



# **Air Quality Review: Lower Thames Crossing DCO Air Quality Assessment**

May 2023



Experts in air quality  
management & assessment



## Document Control

<b>Client</b>	CSA Architecture	<b>Principal Contact</b>	Barry Mullen
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<b>Report Prepared By:</b>	Martin Peirce
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**Air Quality Consultants Ltd**  
**23 Coldharbour Road, Bristol BS6 7JT Tel: 0117 974 1086**  
**24 Greville Street, Farringdon, London, EC1N 8SS Tel: 020 3873 4780**  
**aqc@aqconsultants.co.uk**

Registered Office: 23 Coldharbour Road, Bristol BS6 7JT  
 Companies House Registration No: 2814570

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# 1 Introduction

- 1.1 Highways England is seeking a Development Consent Order (DCO) for its proposed Lower Thames Crossing (LTC) project (hereafter referred to as the 'Project'). The DCO application is supported by an Environmental Statement (ES), of which Chapter 5 (plus appendices) addresses the impacts of the Project on air quality.
- 1.2 This report provides a review of the information submitted in Chapter 5 of the ES. The review considers the impacts the Project will have on air quality at the Whitecroft Care Home in Grays (hereafter referred to as the 'Site'). Furthermore the review considers if the air quality assessment is based on an appropriate methodology and if any further work is required to quantify the air quality impacts of the Project on the Site.
- 1.3 This report follows a previous report by AQC<sup>1</sup> (referred to as the '2019 Review') which similarly reviewed the Preliminary Environmental Information Report (PEIR). The PEIR effectively acts as a first draft of the ES, and the ES builds on and supersedes the PEIR. This report therefore considers and focuses on whether the issues identified in the 2019 Review have been addressed in the ES.
- 1.4 The present review has been carried out by Air Quality Consultants Ltd. (AQC) on behalf of CSA Architecture, and is based primarily on the following documents:
- Lower Thames Crossing, 6.1 Environmental Statement Chapter 5 – Air Quality (October 2022);
  - Lower Thames Crossing, 6.3 Environmental Statement Appendices, Appendix 5.1 – Air Quality Methodology (October 2022);
  - Lower Thames Crossing, 6.3 Environmental Statement Appendices, Appendix 5.2 – Air Quality Baseline Conditions (October 2022);
  - Lower Thames Crossing, 6.3 Environmental Statement Appendices, Appendix 5.3 – Air Quality Construction Phase Results (October 2022);
  - Lower Thames Crossing, 6.3 Environmental Statement Appendices, Appendix 5.4 – Air Quality Operational Phase Results (October 2022);
  - Lower Thames Crossing, 6.3 Environmental Statement Appendices, Appendix 5.5 – Air Quality Legislation and Policy (October 2022);
  - Lower Thames Crossing, 6.2 Environmental Statement Figures, Figure 5.6 - Operational Phase Receptors and Results (3 of 4) (October 2022);
  - Lower Thames Crossing, 5.1 Consultation Report (1 of 6) (October 2022); and

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<sup>1</sup> AQC (2019) Air Quality Review: Lower Thames Crossing Air Quality Assessment. J3960A/1/F1, November 2019.

- Lower Thames Crossing, 5.1 Consultation Report, Appendix I, List of all respondents to statutory consultation (October 2022).

1.5 Where methodological failings are identified, they are described as either a:

- Minor Issue – weaknesses have been identified but the professional experience of the reviewers suggests that these are unlikely to affect the conclusions of the assessment;
- Moderate Issue – weaknesses have been identified which may or may not affect the conclusions<sup>2</sup>; or
- Major Issue – in the opinion of the reviewers, the failings of the assessment are highly likely to invalidate the reported conclusions.

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<sup>2</sup> An issue which is classified as moderate could thus move to being either a major or minor issue depending on specific unknown factors.

## 2 Review

### General Scope

- 2.1 The air quality assessment presented in the ES has been undertaken based on the Design Manual for Roads and Bridge (DMRB) guidance LA 105 Air Quality<sup>3</sup>. DMRB guidance is the standard industry approach for the modelling of road infrastructure projects, and the overall use of the DMRB Guidance for this type project is deemed acceptable. The LA 105 document supersedes the guidance used for the PEIR. However, the review of the air quality assessment has identified the following technical issues, which are detailed below.

