BLOOR HOMES

# LAND EAST OF ASHINGDON ROAD, ROCHFORD

# AIR QUALITY ASSESSMENT ADDENDUM

REPORT REF. 185180-14
PROJECT NO. 185180
OCTOBER 2020

# LAND EAST OF ASHINGDON ROAD, ROCHFORD

# AIR QUALITY ASSESSMENT ADDENDUM

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**APPENDICES**

## DOCUMENT CONTROL SHEET

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## 1.0 INTRODUCTION

1.1 Ardent Consulting Engineers (ACE) is retained by Bloor Homes to undertake an Air Quality Assessment (AQA) Addendum to address comments received by Rochford District Council (RDC) on planning application ref. 20/00363/OUT.

1.2 The RDC comments are set out at **Appendix A**.

1.3 This Addendum should be read in conjunction with the submitted AQA undertaken by ACE (Doc Ref: 185180-010) dated December 2019.

1.4 This Addendum also covers updates in respect to the sphere of air quality research / monitoring and updated modelling methods, since the original air quality assessment was produced. These include (but are not limited to):

- Updated ADM-Roads model (v5.0.0.1);
- Updated Defra Emissions (v10.1);
- Updated Defra $NO_x$ to $NO_2$ Calculator (v8.1);
- Updated model verification with 2019 measured Nitrogen Dioxide ($NO_2$) concentrations (undertaken by RDC); and
- Updated meteorological data (2019) from Southend Airport (in line with the model verification year).

1.5 The scope of works has been discussed and agreed with the relevant environmental health officer at RDC (Martin Howlett).

## 2.0 ASSESSMENT APPROACH

### Modelling Methodology

2.1 The modelling of the release of vehicular emissions, (dispersion) into the air has been carried out using the latest version of the air dispersion model: ADMS-Roads (v5.0.0.1). The model calculates pollution concentrations and deposition over a specified area and/or at a specified locations, based upon the following input information:-

- Source parameters: e.g. highway width, average speed of vehicles, the number of vehicles per hour and the diurnal traffic profile;
- Meteorological parameters: e.g. wind speed, direction, precipitation, temperature and atmospheric stability; and
- Topographical factors: e.g. ground levels, buildings and surface roughness.

2.2 The meteorological data required for the ADMS-Roads model, must be sourced from a representative location to the study site and include a full year of sequential readings. The same weather station site (Southend Airport) has been used as for the original Air Quality Assessment but for 2019 (in line with the most recently available monitoring data and updated verification process).

2.3 The 2019 wind rose for the site is illustrated in **Figure 2.1**.

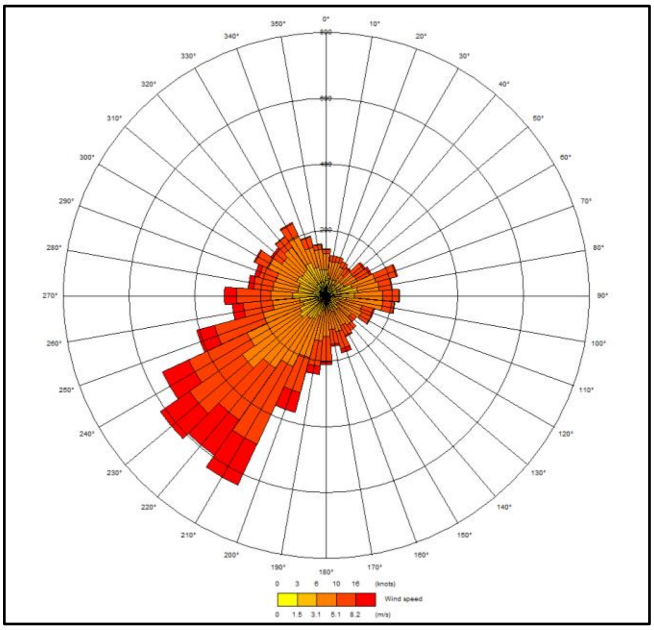

**Figure 2.1: Southend Airport Windrose (2019)**

**Road Traffic Emissions**

2.4 There are numerous sources of $NO_2$, $PM_{10}$ and $PM_{2.5}$, which include for example, industry and domestic origins. However, the main source is usually road transport.

2.5 For the purpose of this assessment and due to the absence of other sources in the area, only road traffic emissions have been modelled.

2.6 The potential impacts have been modelled using the ADMS-Roads atmospheric dispersion model using the most recent Emission Factor Toolkit (v10.1) built into the ADMS-Roads model.

