

# ENVIRONMENTAL STATEMENT VOLUME 2 APPENDIX 7.5 – OPERATIONAL PHASE ASSESSMENT

Project No.: 70058541 Great Lakes UK Limited **WSP** 

# Appendix 7.5 – Operational Phase Assessment.

### **Road Traffic Emissions**

Additional traffic generated by the operation of the Proposed Development will generate additional vehicle emissions. An assessment was therefore undertaken using air quality dispersion modelling techniques (ADMS ROADS) in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site.

The following scenarios have been modelled:

- 2018 Verification Year;
- 2022 Do Minimum (DM);
- 2022 Do Something (DS);

The DM (i.e. without development) scenario is representative of anticipated traffic data for 2022 including committed development. The DS (i.e. with development) scenario is representative of anticipated traffic data for 2022 including committed development, with the addition of predicted variations in traffic flow patterns as a result of the Proposed Development.

There remains some uncertainty regarding future  $NO_x$  emissions from diesel vehicles and to take this into account, emission factors from 2018 have been used within the future year scenarios. This assumes no improvement in emissions in the future and therefore presents a worse case scenario.

In order to determine the significance of the predicted impacts, the approach suggested by the EPUK/IAQM guidance<sup>i</sup>, has been used for existing sensitive receptor locations where the annual mean objective applies i.e. residential properties. The EPUK/IAQM approach provides a method for identifying the impact descriptor for each receptor based on the change in pollutant concentrations between the DM and DS scenario and the pollutant concentration predicted during the DS scenario, expressed as a percentage of the AQO.

To determine the overall significance of the effects of a Proposed Development, professional judgement is also required. A number of factors are considered including the air quality with and without the proposed development, the extent of current and future exposure, the assumptions adopted in the prediction of the impacts as well as the impact descriptors for the individual receptors. Where a single development can be judged in isolation, it is likely that a 'substantial' (major) or 'moderate' (moderate) impact will give rise to a significant effect and a 'slight' (minor) or 'negligible' (negligible) impact will not have a significant effect.

Table A5-1 has been replicated from the EPUK/IAQM guidance<sup>i</sup> and provides detail on the impact descriptors used to determine effects at existing sensitive receptors in the vicinity of the Site.

Table A5-1: EPUK/IAQM Impact Descriptors for Individual Receptors

| Long Term Average Concentration at Receptor Location | % Change in Concentration relative to Air Quality Assessment Level (AQAL) |             |             |             |
|--|---|-------------|-------------|-------------|
|  | 1 2-5 6-10 >10  |             |             |             |
| 75% or less of AQAL                                  | Negligible  | Negligible  | Slight      | Moderate    |
| 76-94% of AQAL                                       | Negligible  | Slight      | Moderate    | Moderate    |
| 95-102% of AQAL                                      | Slight  | Moderate    | Moderate    | Substantial |
| 103-109% of AQAL                                     | Moderate  | Moderate    | Substantial | Substantial |
| 110% of more of AQAL                                 | Moderate  | Substantial | Substantial | Substantial |

## Predicted NO<sub>2</sub> Concentrations

Annual mean NO<sub>2</sub> concentrations were predicted for 2022 and are summarised in Table A5-2. Table A5-2: Predicted Annual Mean Concentrations of NO<sub>2</sub> in 2022 at Existing Sensitive Receptors

