	Hawkwell Farm Cottages	Residential	456885	224367
3	Coach House Bungalow, Bucknell	Residential	455975	225580
4	7 Middleton Road, Bucknell	Residential	455914	225560
5	The Maple, Bucknell	Residential	455972	225612
6	Exton Cottages, Ardley	Residential	454335	227523
7	Spruce Drive	Residential	458620	224407
8	Blackburn Walk	Residential	459384	224034
9	Proposed Development 1	Residential	456699	224591
10	Proposed Development 2	Residential	457101	224075
11	Proposed Development 3	Residential	457967	224410
12	Proposed Development 4	Residential	458125	224606

Significance criteria

6.2.11 There has been no change to the significance criteria presented within the 2021 ES.

Uncertainties and limitations

6.2.12 There is an inherent level of uncertainty associated with any assessment process; however, the methodology presented has been developed to minimise errors where possible. Potential errors in predicted concentrations due to uncertainties in the assessment source activity data (e.g., traffic flows and emission factors) and the estimated background concentration are minimised by the verification of modelled concentrations using local monitoring data.

6.2.13 LAQM.TG22 recommends that modelled concentrations should be within 25% of monitored concentrations, ideally within 10%. Where there is a large discrepancy between modelled and measured concentrations, it is considered necessary to adjust the model results to reflect local air quality more accurately.

6.2.14 The modelled NO_2 concentrations have been verified using 2023 data from roadside diffusion tube monitoring sites in Ardley (tube 20), Middleton Stoney (tube 21) and on London Road in Bicester (tube 34). Full details of the model verification process are presented in **Appendix 6.3**.

6.3 Relevant Policy

National Planning Policy Framework

6.3.1 With the exception of changes to paragraph numbers there are no material differences between the air quality policy within the current National Planning Policy Framework (Dec 2024 (and non-policy updates Feb 2025)) and the July 2021 version of the NPPF, as reported within the 2021 ES.

Planning Practice Guidance

6.3.2 The Government's online Planning Practice Guidance (PPG) for air quality has not been revised.

Environmental Targets Regulations

6.3.3 On 31st January 2023, the Government published an Environmental Improvement Plan (Defra, 2023), which includes an Annual Mean Concentration Target (AMCT) of 10 $\mu g/m^3$, to be achieved by the end of 2040. The Plan also includes an interim target of 12 $\mu g/m^3$, to be achieved by the end of January 2028. The 10 $\mu g/m^3$ target for $PM_{2.5}$ has been adopted into UK law via the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023.

6.3.4 Interim Planning Guidance on the consideration of the $PM_{2.5}$ targets has been published by Defra (Defra, 2024) which states that applicants are advised to consider:

- Site proximity to people (particularly large populations and/or vulnerable groups, e.g. schools, hospitals, care homes, areas of deprivation) and the impact of the development on these.
- Site proximity to pollution sources and the impact of these on users of the development.
- Exposure and emissions during both construction and in-use.

6.3.5 In addition, applicants are advised to explain what actions and or mitigation measures have been considered to $PM_{2.5}$ exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of $PM_{2.5}$ and its precursors.

6.3.6 The revised assessment has evaluated the predicted $PM_{2.5}$ concentrations at existing and on-site receptors, with respect to these targets.

Emerging Local Plan

Cherwell Local Plan Review 2042

6.3.7 Cherwell District Council (CDC) is also preparing a new Local Plan. The consultation (Regulation 19) on the draft of the Cherwell Local Plan Review 2042 was held between 19th December 2024 and 25th February 2025. The Submission Local Plan was approved by CDC Executive on 1 July 2025 and by Full Council on 21 July 2025 and was submitted to the Secretary of State for Housing, Communities and Local Government for independent examination, on 31 July 2025. Officers prepared a Schedule of Proposed Changes and Minor Modifications which they consider would improve and update the draft plan in view of the representations received and updated evidence. These will be submitted for consideration by the Inspector at the examination and if appropriate may form the basis for future Main Modifications to the Submission Local Plan as recommended by the Inspector in order to make the plan sound and/or legally compliant. As such, at this time, only limited weight can be attributed to the emerging Local Plan as a material planning consideration.