2.7 It has been widely known for some time that $NO_x$/$NO_2$ levels are not reducing as quickly as anticipated and this was identified by Defra in 2011. This was recently reiterated in an Institute of Air Quality Management (IAQM) Interim Position Statement released in July 2018, recognising that emissions from diesel vehicles have not declined as expected by Defra.

2.8 It states: *"it has been known since around 2011 that [$NO_x$] emissions from diesel vehicles have not declined as expected despite the introduction of increasingly more stringent European Union (EU) emission limits."*

2.9 Therefore, the DEFRA Emissions Factors Toolkits, (built into ADMS-Roads) are considered to be underperforming.

2.10 The reason for the disparity relates to the on-road performance of modern diesel vehicles. New vehicles registered in the UK have had to meet progressively tighter European type approval emissions categories, referred to as "Euro" standards. While the $NO_x$ emissions from newer vehicles should be lower than those from equivalent older vehicles, the on-road performance of some modern diesel vehicles has often been no better than that of earlier models.

2.11 In order to address this, the previous assessment included a sensitivity assessment for nitrogen dioxide ($NO_2$), which assumed no reductions in future emissions.

2.12 However, the latest real-world monitoring data suggests that diesel vehicles are capable of achieving the emissions limits required under the Worldwide Harmonised Light Vehicle Test Procedure (WLTP) and Real Driving Emissions (RDE) tests, not only for Euro 6c and Euro 6d-TEMP vehicles, but also for Euro 6d.

2.13 A recent report produced by Air Quality Consultants (AQC) (February 2020) - *Performance of Defra's Emission Factor Toolkit 2013 – 2019* concluded:

*"It is considered that the EFT may be relied upon to predict the most likely, or potentially conservative, situation in the future, provided that the assessment is verified against measurements made in the year 2016 or later."*

2.14 Furthermore, AQC (September 2020) *A comparison of the EFT v9.0 and the most up to date EFT v10.1* concluded:
*"There remains no justification for the use of sensitivity tests assuming higher $NO_x$ emissions in the future than EFT v10 predicts."*

2.15 On this basis no sensitivity testing is deemed to be required. However, details on the model uncertainty and the verification process can be found in **Appendix B**.

2.16 Vehicles emit $NO_x$ with different proportions of $NO_2$. In the atmosphere, chemical reactions take place between NO, $NO_2$ and Ozone.

2.17 In this assessment, the screening of $NO_x$ emissions has taken place, and the resulting $NO_2$ concentration has been calculated post modelling, using the DEFRA $NO_x$ to $NO_2$ Calculator (v8.1).

**Verification Method**

2.18 Whilst ADMS-Roads is widely accepted for its use in assessments of this nature, it is still important that a model verification process is undertaken to confirm that the model's performance for the site, is within an acceptable margin of error. Therefore, a comparison of modelled results with measured results for the study area in line with LAQM.TG (16) has been undertaken and details of the verification are set out **Appendix B**.

2.19 The model was found to be under-predicting compared to the measured concentrations, which is not unusual, and therefore an adjustment factor of 2.73 was applied to the road-$NO_X$, $PM_{10}$ and $PM_{2.5}$ modelled results.

**Model Uncertainty**

2.20 There are many uncertainties when considering both measured and predicted pollution concentrations. The model is dependent upon the traffic data provided for the project, and should this be subject to change, so may the resulting pollution concentrations.

2.21 Concern was raised during the consultation stage about the adverse impacts of the introduction/changes to junction environments.

2.22 In order to address this concern, advise has been taken from Local Air Quality Management Technical Guidance (TG(16)), which states:

*"7.241 For junctions, common sense, driving experience and local knowledge are helpful to estimate speeds. For example, for a section of road leading up to traffic lights, the aim should be to estimate average speeds over a 50m section of road:*

*• Traffic pulling away from the lights, e.g. 40-50 kph;*

*• Traffic approaching the lights when green, e.g. 20-50 kph; and*

*• Traffic on the carriageway approaching the lights when red, e.g. 5-20 kph, depending on the time of day and how congested the junction is.*

*7.242 It is considered that the combined effect of these three conditions is likely in most instances to be a two-way average speed for all vehicles of 20 to 40 kph. Speeds in similar ranges would also apply at roundabouts…"*

2.23 Therefore, to address these concerns sections of road near to junctions and signal control have been reduced to a speed of 20kph.