### Policy and Guidance

- 2.2 The overall policy and guidance documents considered in the air quality assessment are presented in Appendix 5.5 to Chapter 5 of the ES, which are considered correct and acceptable for the assessment.
- 2.3 Whilst Table 1.4 of Appendix 5.5 presents details of the Local Plans published by relevant local authorities, the air quality assessment makes no reference to the local Air Quality Action Plans and the measures contained within these documents to improve local air quality. Given the Project is found to increase traffic related emissions at the Site (discussed below) reference should be made to the Thurrock Council's Air Quality and Health Strategy (2016) to ensure the LTC does not restrict any local air quality measures to improve air quality.

### Consultation

- 2.4 A very large number of interested parties have been involved in the consultation for the DCO application. The air quality chapter of the ES identifies a number of stakeholders engaged specifically for air quality, but does not identify the representations from representatives of Whitecroft Care Home. These are included in the list of respondents to the statutory consultation (Chapter 5.1 Appendix I).
- 2.5 Chapter 5.1, Consultation Report, states at Table 9.11 that the following minor change was introduced after December 2021 engagement:

*Relocation of Stanford Road construction compound: The Applicant proposed to relocate the Stanford Road construction compound to reduce the impact on agricultural land and move it further away from Whitecroft Care Home. It would be relocated approximately 230 metres south of the current proposed location.*

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<sup>3</sup> Highways Agency (2019) Design Manual for Roads and Bridges. Sustainability & Environment Appraisal. LA 105 Air quality. Revision 0, November 2019.

## Predicted Air Quality Impacts

- 2.6 The air quality assessment has selected worst-case locations where total pollutant concentrations are expected to be the greatest (typically closest receptors to roads), or where the largest change in air quality is anticipated based on the traffic impacts. These receptors include residential uses, schools, hospitals, care homes and hotels. In the ES, the Site has been selected as a receptor (identifier LTC262). Both construction and operational phase impacts at this receptor have been modelled.
- 2.7 The modelling results at LTC262 are summarised in Table 1.

**Table 1: Modelled annual mean concentrations at LTC262**

Scenario / year	Pollutant	Increase in Concentration ( $\mu\text{g}/\text{m}^3$ )	Total Concentration ( $\mu\text{g}/\text{m}^3$ )	Objective ( $\mu\text{g}/\text{m}^3$ )
<b>Construction, 2025</b>	Nitrogen Dioxide	0.3	26.4	40
	PM <sub>10</sub>	0.1	19.8	40
	PM <sub>2.5</sub>	Not modelled	Not modelled	See text
<b>Construction, 2026</b>	Nitrogen Dioxide	-0.1	25.5	40
	PM <sub>10</sub>	0.0	19.7	40
	PM <sub>2.5</sub>	Not modelled	Not modelled	See text
<b>Construction, 2027</b>	Nitrogen Dioxide	0.2	25.5	40
	PM <sub>10</sub>	0.0	19.7	40
	PM <sub>2.5</sub>	Not modelled	Not modelled	See text
<b>Construction, 2028</b>	Nitrogen Dioxide	0.2	25.2	40
	PM <sub>10</sub>	0.0	19.8	40
	PM <sub>2.5</sub>	Not modelled	Not modelled	See text
<b>Construction, 2029</b>	Nitrogen Dioxide	0.2	24.9	40
	PM <sub>10</sub>	0.0	19.8	40
	PM <sub>2.5</sub>	Not modelled	Not modelled	See text
<b>Construction, 2030</b>	Nitrogen Dioxide	0.1	24.6	40
	PM <sub>10</sub>	0.0	19.8	40
	PM <sub>2.5</sub>	Not modelled	Not modelled	See text

Scenario / year	Pollutant	Increase in Concentration ( $\mu\text{g}/\text{m}^3$ )	Total Concentration ( $\mu\text{g}/\text{m}^3$ )	Objective ( $\mu\text{g}/\text{m}^3$ )
Operation, 2030	Nitrogen Dioxide	1.1	26.2	40
	PM <sub>10</sub>	0.2	20.0	40
	PM <sub>2.5</sub>	0.1	13.1	See text