| Sensi | tive Receptor                        |      | l Annual Mean l<br>ation (μg/m³) | NO <sub>2</sub> |
|-------|--------------------------------------|------|----------------------------------|-----------------|
|       |                                      | DM   | DS                               | Change          |
| R1    | Residential – A4095                  | 22.3 | 22.8                             | 0.5             |
| R2    | Residential – A4095                  | 25.3 | 26.1                             | 0.8             |
| R3    | Residential – A4095                  | 29.5 | 30.7                             | 1.2             |
| R4    | Residential – A4095                  | 33.1 | 34.5                             | 1.4             |
| R5    | Residential – A4095                  | 25.6 | 26.4                             | 0.7             |
| R6    | Residential – Unnamed Road           | 23.3 | 23.7                             | 0.4             |
| R7    | Residential – A4095                  | 21.1 | 21.6                             | 0.5             |
| R8    | Residential – A4095                  | 25.1 | 26.1                             | 1.0             |
| R9    | Residential – Church Lane            | 39.2 | 39.6                             | 0.4             |
| R10   | Residential – Caravan Park           | 35.6 | 36.0                             | 0.4             |
| R11   | Hotel – Premier Inn Bicester         | 25.1 | 25.2                             | 0.1             |
| R12   | Residential – A4095                  | 21.5 | 21.9                             | 0.4             |
| R13   | Residential – A4095                  | 35.3 | 36.9                             | 1.6             |
| R14   | Residential – A4095                  | 25.0 | 25.8                             | 0.8             |
| R15   | Residential – Unnamed Road           | 20.5 | 20.5                             | 0.0             |
| R16   | Residential – Unnamed Road           | 22.4 | 22.5                             | 0.1             |
| R17   | Residential – A4095                  | 30.5 | 31.8                             | 1.3             |
| R18   | Residential – A4095                  | 31.2 | 32.5                             | 1.3             |
| R19   | Residential – A4095                  | 31.5 | 32.9                             | 1.4             |
| R20   | Residential – A4095                  | 26.4 | 27.3                             | 0.9             |
| R21   | Residential – A4095                  | 24.3 | 24.9                             | 0.6             |
| R22   | Residential – A4095                  | 29.3 | 30.4                             | 1.1             |
| R23   | Residential – Unnamed Road           | 22.5 | 22.8                             | 0.3             |
| R24   | Bicester Hotel, Golf and Spa         | 24.0 | 24.1                             | 0.1             |
| R25   | Bicester Hotel, Golf and Spa Grounds | 37.6 | 37.6                             | 0.0             |
| R26   | Bicester Hotel, Golf and Spa Grounds | 68.2 | 68.3                             | 0.1             |
| R27   | Bicester Hotel, Golf and Spa Grounds | 53.0 | 53.1                             | 0.1             |
| R28   | Bicester Hotel, Golf and Spa Grounds | 61.4 | 61.5                             | 0.1             |
| R29   | Residential – Bicester Park Homes    | 39.3 | 39.8                             | 0.5             |
| R30   | Residential – Haydock Road           | 22.5 | 22.6                             | 0.1             |

As indicated in Table A5-2, predicted annual mean  $NO_2$  concentrations were below the annual mean objective of  $40\mu g/m^3$  in both the DM and DS scenario for 2022 at the 24 sensitive

receptor locations considered in this assessment where the annual mean objective applies i.e. existing residential properties.

The remaining 6 receptor locations comprise the existing Premier Inn Hotel in Bicester and locations representative of the Bicester Hotel, Golf and Spa resort and its grounds. In line with LAQM.TG(16)<sup>ii</sup>, these locations where public exposure is expected to be short term i.e. a hotel or a golf course are comparable to the 1-hour mean for short term exposure.

The methodology within LAQM.TG(16) states that:

"[...] exceedances of the 1-hour mean are unlikely to occur where the annual mean is below  $60\mu g/m^3$ ."

The maximum annual  $NO_2$  concentration predicted at receptors representative of Bicester Hotel, Golf and Spa grounds in the DS scenario is  $68.7\mu g/m^3$ . This is above the indicative criteria of  $60\mu g/m^3$ , however  $NO_2$  concentrations in the DM scenario were also predicted to be  $60.7\mu g/m^3$ . Therefore, traffic associated with the Proposed Development does not lead to an exceedance of the hourly mean for  $NO_2$ .

Predicted impacts on annual mean NO<sub>2</sub> concentrations, in line with the EPUK/IAQM guidance<sup>i</sup>, at the 25 sensitive receptor locations where the annual mean objectives apply are summarised in Table A5-3.