**Sensitive Locations**

2.24 The sensitive locations at which the standards and objectives apply are places where the population is expected to be exposed to the various pollutants over the particular averaging period. Thus, for those objectives to which an annual mean standard applies, the most common sensitive receptor locations used to measure concentrations against the set standards are areas of residential housing, since it is reasonable to expect that people living in their homes could be exposed to pollutants over such a period of time. Schools and children's playgrounds are considered to be sensitive locations for comparison with annual mean objectives due to the increased sensitivity of young people to the effects of pollution (regardless of whether or not their exposure to pollution could be over an annual period). For shorter averaging periods of between 15 minutes, 1 hour or 1 day, the sensitive receptor location can be anywhere where the public could be exposed to the pollutant over these shorter periods of time, which includes residential and school exposure, as well as other areas with shorter exposure.

2.25 The same modelling locations have been utilised as for the original air quality assessment. However, seven additional receptor locations have been included (nos. 11 to 17) following the request of the RDC environmental health officer.

2.26 As identified in the Transport Assessment (TA) prepared by ACE (report ref. 185180-07), the proposed site access arrangement from Ashingdon Road requires a reduction in width of the footway in front of Holt Farm Junior and Infant Schools. Receptor nos. 12 and 13 have therefore been located on the footway to quantify the potential exposure of children walking to the schools along Ashingdon Road.

2.27 Receptor nos. 11 and 14 have been modelled at the facades of the dwellings north and south of the site access, respectively.

2.28 Receptor no. 15 has modelled at the request of RDC, to consider the air quality concentrations at Rochford Day Nursery, and receptor no. 16 to represent the impacts upon 2 – 42 Sutton Road. An additional receptor (no.17) has been modelled to consider the potential impacts of vehicular traffic adjacent to the Southend Road (S) arm of the Anne Boleyn roundabout.

2.29 The receptor locations are set out in **Table 2.1** and illustrated in **Appendix C**.

**Table 2.1: Modelled Receptor Locations**

| Receptor No. | Type | Grid References | | |
|---|---|---|---|---|
| | | X | Y | Z |
| 1 | Residential | 587289 | 190574 | 1.5 |
| 2 | St. Teresa's Catholic Primary School | 587109 | 191070 | 1.5 |
| 3 | Holt Farm School | 587016 | 191488 | 1.5 |
| 4 | Residential | 586889 | 192159 | 1.5 |
| 5 | Commercial / Residential | 586895 | 191972 | 1.5 |
| 6 | Residential | 587032 | 191539 | 1.5 |
| 7 | Residential | 587218 | 190709 | 1.5 |
| 8 | Residential | 587221 | 190522 | 1.5 |
| 9 | Residential | 587718 | 189693 | 1.5 |
| 10 | Residential | 587686 | 189566 | 1.5 |
| 11 | Residential – North of Access | 587042 | 191501 | 1.5 |
| 12 | Footway – North of Access | 587026 | 191489 | 1.5 |
| 13 | Footway – South of Access | 587031 | 191465 | 1.5 |
| 14 | Residential – South of Access | 587061 | 191468 | 1.5 |
| 15 | The Rochford Day Nursery | 587268 | 190585 | 1.5 |
| 16 | Residential | 587767 | 189651 | 1.5 |
| 17 | Residential | 587674 | 189650 | 1.5 |

**Assessment Scenarios**

2.30 The same traffic scenarios have been modelled (as per the original air quality assessment):

- 2019 Baseline;
- 2029 Baseline; and
- 2029 Baseline + Proposed Development

**Significance Criteria**

2.31 Currently there is no formal guidance on the absolute magnitude and significance criteria for the assessment of air quality impacts.

2.32 However, the Environmental Protection UK (EPUK) and IAQM (2017) have published recommendations for describing the impact at individual receptor locations, as set out in **Table 2.2**, and utilised within this assessment to determine the description of the impacts.

**Table 2.2: Air Quality Impact Descriptors for Individual Receptors**

| Long term average Concentration at receptor in assessment year. | % Change in concentration relative to Air Quality Action Level (AQAL) | | | |
|---|---|---|---|---|
| | 1 | 2-5 | 6-10 | >10 |
| 75% of 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% or more of AQAL | Moderate | Substantial | Substantial | Substantial |

2.33 When considered at individual receptors, moderate or substantial impacts at individual receptors may be considered significant and negligible or slight impacts not significant. Consideration of the overall effect on air quality needs to incorporate consideration of impacts as a whole including the extent to which receptors represent sensitive locations and whether this wider impact is significant or not.

## 3.0 BASELINE CONDITIONS

### Updated Local Air Quality Monitoring

3.1 RDC have no automatic monitoring stations but operate a network of non-automatic nitrogen dioxide ($NO_2$) diffusion tubes. A review of the monitoring network indicates two diffusion tube sites are located near to the site.