- 2.8 It is noted the programme has now changed and the project is considered to start in 2026 and the operational year being 2032. With regards to air quality traffic emissions are predicted to decline in future years as newer vehicles with cleaner emissions will replace older vehicles and measures (such as London Ultra Low Emission Zone) will encourage the use of vehicles with lower emissions. As such the results presented in the air quality assessment are worst-case and conservative.
- 2.9 For PM<sub>2.5</sub>, the comparison against an assessment level is complicated because there is no national objective prescribed for planning purposes. Local authorities commonly use 20  $\mu\text{g}/\text{m}^3$ <sup>4</sup> or 25  $\mu\text{g}/\text{m}^3$ <sup>5</sup>, while the Greater London Authority has an objective of 10  $\mu\text{g}/\text{m}^3$  for PM<sub>2.5</sub>. Thurrock Council's Annual Status Report for 2021 uses 25  $\mu\text{g}/\text{m}^3$  as its objective. The UK Government has announced 10  $\mu\text{g}/\text{m}^3$  as a target to be met by 2040, but this is not yet in legislation and does not impose a planning requirement. It should also be noted that according to the ES modelling, the annual mean PM<sub>2.5</sub> concentration at LTC262 in the baseline year of 2016 was 13.7  $\mu\text{g}/\text{m}^3$ , so the 2030 operational phase concentration will be an improvement on the baseline even with the Project.
- 2.10 The overall impact of the Project is considered unlikely to lead to a significant impact on air quality at LTC262.

## Technical Methodology

- 2.11 The following sections consider the methodology used in the air quality assessment and identify methodological failings which have the potential to effect the overall conclusions set out in Chapter 5 of the ES. As discussed in Section 1, a classification of each failing has been applied as minor, moderate or major.

## Construction Assessment

- 2.12 An air quality impact assessment of emissions from construction vehicles and plant has been included, and impacts at receptor LTC262 (representing the Site) have been modelled. This is therefore considered satisfactory.

<sup>4</sup> National Air Quality Strategy Objective exposure reduction annual mean and EU legal annual mean air quality limit value by 2020

<sup>5</sup> EU legal annual mean air quality limit value by 2015



- 2.13 An assessment of construction dust has been undertaken based on best practice guidance. This has considered any dust impacts at the Site. This is therefore considered satisfactory.

### **Modelling Methodology**

#### **Modelling of PM<sub>2.5</sub> [Moderate Issue]**

- 2.14 The ES states that the DMRB methodology does not require PM<sub>2.5</sub> to be assessed as the UK currently meets its legal requirements for the achievement of the PM<sub>2.5</sub> air quality thresholds. However, PM<sub>2.5</sub> is a pollutant of significant concern and UK Government has set targets to reduce concentrations in England as part of the published Environmental Improvement Plan<sup>6</sup>. One set of targets focuses on absolute concentrations. The long-term target is to achieve an annual mean PM<sub>2.5</sub> concentration of 10 µg/m<sup>3</sup> by the end of 2040, with the interim target being a value of 12 µg/m<sup>3</sup> by the start of 2028<sup>7</sup>. The second set of targets relate to reducing overall population exposure to PM<sub>2.5</sub>. By the end of 2040, overall population exposure to PM<sub>2.5</sub> should be reduced by 35% compared with 2018 levels, with the interim target being a reduction of 22% by the start of 2028. An assessment of PM<sub>2.5</sub> impacts is therefore important. The ES has included such an assessment, in response to comments from a number of consultees.
- 2.15 The operational PM<sub>2.5</sub> calculations are described as assuming that the road vehicle PM<sub>2.5</sub> emissions are the same as the PM<sub>10</sub> emissions. This is a conservative assumption. However, there are some discrepancies between the reported changes, which should be the same for PM<sub>2.5</sub> and PM<sub>10</sub> if the explanation of the methodology is correct. An example of the discrepancy can be seen at receptor LTC262, representing the Site, as shown in Table 1: the change in PM<sub>10</sub> is given as 0.2 µg/m<sup>3</sup> and the change in PM<sub>2.5</sub> is given as 0.1 µg/m<sup>3</sup>. This appears to be because the changes are calculated from the total concentrations after rounding instead of before rounding.
- 2.16 PM<sub>2.5</sub> concentrations from the construction phase have not been calculated. However, the changes may be taken as at most the same as for PM<sub>10</sub>, i.e. at most 0.1 µg/m<sup>3</sup> at the LTC262 receptor representing the Site.
- 2.17 Whilst PM<sub>2.5</sub> concentrations are unlikely to be significant, the failings in the assessment should be clarified. As well as how the project is compliant against the Defra PM<sub>2.5</sub> targets for England.

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<sup>6</sup> Defra (2023) A Green Future: Our 25 Year Plan to Improve the Environment. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/693158/25-year-environment-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf)

<sup>7</sup> Meaning that it will be assessed using measurements from 2027. The 2040 target will be assessed using measurements from 2040. National targets are assessed against concentrations expressed to the nearest whole number, for example a concentration of 10.4 µg/m<sup>3</sup> would not exceed the 10 µg/m<sup>3</sup> target.