6.4 Baseline Conditions

6.4.1 The existing baseline conditions have been evaluated with respect to the modified study area.

Local Monitoring Data

6.4.2 Details of local air quality monitoring sites that are considered relevant to the assessment are presented in **Table 6.4.1**. All the sites are passive diffusion tubes, measuring long-term NO_2 concentrations. The monitoring locations are shown in **Appendix 6.7.**

Table 6.4.1: Air Quality Monitoring Sites

ID	Location	Type	Easting	Northing
20	Ardley	Roadside	454301	227498
21	Middleton Stoney	Roadside	453397	223516
31	Bicester - Villiers Road	Urban Background	457619	222535
32	Bicester - Tamarisk Gardens	Urban Background	458333	224432
HL	Howes Lane 2014	Roadside	457956	224362
SD	Shakespeare Drive 2016	Roadside	456937	223586

6.4.3 A summary of bias adjusted annual mean NO_2 concentrations measured between 2019 and 2023 is presented in **Table 6.4.2**. There were no measured exceedances of the annual mean air quality objective of 40 $\mu g/m^3$ over the five-year period. Urban background NO_2 concentrations in the area are around 30-35% of the air quality objective.

6.4.4 Research has shown that exceedances of the short-term objective for NO_2 are unlikely where the annual mean concentrations are below 60 $\mu g/m^3$ (Laxen and Marner, 2003). The measured concentrations are well below this threshold and therefore the risk of an exceedance of 1-hour mean NO_2 objective in the study area is negligible.

Table 6.4.2: Measured Annual Mean NO_2 Concentrations (μg/m^3)

ID	2019	2020	2021	2022	2023
20	24.4	18.3	18.5	18.0	17.9
21	31.3	22.2	22.4	25.2	25.0
31	17.0	12.3	12.5	13.4	12.2
32	15.0	11.6	11.8	12.1	12.9
HL	20.7 (a)	19.3	19.6	-	-
SD	23.2	19.9	20.1	-	-
(a) Data capture < 90%					

Defra Mapped Background Concentrations

6.4.5 The latest Defra background maps were released in November 2024 and are based on 2021 monitoring data and emission inventories, with projections for future years. A calibration study undertaken by Logika Group that compared measured and mapped NO_2 concentrations in 2022, 2023 and 2024 indicates that, on average, the mapped data underpredicts 2023 background concentrations outside London by 11%. A comparison between the measured urban background concentrations in Bicester with the mapped concentration for the relevant grid-square is presented in **Table 6.4.3**. The data indicates that the Defra maps are underpredicting annual mean background concentrations in the area by an average of 41%. A local calibration factor has been derived which has been used to adjust the mapped NO_2 concentrations in the study area.

Table 6.4.3: Mapped and Measured 2023 Annual Mean Background NO_2 Concentrations (μg/m^3)

Monitoring Location	Grid Square	Mapped	Measured	Measured/ Mapped
31	457500, 222500	7.4	12.2	1.6
32	458500, 224500	7.3	12.9	1.8
Local Calibration Factor for NO_2				1.7

6.4.6 The 2023 mapped background concentrations for the study area (proposed development, sensitive receptors and verification locations) are presented in **Table 6.4.4**. In the absence of a local background particulate monitoring site, the mapped concentrations are assumed to be representative of the existing baseline.