3.2 The most recent measured nitrogen dioxide ($NO_2$) concentrations for the two closest sites are set out in **Table 3.1**.

**Table 3.1: Measured $NO_2$, Concentrations**

| ID | Name | Type | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|
| **Non-Automatic Monitors – $NO_2$ Annual Mean (µg/m$^3$)** | | | | | | | |
| SS | South Street | K | 34.08 | 32.82 | 30.75 | 30.93 | 31.19 |
| ABSR | Anne Boleyn Sutton Road | R | 39.74 | **42.09** | **42.44** | **40.08** | 38.84 |
| **Objective** | | | **40** | | | | |

3.3 A review of the monitoring locations indicates some exceedances of the nitrogen dioxide, ($NO_2$) annual mean objective, (40µg/m$^3$) at the *Anne Boleyn Sutton Road* (roadside location) site, but no exceedances at *South Street* (kerbside location) site.

### Updated Mapped Background Pollution

3.4 The Defra website includes estimated background air pollution data for $NO_x$, $NO_2$, $PM_{10}$ and $PM_{2.5}$ for each 1km by 1km OS grid square.

3.5 The updated (August 2020) background pollutant concentrations are modelled from the base year of 2018 and based on ambient monitoring, meteorological data from 2018 and then projected for future years.

3.6 Projected pollutant concentrations for the existing, (2019) and future development year, (2029) for the closest OS grid square to the previously specified receptors are shown in **Table 3.2** below.

3.7 All annual mean concentrations are within the relevant objective limits for $NO_2$ and $PM_{10}$ and limit value for $PM_{2.5}$

**Table 3.2: Annual Mean Background Concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$**

| Pollutant | Annual Mean (µg/m$^3$) | |
|---|---|---|
| | 2019 | 2029 |
| **$NO_2$*** | 12.7 – 15.4 | 9.9 – 12.1 |
| **$PM_{10}$** | 14.6 – 15.1 | 13.4 – 13.9 |
| **$PM_{2.5}$** | 9.7 – 9.8 | 8.8 – 8.9 |

*The background $NO_2$ concentrations from the Defra background mapping have been calibrated against the background concentrations measured in 2019 across the AURN network (where data capture is greater than 75%)

**2019 Baseline Air Quality Modelling**

3.8 The updated modelled 2019 baseline concentrations set out in **Tables 3.3** to **3.4,** have been predicted for the receptor locations set out in **Table 2.1,** and illustrated in **Appendix C.**

**Table 3.3: 2019 Modelled $NO_2$ Annual Mean Concentrations (µg/m$^3$)**

| Receptor | $NO_2$ Annual Mean (µg/m$^3$) |
|---|---|
| 1 | 25.4 |
| 2 | 19.9 |
| 3 | 24.3 |
| 4 | 22.7 |
| 5 | 26.8 |
| 6 | 32.9 |
| 7 | 27.4 |
| 8 | 21.7 |
| 9 | 30.2 |
| 10 | 28.3 |

| | |
|---|---|
| 11 | 30.5 |
| 12 | 32.9 |
| 13 | 33.8 |
| 14 | 24.1 |
| 15 | 31.6 |
| 16 | 40.0 |
| 17 | 25.8 |

**Table 3.4: 2019 Modelled $PM_{10}$ & $PM_{2.5}$ Annual Mean Concentrations (µg/m$^3$)**

| Receptor | Particulate Matter Annual Mean (µg/m$^3$) | |
|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ |
| 1 | 16.7 | 10.9 |
| 2 | 16.3 | 10.4 |
| 3 | 16.8 | 10.8 |
| 4 | 16.5 | 10.9 |
| 5 | 17.2 | 11.0 |
| 6 | 18.2 | 11.6 |
| 7 | 17.4 | 11.3 |
| 8 | 16.0 | 10.5 |
| 9 | 17.2 | 11.2 |
| 10 | 17.4 | 11.3 |
| 11 | 17.8 | 11.4 |
| 12 | 18.2 | 11.6 |
| 13 | 17.9 | 11.7 |
| 14 | 16.8 | 10.8 |
| 15 | 17.6 | 11.4 |
| 16 | 18.8 | 12.2 |
| 17 | 16.5 | 10.8 |

3.9 None of the modelled 2019 annual mean nitrogen dioxide ($NO_2$), concentrations at specified receptors exceed the annual mean objective. Receptor no(s). 12 and 13 have been located on the footway and are not situated at a location where the general population are likely to be exposed over a long period of time (as discussed in further detail in paragraph 2.24). It would therefore be more prudent to consider these two locations against the hourly mean objective.