### Terrain and Road Elevation [Moderate Issue]

- 2.18 The air quality assessment does not provide details on how local terrain has been considered in the modelling. This could include the use of a terrain file in the air quality model and/or the use of additional calculated vehicle emissions for changes in gradient.
- 2.19 Similar to the above, the air quality assessment does not provide any details on the inclusion of street canyons, gradients and flyovers within the detailed dispersion modelling. Particularly how the model has considered the LTC route alignment passing over Baker Street to join the A13. Further clarification is required.

### Meteorological Data [Minor Issue]

- 2.20 The air quality model has used meteorological data from Stansted Airport, Gravesend-Broadness and London City Airport, depending on receptor. All receptors are within 30 km of the allocated meteorological station. The wind roses for the three stations are similar. A sensitivity assessment could have been undertaken to compare the effect of using different stations on the model results.

### Modelling Tools

- 2.21 The air quality modelling assessment has been updated since the PEIR and uses the current versions of the key tools, including DMRB, ADMS-Roads and the Emission Factors Toolkit.

### TAG Appraisal and Assessment of Significance

- 2.22 An assessment of the significance of the air quality impacts has been carried out following DMRB guidance.

## Comparison with PEIR

- 2.23 The 2019 Review<sup>1</sup> identified a number of Moderate and Minor issues with the PEIR. Several of these have been addressed in the ES and are either no longer considered to be issues, or can be downgraded from Moderate to Minor. However, a new Moderate issue has been identified in the ES. A summary of the issues and how they have changed between the PEIR and ES is given in xxx.

**Table 2: Summary of Identified Issues**

<b>Issue</b>	<b>Severity in PEIR</b>	<b>Severity in ES</b>
<b>No reference Thurrock Council's Air Quality and Health Strategy (2016)</b>	Not rated	Minor
<b>Impacts not modelled at Site location</b>	Not rated	Resolved
<b>No assessment of impact from construction plant at vehicles</b>	Moderate	Resolved (except PM <sub>2.5</sub> )
<b>Modelling of PM<sub>2.5</sub> impacts</b>	Not rated	Moderate
<b>Terrain and road elevation</b>	Moderate	Moderate (no change)
<b>Meteorological data</b>	Minor	Minor (some improvement)
<b>Modelling tools</b>	Moderate	Resolved
<b>Assessment of Significance</b>	Moderate	Resolved

### 3 Summary

- 3.1 A total of 765 individual human health receptors have been considered in the air quality modelling assessment, including one receptor (identifier LTC262) representative of the Site.
- 3.2 Whilst predicted air quality concentrations at this receptor are predicted to increase as a result of the Project, this increase is considered unlikely to lead to a significant impact on air quality.
- 3.3 Whilst the general scope and methodology to the air quality is assessment is considered acceptable there are a number of Moderate Issue methodological failings which could impact the conclusions of the assessment. These include:
- The assessment of PM<sub>2.5</sub> emissions from the operational phase is simple but expected to be conservative; however, there are discrepancies in the results presented which reduces confidence in the assessment. In addition, further detail is required to demonstrate the development is compliant against the Defra PM<sub>2.5</sub> targets for England.
  - Moreover, the assessment has excluded PM<sub>2.5</sub> emissions from construction activities (plant and road vehicles). However, consideration of impacts from PM<sub>10</sub> emissions suggests that the impacts from PM<sub>2.5</sub> are unlikely to be significant.
  - The air quality modelling assessment does not provide details on how local terrain has been considered in the modelling. This could include the use of a terrain file in the air quality model and /or the use of additional calculated vehicle emissions for changes in gradient. Similarly, the air quality assessment does not provide any details on the inclusion of street canyons, gradients and flyovers within the detailed dispersion modelling. Particularly how the model has considered the LTC route alignment passing over Baker Street to join the A13. Further clarification is required.
- 3.4 Further to the above, there is a Minor Issue relating to the use of the meteorological data. A sensitivity assessment could have been undertaken to check the effect of meteorological station selection on the results.
- 3.5 The most critical issues identified in the 2019 Review have been resolved in the ES, including the assessment of construction impacts, the inclusion of the Site as a specific receptor, the use of the most up-to-date tools and guidance, and the inclusion of an assessment of the significance of the air quality impacts.