Table A5-3: Predicted NO<sub>2</sub> Impacts

| Sensitive Receptor |                            | % Change in<br>Concentration<br>Relative to AQO | Long Term Average Concentration | Magnitude of<br>Impact |
|--------------------|----------------------------|---|---------------------------------|------------------------|
| R1                 | Residential – A4095        | 1.3   | 75% or Less                     | Negligible             |
| R2                 | Residential – A4095        | 2.0   | 75% or Less                     | Negligible             |
| R3                 | Residential – A4095        | 2.9   | 76 – 94%                        | Slight                 |
| R4                 | Residential – A4095        | 3.5   | 76 – 94%                        | Slight                 |
| R5                 | Residential – A4095        | 2.0   | 75% or Less                     | Negligible             |
| R6                 | Residential – Unnamed Road | 1.1   | 75% or Less                     | Negligible             |
| R7                 | Residential – A4095        | 1.2   | 75% or Less                     | Negligible             |
| R8                 | Residential – A4095        | 2.4   | 75% or Less                     | Negligible             |
| R9                 | Residential – Church Lane  | 0.8   | 95 – 102%                       | Slight                 |
| R10                | Residential – Caravan Park | 1.1   | 76 – 94%                        | Negligible             |
| R12                | Residential – A4095        | 1.1   | 75% or Less                     | Negligible             |
| R13                | Residential – A4095        | 4.1   | 76 – 94%                        | Slight                 |
| R14                | Residential – A4095        | 1.8   | 75% or Less                     | Negligible             |
| R15                | Residential – Unnamed Road | 0.2   | 75% or Less                     | Negligible             |
| R16                | Residential – Unnamed Road | 0.4   | 75% or Less                     | Negligible             |
| R17                | Residential – A4095        | 3.2   | 76 – 94%                        | Slight                 |
| R18                | Residential – A4095        | 3.3   | 76 – 94%                        | Slight                 |
| R19                | Residential – A4095        | 3.3   | 76 – 94%                        | Slight                 |
| R20                | Residential – A4095        | 2.2   | 75% or Less                     | Negligible             |
| R21                | Residential – A4095        | 1.5   | 75% or Less                     | Negligible             |

| R22 | Residential – A4095               | 2.8 | 75% or Less | Slight     |
|-----|-----------------------------------|-----|-------------|------------|
| R23 | Residential – Unnamed Road        | 0.8 | 75% or Less | Negligible |
| R29 | Residential – Bicester Park Homes | 1.1 | 95 – 102%   | Slight     |
| R30 | Residential – Haydock Road        | 0.2 | 75% or Less | Negligible |

As indicated in Table A5-3, the magnitude of impacts on annual mean NO<sub>2</sub> concentrations at existing residential properties as a result of the Proposed Development was predicted to be negligible at 15 receptor locations and slight at the remaining 9 receptor locations.

Seven of the nine receptor locations where slight impacts are predicted are located along the A4095 through the village of Chesterton. For receptors R11 and R29, slight impacts are also predicted. Where slight impacts are predicted, it should be noted that annual mean  $NO_2$  concentrations remain below the air quality objective of  $40\mu g/m^3$  with the Proposed Development in place.

The overall significance of operational phase road traffic emission impacts on annual mean NO<sub>2</sub> was determined to be significant in line with the EPUK/IAQM guidance<sup>i</sup>.

### Particulate Matter - PM<sub>10</sub> and PM<sub>2.5</sub>

Annual mean PM<sub>10</sub> concentrations were predicted for the 2022 DM and DS scenarios and are summarised in Table A5-2.