3.10 Defra (2018) Local Air Quality Management Technical Guidance (TG16) states:

*"Dispersion models cannot predict short-term concentrations as reliably as annual mean concentrations…..Previous research carried out on behalf of Defra and the Devolved Administrations identified that exceedances of the $NO_2$ 1-hour mean are unlikely to occur where the annual mean is below 60 μg/$m^3$ This assumption is still considered valid; therefore local authorities should refer to it.."*

3.11 Based upon this and the annual mean concentrations at receptor no(s). 12 and 13 being below 60μg/$m^3$, it is unlikely that receptors utilising the footways, (along Ashingdon Road) would be adversely impacted by air quality.

3.12 It is noted that receptor no.16 (representative of 2 Sutton Road) is at the nitrogen dioxide ($NO_2$) annual mean objective (40 μg/$m^3$).

3.13 The $PM_{10}$ and $PM_{2.5}$ concentrations at specified receptors are all below their respective annual mean objectives.

3.14 To predict the short-term (24-hour mean) $PM_{10}$ concentrations the following equation has been taken from the Local Air Quality Management Technical Guidance (TG(16)) to derive the number of days that the daily mean limit of 50μg/$m^3$ is likely to be exceeded:

*No.24 hour exceedences = -18.5 + 0.00145 x annual mean$^3$ + (206/annual mean)*

3.15 The highest predicted modelled annual mean $PM_{10}$ concentration in the **Table 3.4** is 18.8μg/$m^3$.

3.16 Based on the above formula, this equates to 2.1 exceedance days, which is below the 35-day limit. Therefore, the modelled receptor locations are not considered to be exposed to unacceptable short-term concentrations of $PM_{10}$.

**2029 Baseline Air Quality Modelling**

3.17 The updated modelled 2029 baseline concentrations, set out in **Tables 3.5** to **3.6,** have been predicted for the receptor locations set out in **Table 2.1,** and illustrated in **Appendix C**.

**Table 3.5: 2029 Modelled $NO_2$ Annual Mean Concentrations (µg/m³)**

| Receptor | $NO_2$ Annual Mean (µg/m³) |
|---|---|
| 1 | 15.5 |
| 2 | 12.7 |
| 3 | 14.4 |
| 4 | 13.8 |
| 5 | 15.5 |
| 6 | 18.0 |
| 7 | 16.3 |
| 8 | 14.0 |
| 9 | 18.0 |
| 10 | 17.3 |
| 11 | 17.0 |
| 12 | 18.0 |
| 13 | 18.3 |
| 14 | 14.4 |
| 15 | 18.0 |
| 16 | 22.1 |
| 17 | 16.3 |

**Table 3.6: 2029 Modelled $PM_{10}$ & $PM_{2.5}$ Annual Mean Concentrations (µg/m³)**

| Receptor | Particulate Matter Annual Mean (µg/m³) | |
|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ |
| 1 | 15.6 | 10.0 |
| 2 | 15.1 | 9.5 |
| 3 | 15.7 | 9.8 |
| 4 | 15.4 | 10.0 |

| | | |
|---|---|---|
| 5 | 16.1 | 10.1 |
| 6 | 17.1 | 10.6 |
| 7 | 16.3 | 10.3 |
| 8 | 14.8 | 9.5 |
| 9 | 16.0 | 10.2 |
| 10 | 16.2 | 10.3 |
| 11 | 16.7 | 10.4 |
| 12 | 17.1 | 10.6 |
| 13 | 16.8 | 10.6 |
| 14 | 15.6 | 9.8 |
| 15 | 16.4 | 10.4 |
| 16 | 17.6 | 11.1 |
| 17 | 15.3 | 9.8 |

3.18 The modelled 2029 annual mean concentrations at all the specified receptors for nitrogen dioxide ($NO_2$), $PM_{10}$ and $PM_{2.5}$ are all below their respective annual mean objectives.

3.19 The annual mean nitrogen dioxide ($NO_2$) concentrations are all below 60 $\mu g/m^3$, which as previously highlighted, is regarded to be an indicator that the hourly mean objective will also not be breached.

3.20 The highest predicted modelled annual mean $PM_{10}$ concentration in the **Table 3.6** is 17.6$\mu g/m^3$.

3.21 Based on the formula set out in paragraph 3.14 (to predict the short-term (24-hour mean) $PM_{10}$ concentrations), this equates to 1.1 exceedance days, which is below the 35-day limit (at 50$\mu g/m^3$) for the short-term (24-hour mean) $PM_{10}$ objective. Therefore, the modelled receptor locations are not considered to be exposed to unacceptable short-term concentrations of $PM_{10}$.