Table 6.4.4: 2023 Mapped Background Concentrations (µg/m^3)

Grid Square	**NO_2**	**PM_{10}**	**$PM_{2.5}$**
NW Bicester (receptors 1, 2, 7, 8,9, 10, 11 and 12)			
456500, 225500	10.9	12.7	6.6
457500, 225500	10.8	12.3	6.6
456500, 224500	11.1	13.0	6.7
457500, 224500	11.3	12.7	6.9
458500, 224500	12.5	12.3	7.3
459500, 224500	12.0	11.4	6.8
Maximum	*12.5*	*13.0*	*7.3*
Bucknell (receptors 3, 4 and 5)			
455500, 225500	12.5	13.2	6.8
456500, 225500	10.9	12.7	6.6
Maximum	*12.5*	*13.2*	*6.8*
Ardley (receptor 6 and diffusion tube 20)			
453500, 227500 (a)	11.3	12.5	6.6
Middleton Stoney (diffusion tube 21)			
453500, 223500	11.1	12.1	6.6
Central Bicester (diffusion tube 34)			
458500, 222500	13.7	12.5	7.4
(a) The receptor and diffusion tube are in grid square 454500, 227500, however the mapped background is heavily influenced by motorway emissions. The receptor and diffusion tube site are over 400m from the motorway and therefore the background concentration for the adjacent grid square is considered more representative.			

Future Baseline Conditions (Do Nothing Scenario)

6.4.7 The latest year for which reliable mapped data is available is 2030. A summary of the maximum and minimum 2030 mapped annual mean background concentrations across the study area is presented in **Table 6.4.5**.

6.4.8 The concentrations are lower than in 2023 due to anticipated emissions reductions associated with increasingly stringent standards, the gradual renewal of the vehicle fleet and the increased uptake of electric vehicles.

Table 6.4.5: Mapped Future Background Concentrations (μg/m^3)

Pollutant	**2030 Annual Mean**	**NAQO**
NO_2	8.3 – 9.9 (a)	40
PM_{10}	10.8 – 12.6	40
$PM_{2.5}$	6.1 – 6.8	20 / 10
(a) Estimated using local 2023 calibration factor.		

6.4.9 To ensure that the assessment of potential impacts is as conservative as possible, concentrations have been predicted at the proposed development and sensitive receptors in 2031, using 2023 background concentrations, as summarised in **Table 6.4.4**.

6.5 Potential Effects

Construction stage

6.5.1 The potential effects reported within the 2021 ES remain as reported therein.

Post-completion stage

6.5.2 Predicted 2031 annual mean pollutant concentrations at the identified receptor locations, without (Do Nothing, DN) and with (Do Something, DS) the proposed development traffic have been compared with the relevant long-term air quality standard for the protection of human health (the Air Quality Assessment Level, AQAL).

6.5.3 The predicted annual mean NO_2 concentrations are presented in **Table 6.5.1** and are less than 50% of the AQAL of 40 μg/m^3 at all existing and proposed receptor locations. The maximum impact is predicted at Coach House Bungalow in Bucknell, with an increase of 1.2 μg/m^3. The predicted concentration at this location is 16.2 μg/m^3 (41% of the AQAL), therefore, as reported in the 2021 ES, the impact is negligible (not significant).

6.5.4 The highest predicted on-site concentrations occur at receptor 10, which is adjacent to Bucknell Road, however at 18.2 μg/m^3, the risk of an exceedance of the long or short-term air quality standards is negligible.

Table 6.5.1: Predicted 2031 Annual Mean NO_2 Concentrations (µg/m^3)

ID	Location	DN	DS	Increase (% AQAL)	Impact
1	Germander Way	14.9	15.4	1%	Negligible
2	Hawkwell Farm Cottages	13.2	13.8	2%	Negligible
3	Coach House Bungalow, Bucknell	15.0	16.2	3%	Negligible
4	7 Middleton Road, Bucknell	15.0	15.5	1%	Negligible
5	The Maple, Bucknell	16.6	17.6	2%	Negligible
6	Exton Cottages, Ardley	16.1	16.9	2%	Negligible
7	Spruce Drive	15.5	15.6	0%	Negligible
8	Blackburn Walk	15.7	15.9	0%	Negligible
9	Proposed Development 1	-	13.7	-	-
10	Proposed Development 2	-	18.4	-	-
11	Proposed Development 3	-	15.7	-	-
12	Proposed Development 4	-	13.4	-	-

6.5.5 The predicted annual mean PM_{10} concentrations are presented in **Table 6.5.2** and are less than 50% of the AQAL of 40 µg/m^3 at all existing and proposed receptor locations. Again, the maximum impact is predicted at Coach House Bungalow in Bucknell, with an increase of 0.78 µg/m^3. The predicted concentration at this location is 15.6 µg/m^3 (39% of the AQAL), therefore, as reported in the 2021 ES, the impact is negligible (not significant).