Table A5-3: Predicted Annual Mean PM<sub>10</sub> Concentrations

| Sensi | tive Receptor                |      | l Annual Mean l<br>ation (μg/m³) | PM <sub>10</sub> |
|-------|------------------------------|------|----------------------------------|------------------|
|       |                              | DM   | DS                               | Change           |
| R1    | Residential – A4095          | 16.3 | 16.4                             | 0.1              |
| R2    | Residential – A4095          | 16.7 | 16.9                             | 0.2              |
| R3    | Residential – A4095          | 17.4 | 17.5                             | 0.1              |
| R4    | Residential – A4095          | 17.9 | 18.1                             | 0.2              |
| R5    | Residential – A4095          | 16.8 | 16.9                             | 0.1              |
| R6    | Residential – Unnamed Road   | 16.4 | 16.5                             | 0.1              |
| R7    | Residential – A4095          | 16.1 | 16.2                             | 0.1              |
| R8    | Residential – A4095          | 18.2 | 18.4                             | 0.2              |
| R9    | Residential – Church Lane    | 20.9 | 20.9                             | 0.1              |
| R10   | Residential – Caravan Park   | 19.9 | 20.0                             | 0.1              |
| R11   | Hotel – Premier Inn Bicester | 18.5 | 18.5                             | 0.0              |
| R12   | Residential – A4095          | 16.2 | 16.3                             | 0.1              |
| R13   | Residential – A4095          | 18.3 | 18.6                             | 0.3              |
| R14   | Residential – A4095          | 16.7 | 16.8                             | 0.1              |
| R15   | Residential – Unnamed Road   | 16.0 | 16.0                             | 0.0              |
| R16   | Residential – Unnamed Road   | 16.2 | 16.2                             | 0.0              |
| R17   | Residential – A4095          | 17.5 | 17.7                             | 0.2              |
| R18   | Residential – A4095          | 17.6 | 17.8                             | 0.2              |
| R19   | Residential – A4095          | 17.7 | 17.9                             | 0.2              |

| Sensit | ive Receptor                         | Predicted Annual Mean PM <sub>10</sub><br>Concentration (µg/m³) |      |        |
|--------|--------------------------------------|---|------|--------|
|        |                                      | DM  | DS   | Change |
| R20    | Residential – A4095                  | 16.9  | 17.0 | 0.1    |
| R21    | Residential – A4095                  | 16.6  | 16.7 | 0.1    |
| R22    | Residential – A4095                  | 17.3  | 17.5 | 0.2    |
| R23    | Residential – Unnamed Road           | 16.2  | 16.3 | 0.1    |
| R24    | Bicester Hotel, Golf and Spa         | 16.4  | 16.4 | 0.0    |
| R25    | Bicester Hotel, Golf and Spa Grounds | 19.7  | 19.7 | 0.0    |
| R26    | Bicester Hotel, Golf and Spa Grounds | 24.3  | 24.3 | 0.0    |
| R27    | Bicester Hotel, Golf and Spa Grounds | 21.8  | 21.8 | 0.0    |
| R28    | Bicester Hotel, Golf and Spa Grounds | 23.2  | 23.2 | 0.0    |
| R29    | Residential – Bicester Park Homes    | 20.4  | 20.5 | 0.1    |
| R30    | Residential – Haydock Road           | 17.9  | 17.9 | 0.0    |

As indicated in Table A5-3, predicted annual mean  $PM_{10}$  concentrations did not exceed the air quality objective of  $40\mu g/m^3$  at the 24 sensitive receptor locations where the annual mean objective applies.

The remaining 6 receptor locations comprise the existing Premier Inn Hotel in Bicester and locations representative of the Bicester Hotel, Golf and Spa resort and its grounds. In line with LAQM.TG(16)<sup>ii</sup>, these locations where public exposure is expected to be short term i.e. a hotel or a golf course are comparable to the 24-hour mean for short term exposure.