# 4.0 OPERATIONAL IMPACTS

## Updated Traffic Emissions

### *Proposed Development*

4.1 The predicted 'Future Baseline' $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations, (at the previously specified receptor locations) have been compared to the predicted 'Future Baseline + Proposed Development' concentrations, and the results are set out in **Tables 4.1** to **4.3**. The tables also set out the impact descriptor at each receptor location in line with the assessment matrix in **Table 2.2**.

**Table 4.1: Predicted Development Impact on Annual Mean $NO_2$ Concentrations**

| Receptor | Annual Mean $NO_2$ (µg/m³) | | | |
|---|---|---|---|---|
| | Future Baseline | Future Baseline + Operational Traffic | % Change of Objective | Impact Descriptor |
| 1 | 15.5 | 15.8 | 1 | Negligible |
| 2 | 12.7 | 12.9 | 0 | Negligible |
| 3 | 14.4 | 14.9 | 1 | Negligible |
| 4 | 13.8 | 14.1 | 1 | Negligible |
| 5 | 15.5 | 15.8 | 1 | Negligible |
| 6 | 18.0 | 18.4 | 1 | Negligible |
| 7 | 16.3 | 16.7 | 1 | Negligible |
| 8 | 14.0 | 14.2 | 0 | Negligible |
| 9 | 18.0 | 18.2 | 0 | Negligible |
| 10 | 17.3 | 17.5 | 0 | Negligible |
| 11 | 17.0 | 17.6 | 2 | Negligible |
| 12 | 18.0 | 18.8 | 2 | Negligible |
| 13 | 18.3 | 19.2 | 2 | Negligible |
| 14 | 14.4 | 15.0 | 2 | Negligible |
| 15 | 18.0 | 18.5 | 1 | Negligible |
| 16 | 22.1 | 22.2 | 0 | Negligible |
| 17 | 16.3 | 16.4 | 0 | Negligible |

**Table 4.2: Predicted Development Impact on Annual Mean $PM_{10}$ Concentrations**

| Receptor | Annual Mean $PM_{10}$ ($\mu g/m^3$) | | | |
|---|---|---|---|---|
| | Future Baseline | Future Baseline + Operational Traffic | % Change of Objective | Impact Descriptor |
| 1 | 15.6 | 15.8 | 0 | Negligible |
| 2 | 15.1 | 15.2 | 0 | Negligible |
| 3 | 15.7 | 15.9 | 0 | Negligible |
| 4 | 15.4 | 15.5 | 0 | Negligible |
| 5 | 16.1 | 16.2 | 0 | Negligible |
| 6 | 17.1 | 17.3 | 1 | Negligible |
| 7 | 16.3 | 16.5 | 1 | Negligible |
| 8 | 14.8 | 14.9 | 0 | Negligible |
| 9 | 16.0 | 16.1 | 0 | Negligible |
| 10 | 16.2 | 16.3 | 0 | Negligible |
| 11 | 16.7 | 16.9 | 1 | Negligible |
| 12 | 17.1 | 17.4 | 1 | Negligible |
| 13 | 16.8 | 17.1 | 1 | Negligible |
| 14 | 15.6 | 15.9 | 1 | Negligible |
| 15 | 16.4 | 16.7 | 1 | Negligible |
| 16 | 17.6 | 17.7 | 0 | Negligible |
| 17 | 15.3 | 15.3 | 0 | Negligible |

**Table 4.3: Predicted Development Impact on Annual Mean $PM_{2.5}$ Concentrations**

| Receptor | Annual Mean $PM_{2.5}$ ($\mu g/m^3$) | | | |
|---|---|---|---|---|
| | Future Baseline | Future Baseline + Operational Traffic | % Change of Objective | Impact Descriptor |
| 1 | 10.0 | 10.0 | 0 | Negligible |
| 2 | 9.5 | 9.6 | 0 | Negligible |
| 3 | 9.8 | 9.9 | 0 | Negligible |
| 4 | 10.0 | 10.0 | 0 | Negligible |
| 5 | 10.1 | 10.1 | 0 | Negligible |
| 6 | 10.6 | 10.7 | 0 | Negligible |
| 7 | 10.3 | 10.4 | 1 | Negligible |
| 8 | 9.5 | 9.6 | 0 | Negligible |

| | | | | |
|---|---|---|---|---|
| 9 | 10.2 | 10.2 | 0 | Negligible |
| 10 | 10.3 | 10.4 | 0 | Negligible |
| 11 | 10.4 | 10.5 | 1 | Negligible |
| 12 | 10.6 | 10.8 | 1 | Negligible |
| 13 | 10.6 | 10.8 | 1 | Negligible |
| 14 | 9.8 | 9.9 | 1 | Negligible |
| 15 | 10.4 | 10.6 | 1 | Negligible |
| 16 | 11.1 | 11.1 | 0 | Negligible |
| 17 | 9.8 | 9.8 | 0 | Negligible |