6.5.6 The highest predicted on-site PM_{10} concentration occurs at receptor 10, however at 17.3 µg/m^3, the risk of an exceedance of the long or short-term air quality standards is negligible.

Table 6.5.2: Predicted 2031 Annual Mean PM_{10} Concentrations (µg/m³)

ID	Location	DN	DS	Increase (% AQAL)	Impact
1	Germander Way	14.5	14.9	1%	Negligible
2	Hawkwell Farm Cottages	13.5	13.9	1%	Negligible
3	Coach House Bungalow, Bucknell	14.8	15.6	2%	Negligible
4	7 Middleton Road, Bucknell	14.9	15.3	1%	Negligible
5	The Maple, Bucknell	15.8	16.5	2%	Negligible
6	Exton Cottages, Ardley	15.7	16.2	1%	Negligible
7	Spruce Drive	15.0	15.1	0%	Negligible
8	Blackburn Walk	15.1	15.2	0%	Negligible
9	Proposed Development 1	-	13.8	-	-
10	Proposed Development 2	-	17.3	-	-
11	Proposed Development 3	-	15.1	-	-
12	Proposed Development 4	-	13.6	-	-

6.5.7 The predicted annual mean $PM_{2.5}$ concentrations are presented in **Table 6.5.3** and are less than 50% of the AQAL of 20 µg/m³ at all existing and proposed receptor locations. The concentrations are also predicted to be below the Government's 2040 AMCT of 10 µg/m³ at all locations.

6.5.8 Again, the maximum impact is predicted at Coach House Bungalow in Bucknell, with an increase of 0.41 µg/m³. The predicted concentration at this location is 8.0 µg/m³ (39% of the AQAL), therefore, as reported in the 2021 ES, the impact is negligible (not significant).

6.5.9 The highest predicted on-site $PM_{2.5}$ concentration occurs at receptor 10 at 9.6 µg/m³, well below both the current air quality standard and the 2040 AMCT. The risk of an exceedance is negligible.

Table 6.5.3: Predicted 2031 Annual Mean $PM_{2.5}$ Concentrations (μg/m^3)

ID	Location	DN	DS	Increase (% AQAL)	Impact
1	Germander Way	8.1	8.3	1%	Negligible
2	Hawkwell Farm Cottages	7.6	7.8	1%	Negligible
3	Coach House Bungalow, Bucknell	7.6	8.0	2%	Negligible
4	7 Middleton Road, Bucknell	7.7	7.9	1%	Negligible
5	The Maple, Bucknell	8.2	8.5	2%	Negligible
6	Exton Cottages, Ardley	8.3	8.5	1%	Negligible
7	Spruce Drive	8.4	8.4	0%	Negligible
8	Blackburn Walk	8.5	8.5	0%	Negligible
9	Proposed Development 1	-	7.7	-	-
10	Proposed Development 2	-	9.6	-	-
11	Proposed Development 3	-	8.4	-	-
12	Proposed Development 4	-	7.6	-	-

6.6 Mitigation Measures

Construction stage

6.6.1 The proposed construction stage mitigation measures reported within the 2021 ES remain as reported therein.

Post-completion stage

6.6.2 The proposed post-completion stage mitigation measures reported within the 2021 ES remain as reported therein.

6.7 Residual Effects

Construction stage

6.7.1 No change to the constructional effects identified in the 2021 application have been identified.

Post-completion stage

6.7.2 No change to the post completion effects identified in the 2021 application have been identified.

6.8 Cumulative Effects

6.8.1 No changes to cumulative effects have been identified and hence no change to the assessment in the 2021 ES is reported.