The methodology presented within LAQM.TG(16) $^{\parallel}$  to determine compliance with the 24-hour mean PM<sub>10</sub> objective, using the following relationship:

No. 24-hour mean exceedances =  $-18.5 + 0.00145 \times \text{annual mean}^3 + (206/\text{annual mean})$ 

Based upon the maximum predicted annual mean  $PM_{10}$  concentration of  $24.3\mu g/m^3$  modelled at receptor R24, this equates to 11 days where 24-hour mean  $PM_{10}$  concentrations are greater than  $50\mu g/m^3$ . Thirty-five 24-hour periods where concentrations are in excess of  $50\mu g/m^3$  are permitted and therefore, the number of maximum exceedances is in compliance with the 24-hour mean AQO. Predicted impacts on annual mean  $PM_{10}$  concentrations at the sensitive receptor locations where the annual mean objective applies are summarised in Table A5-4.

Table A5-4: Predicted PM<sub>10</sub> Impacts

| Sensi | tive Receptor              | % Change in Concentration Relative to AQO | Long Term Average Concentration | Magnitude of<br>Impact |
|-------|----------------------------|---|---------------------------------|------------------------|
| R1    | Residential – A4095        | 0.2                                       | 75% or Less                     | Negligible             |
| R2    | Residential – A4095        | 0.3                                       | 75% or Less                     | Negligible             |
| R3    | Residential – A4095        | 0.4                                       | 75% or Less                     | Negligible             |
| R4    | Residential – A4095        | 0.6                                       | 75% or Less                     | Negligible             |
| R5    | Residential – A4095        | 0.3                                       | 75% or Less                     | Negligible             |
| R6    | Residential – Unnamed Road | 0.2                                       | 75% or Less                     | Negligible             |
| R7    | Residential – A4095        | 0.2                                       | 75% or Less                     | Negligible             |

| Sensi | tive Receptor                     | % Change in<br>Concentration<br>Relative to AQO | Long Term Average Concentration | Magnitude of<br>Impact |
|-------|-----------------------------------|---|---------------------------------|------------------------|
| R8    | Residential – A4095               | 0.3   | 75% or Less                     | Negligible             |
| R9    | Residential – Church Lane         | 0.2   | 75% or Less                     | Negligible             |
| R10   | Residential – Caravan Park        | 0.2   | 75% or Less                     | Negligible             |
| R12   | Residential – A4095               | 0.2   | 75% or Less                     | Negligible             |
| R13   | Residential – A4095               | 0.7   | 75% or Less                     | Negligible             |
| R14   | Residential – A4095               | 0.3   | 75% or Less                     | Negligible             |
| R15   | Residential – Unnamed Road        | 0.0   | 75% or Less                     | Negligible             |
| R16   | Residential – Unnamed Road        | 0.1   | 75% or Less                     | Negligible             |
| R17   | Residential – A4095               | 0.5   | 75% or Less                     | Negligible             |
| R18   | Residential – A4095               | 0.5   | 75% or Less                     | Negligible             |
| R19   | Residential – A4095               | 0.5   | 75% or Less                     | Negligible             |
| R20   | Residential – A4095               | 0.3   | 75% or Less                     | Negligible             |
| R21   | Residential – A4095               | 0.2   | 75% or Less                     | Negligible             |
| R22   | Residential – A4095               | 0.4   | 75% or Less                     | Negligible             |
| R23   | Residential – Unnamed Road        | 0.1   | 75% or Less                     | Negligible             |
| R29   | Residential – Bicester Park Homes | 0.2   | 75% or Less                     | Negligible             |
| R30   | Residential – Haydock Road        | 0.0   | 75% or Less                     | Negligible             |

As indicated in Table A5-4, the impacts on annual mean  $PM_{10}$  concentrations as a result of the Proposed Development was predicted to be negligible at all sensitive receptor locations considered where the annual mean applies. As such, the overall significance of operational phase road traffic emission impacts on annual mean  $PM_{10}$  was determined to be not significant in line with the EPUK/IAQM guidance.

Annual mean PM<sub>2.5</sub> concentrations were predicted for the 2022 DM and DS scenarios and are summarised in Table A5-5.