4.2 The modelled pollutant concentrations are all below their respective annual mean objective / targets.

4.3 The annual mean $NO_2$ concentrations are all below 60 µg/m$^3$. It is, therefore, unlikely that the 1-hour mean $NO_2$ objective will be exceeded.

4.4 The highest predicted modelled annual mean $PM_{10}$ concentration in the **Table 4.2** is 17.7µg/m$^3$.

4.5 Based on the formula set out in paragraph 3.14 (to predict the short-term (24-hour mean) $PM_{10}$ concentrations), this equates to 1.2 exceedance days, which is below the 35-day limit (at 50µg/m$^3$) for the short-term (24-hour mean) $PM_{10}$ objective. Therefore, the modelled receptor locations are not considered to be exposed to unacceptable short-term concentrations of $PM_{10}$.

4.6 Using the matrix in **Table 2.2**, it can be seen, that all the impacts for every pollutant and scenario are:

- Nitrogen Dioxide ($NO_2$) – 'Negligible;'
- $PM_{10}$ – Negligible; and
- $PM_{2.5}$ – Negligible.

**Other Operational Considerations**

4.7 As identified in the TA, Essex County Council (ECC), as highway authority, proposes to bring forward an improvement scheme at the "Anne Boleyn" roundabout. The applicant is to provide an appropriate level of funding to ECC towards this highway improvement scheme as part of a S.106 Agreement. Details of the scheme are currently unknown and therefore cannot be addressed fully in this Addendum. ECC will need to give due consideration to the air quality impacts of the scheme through the design process.

## 5.0 MITIGATION MEASURES

### Operational Phase

#### *Development Traffic*

5.1 The proposed development traffic assessment has demonstrated that the impacts are considered to be negligible, and none of the air quality objectives / targets are predicted to be exceeded. On this basis no mitigation measures have been proposed.

5.2 As above, details of the highway improvement scheme at the "Anne Boleyn" roundabout are currently unknown; however the scheme will reduce traffic congestion. ECC will need to give due consideration to the air quality impacts of the scheme through the design process.

## 6.0 SUMMARY AND CONCLUSIONS

### Operational Phase

6.1 The updated air quality modelling exercise has demonstrated that the impacts are considered to be negligible and the air quality concentrations are well below their respective air quality objectives / targets, as per the original assessment.

**REFERENCES**

The Air Quality Standards Regulations (Amendments), 2016

Department for Environment, Food and Rural Affairs (July 2007) Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 & 2)

The Environment Act. 1995 HMSO, London.

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Defra (2017) UK plan for tackling roadside nitrogen dioxide concentrations.

Department for Communities and Local Government (Last Updated 2018) 'LAQM Technical Guidance LAQM.TG(16)', London DEFRA.

Institute of Air Quality Management (2014) Guidance on the Assessment of Dust from Demolition and Construction, IAQM, London

Environmental Protection UK & Institute of Air Quality Management (EPUK & IAQM) (2017) Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, London.

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Defra: MAGIC. https://magic.defra.gov.uk/magicmap.aspx (Accessed on 06.10.2020).

Defra Nox:$No_2$ Calculator: http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html

Carslaw, D., Beevers, S., Westmoreland, E. and Williams, M. (2011) Trends in NOx and $NO_2$ emissions and ambient measurements in the UK.

IAQM. (2018). Interim Position Statement (v1.1): Dealing with Uncertainty in Vehicle NOx Emissions within Air Quality Assessments.

https://www.acea.be/publications/article/access-to-euro-6-rde-monitoring-data

AQC. (2020). Performance of Defra's Emission Factor Toolkit 2013 – 2019

AQC. (2020). Comparison of EFT v10 with EFT v9

Rochford District Council (2011) Core Strategy

Defra: UK-AIR. http://www.uk-air.defra.gov.uk

# APPENDIX A – RDC COMMENTS

**Simon Grubb**

**Subject:** RE: 20/00363/OUT Ashingdon AQ report comments

**From:** Martin Howlett <MHEnvironmentalConsultancy@outlook.com>
**Sent:** 18 September 2020 11:51
**To:** Katie Rodgers <Katie.Rodgers@Rochford.gov.uk>
**Subject:** 20/00363/OUT Ashingdon AQ report comments

I have the following observations following a review of the Air Quality and Transport assessments which were submitted in support of 20/00363/OUT:

Although the approach is generally accepted, there does not appear to be sufficiently substantive connection between the two reports. The air quality report does not discuss the potentially adverse impacts of the introduction/changes to junction environments (i.e. acceleration/deceleration and closer proximity to 'relevant receptors') or school travel peak impacts.

I also have questions regarding the validity of some of the grid referenced locations. In particular I would want location one (Rochford day Nursery) re-modelled (Specific location https://w3w.co/names.table.grain).

Although the figures given in Table 6.1 (page 33) are well below the annual average objective, they are likely to be subject to change and this should be addressed for accuracy.

The report states that there will be no exceedance of the hourly NO2 objective within the study area, but that should be reconfirmed – if it remains the case – once the points above have been evaluated.

Since the report was written, Rochford DC has published its 2020 Annual Status Report which re-confirms recent air quality trends. Any update to the air quality report should reference this.

I note reference to potential s106 money for a junction improvement at Anne Boleyn roundabout. Any physical change here should be planned to avoid worsening of air quality at 'relevant receptor' locations.

I have sent an e-mail to Simon Field at Ardent requesting he call me to discuss these points. Should I be contacted, I will advise you of the conversation.

Regards,

Martin
MH Environmental Consultancy

Disclaimer

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## APPENDIX B – VERIFICATION PROCESS

B.1 Model verification studies are undertaken in order to check the performance of dispersion models and, where modelled concentrations are significantly different to measured concentrations, a factor can be established by which the modelled results can be adjusted in order to improve their reliability. The model verification process is detailed in TG(16).

B.2 According to TG(16), no adjustment factor is necessary where the results of the model all lie within 25% of the measured concentrations but should ideally be within 10%.

B.3 Model verification can only normally be undertaken where there is sufficient roadside monitoring data in the vicinity of the subject scheme being assessed. TG(16) recommends that a combination of automatic and diffusion tube monitoring data is used; although this may be limited by data availability.

B.4 Each monitoring site was reviewed to determine the suitability of the locations for inclusion in the model verification process. The criteria used to determine the suitability of the monitoring data for inclusion into the verification process are outlined below:

- Monitoring location within the defined air quality study area;
- Monitoring data capture greater than 90% complete; and
- Adjacent road link traffic data was available for inclusion in dispersion model.

B.5 A review of locally available traffic data indicates that the non-automatic monitoring location ABSR was the only '*Roadside*' site close enough to the site that could be utilised for the verification process.

B.6 **Table B.1** compares the measured and modelled $NO_2$ concentrations at the monitoring location selected.

| Site | Measured Annual Mean | Modelled Annual Mean | %Diff* |
|---|---|---|---|
| Nitrogen Dioxide ($NO_2$) | | | |
| ABSR | 38.84 | 25.60 | -34.09 |

**Table B.1: $NO_2$ Verification Process**

***((modelled-measured)/measured x 100).**

B.7 As previously highlighted the methodology for undertaking verification of modelling results detailed in the LAQM.TG(16) guidance document, indicates that in order to provide more confidence in the model predictions most results should be within 25% of measured concentrations, although ideally within 10%.

B.8 The data in **Table B.1** shows that the model is under-predicting $NO_2$ concentrations. This is not unusual and is likely to be the result of local dispersion conditions. Therefore, adjustment factors are derived to ensure a conservative assessment.

B.9 As it is primary $NO_x$, rather than secondary $NO_2$, emissions that are modelled, adjustment factors must be derived for the road contribution of $NO_x$. A ratio of the modelled versus measured $NO_x$ concentrations has been undertaken to derive an appropriate adjustment factor, as set out in **Table B.2**.

| Site | Modelled Road $NO_x$ | Measured Road $NO_x$ | Ratio |
|---|---|---|---|
| ABSR | 17.52 | 47.76 | 2.73 |

**Table B.2: Deriving the NOx-Road Adjustment Factor**

B.10 In the absence of any $PM_{10}$ monitoring in the vicinity of the site, the Road-NOx adjustment factor has also been utilised for the Road-$PM_{10}$ & Road-$PM_{2.5}$ adjustment factor.

# APPENDIX C – MODELLING RECEPTOR LOCATIONS