Table A5-5: Predicted Annual Mean PM<sub>2.5</sub> Concentrations

| Sensi | itive Receptor             |      | l Annual Mean l<br>ation (μg/m³) | PM <sub>10</sub> |
|-------|----------------------------|------|----------------------------------|------------------|
|       |                            | DM   | DS                               | Change           |
| R1    | Residential – A4095        | 10.5 | 10.5                             | 0.0              |
| R2    | Residential – A4095        | 10.8 | 10.8                             | 0.0              |
| R3    | Residential – A4095        | 11.2 | 11.3                             | 0.1              |
| R4    | Residential – A4095        | 11.5 | 11.6                             | 0.1              |
| R5    | Residential – A4095        | 10.8 | 10.9                             | 0.1              |
| R6    | Residential – Unnamed Road | 10.5 | 10.6                             | 0.1              |
| R7    | Residential – A4095        | 10.4 | 10.4                             | 0.0              |
| R8    | Residential – A4095        | 11.2 | 11.3                             | 0.1              |
| R9    | Residential – Church Lane  | 12.9 | 13.0                             | 0.1              |

| Sensitive Receptor |                                      |      | l Annual Mean I<br>ation (μg/m³) | Annual Mean PM₁₀<br>ion (µg/m³) |  |  |
|--------------------|--------------------------------------|------|----------------------------------|---------------------------------|--|--|
|                    |                                      | DM   | DS                               | Change                          |  |  |
| R10                | Residential – Caravan Park           | 12.2 | 12.2                             | 0.0                             |  |  |
| R11                | Hotel – Premier Inn Bicester         | 11.4 | 11.4                             | 0.0                             |  |  |
| R12                | Residential – A4095                  | 10.4 | 10.5                             | 0.1                             |  |  |
| R13                | Residential – A4095                  | 11.7 | 11.9                             | 0.2                             |  |  |
| R14                | Residential – A4095                  | 10.7 | 10.8                             | 0.1                             |  |  |
| R15                | Residential – Unnamed Road           | 10.3 | 10.3                             | 0.0                             |  |  |
| R16                | Residential – Unnamed Road           | 10.4 | 10.5                             | 0.1                             |  |  |
| R17                | Residential – A4095                  | 11.3 | 11.4                             | 0.1                             |  |  |
| R18                | Residential – A4095                  | 11.3 | 11.4                             | 0.1                             |  |  |
| R19                | Residential – A4095                  | 11.3 | 11.5                             | 0.2                             |  |  |
| R20                | Residential – A4095                  | 10.9 | 10.9                             | 0.0                             |  |  |
| R21                | Residential – A4095                  | 10.7 | 10.7                             | 0.0                             |  |  |
| R22                | Residential – A4095                  | 11.1 | 11.2                             | 0.0                             |  |  |
| R23                | Residential – Unnamed Road           | 10.5 | 10.5                             | 0.0                             |  |  |
| R24                | Bicester Hotel, Golf and Spa         | 10.6 | 10.6                             | 0.0                             |  |  |
| R25                | Bicester Hotel, Golf and Spa Grounds | 12.2 | 12.2                             | 0.0                             |  |  |
| R26                | Bicester Hotel, Golf and Spa Grounds | 15.4 | 15.4                             | 0.0                             |  |  |
| R27                | Bicester Hotel, Golf and Spa Grounds | 13.7 | 13.7                             | 0.0                             |  |  |
| R28                | Bicester Hotel, Golf and Spa Grounds | 14.6 | 14.6                             | 0.0                             |  |  |
| R29                | Residential – Bicester Park Homes    | 12.8 | 12.8                             | 0.0                             |  |  |
| R30                | Residential – Haydock Road           | 11.1 | 11.1                             | 0.0                             |  |  |

As indicated in Table A5-5, predicted annual mean  $PM_{2.5}$  concentrations did not exceed the air quality objective of  $25\mu g/m^3$  at any sensitive receptor location where the annual mean objective applies.

Predicted impacts on annual mean  $PM_{2.5}$  concentrations at the sensitive receptor locations are summarised in Table A5-6.

Table A5-6: Predicted PM<sub>2.5</sub> Impacts

| Sensi | itive Receptor             | % Change in Concentration Relative to AQO | Long Term<br>Average<br>Concentration | Significance of<br>Impact |
|-------|----------------------------|---|---------------------------------------|---------------------------|
| R1    | Residential – A4095        | 0.2                                       | 75% or Less                           | Negligible                |
| R2    | Residential – A4095        | 0.3                                       | 75% or Less                           | Negligible                |
| R3    | Residential – A4095        | 0.4                                       | 75% or Less                           | Negligible                |
| R4    | Residential – A4095        | 0.5                                       | 75% or Less                           | Negligible                |
| R5    | Residential – A4095        | 0.3                                       | 75% or Less                           | Negligible                |
| R6    | Residential – Unnamed Road | 0.2                                       | 75% or Less                           | Negligible                |

| Sensitive Receptor |                                   | % Change in<br>Concentration<br>Relative to AQO | Long Term<br>Average<br>Concentration | Significance of<br>Impact |
|--------------------|-----------------------------------|---|---------------------------------------|---------------------------|
| R7                 | Residential – A4095               | 0.2   | 75% or Less                           | Negligible                |
| R8                 | Residential – A4095               | 0.3   | 75% or Less                           | Negligible                |
| R9                 | Residential – Church Lane         | 0.2   | 75% or Less                           | Negligible                |
| R10                | Residential – Caravan Park        | 0.2   | 75% or Less                           | Negligible                |
| R12                | Residential – A4095               | 0.2   | 75% or Less                           | Negligible                |
| R13                | Residential – A4095               | 0.6   | 75% or Less                           | Negligible                |
| R14                | Residential – A4095               | 0.3   | 75% or Less                           | Negligible                |
| R15                | Residential – Unnamed Road        | 0.0   | 75% or Less                           | Negligible                |
| R16                | Residential – Unnamed Road        | 0.1   | 75% or Less                           | Negligible                |
| R17                | Residential – A4095               | 0.5   | 75% or Less                           | Negligible                |
| R18                | Residential – A4095               | 0.5   | 75% or Less                           | Negligible                |
| R19                | Residential – A4095               | 0.5   | 75% or Less                           | Negligible                |
| R20                | Residential – A4095               | 0.3   | 75% or Less                           | Negligible                |
| R21                | Residential – A4095               | 0.2   | 75% or Less                           | Negligible                |
| R22                | Residential – A4095               | 0.4   | 75% or Less                           | Negligible                |
| R23                | Residential – Unnamed Road        | 0.1   | 75% or Less                           | Negligible                |
| R29                | Residential – Bicester Park Homes | 0.2   | 75% or Less                           | Negligible                |
| R30                | Residential – Haydock Road        | 0.0   | 75% or Less                           | Negligible                |

As indicated in Table A5-6, the impacts on annual mean PM<sub>2.5</sub> concentrations as a result of the Proposed Development was predicted to be negligible at all sensitive receptor locations considered where the annual mean objective applies. As such, the overall significance of operational phase road traffic emission impacts on annual mean PM<sub>2.5</sub> was determined to be not significant in line with the EPUK/IAQM guidance<sup>i</sup>.

### Site Suitability

In line with the guidance stated in LAQM.TG(16)<sup>7.5</sup>, the 1-hour mean for NO<sub>2</sub> and the 24-hour mean for PM<sub>10</sub> air quality objectives apply to the Proposed Development. As such, this section considers the 1-hour mean and 24-hour mean pollutant concentrations at the Site.

### Predicted NO<sub>2</sub> Concentrations

### **Annual Mean**

Annual mean NO<sub>2</sub> concentrations were predicted at three locations representative of sensitive land use at the Proposed Development for 2022 with the development in place and are summarised in Table A5-7.

Table A5-7: Predicted Annual Mean NO<sub>2</sub> Concentrations

| Sensitive Receptor |                                     | Predicted Annual Mean NO <sub>2</sub> Concentration in the 2022 DS scenario (μg/m³) |
|--------------------|-------------------------------------|---|
| PR1                | Proposed Sensitive Receptor – Hotel | 33.2  |
| PR2                | Proposed Sensitive Receptor – Hotel | 30.1  |

| Sensitive Receptor |   | Predicted Annual Mean NO <sub>2</sub> Concentration in the 2022 DS scenario (µg/m³) |
|--------------------|---|---|
| PR3                | Proposed Sensitive Receptor – Waterpark | 49.7  |

For the hotel and waterpark at the Proposed Development, the hourly mean objective applies. For short term NO<sub>2</sub> concentrations, the methodology presented within LAQM.TG(16)<sup>ii</sup> allows the determination of compliance with the hourly mean NO<sub>2</sub> objective.

The maximum  $NO_2$  concentration predicted at the Proposed Development in the DM scenario is  $49.7\mu g/m^3$ . As this is below the indicative criteria of  $60\mu g/m^3$ , exceedances of the 1-hour mean are considered unlikely.

NO<sub>2</sub> concentrations in the locale of the Proposed Development are therefore considered to be in compliance with the 1-hour mean air quality objective.

### Predicted PM<sub>10</sub> Concentrations

The methodology presented within LAQM.TG(16)<sup>II</sup> has been used to determine compliance with the 24-hour mean PM<sub>10</sub> objective at the location representative of the hotel and waterpark at the Proposed Development.

Annual mean PM<sub>10</sub> concentrations were predicted at three locations representative of sensitive land use at the Proposed Development for 2022 with the development in place and are summarised in Table A5-8.

Table A5-8: Predicted Annual Mean PM<sub>10</sub> Concentrations

| Sensitive Receptor |   | Predicted Annual Mean PM <sub>10</sub> Concentration in the 2022 DM scenario (µg/m³) |  |
|--------------------|---|--|--|
| PR1                | Proposed Sensitive Receptor – Hotel     | 19.1   |  |
| PR2                | Proposed Sensitive Receptor – Hotel     | 18.7   |  |
| PR3                | Proposed Sensitive Receptor – Waterpark | 21.4   |  |

Based upon the maximum predicted annual mean  $PM_{10}$  concentration of  $21.4\mu g/m^3$  modelled at receptor PR3, this equates to 5 days where 24-hour mean  $PM_{10}$  concentrations are greater than  $50\mu g/m^3$ . Thirty-five 24-hour periods where concentrations are in excess of  $50\mu g/m^3$  are permitted and therefore, the number of maximum exceedances is in compliance with the 24-hour mean AQO.

### Significance of Air Quality Impacts

To determine the significance of predicted air quality impacts based upon a site-suitability assessment, such as that undertaken as part of this assessment, the EPUK/IAQM guidance states:

"Where the air quality is such that an air quality objective at the building façade is not met, the effect on residents or occupants will be judged as significant, unless provision is made to reduce their exposure by some means."

With regards to the Proposed Development, the unmitigated impact significance associated with the Proposed Development has been predicted in accordance with the stated assessment methodology. The following factors have been considered when providing justification:

 The development proposals will not introduce any new receptor into an area of exceedance of the 1-hour mean NO<sub>2</sub> air quality objective based upon predicted NO<sub>2</sub> concentrations at the Proposed Development site; and  The development proposals will not introduce any new receptor exposure into an area of exceedance of the annual mean PM<sub>10</sub> air quality objectives based upon predicted PM<sub>10</sub> concentrations at the Proposed Development site.

As no exceedances of the considered air quality objectives are predicted, mitigation measures are not required for the operational phase of the Proposed Development. Therefore, the overall effect is considered to be 'not significant'.

<sup>&</sup>lt;sup>i</sup> Environmental Protection UK and Institute of Air Quality Management (2017) Land-Use Planning & Development Control: Planning for Air Quality v1.2 –[online], Available: http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

Defra (2018) Local Air Quality Management Technical Guidance (TG16) –[online], Available: https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf