

A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Appendix 5.4
Air Quality Sites Used for Verification

HE551508-ARP-EAQ-ZZ-RP-LA-000008

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Table of contents

	Pages
1 Air quality sites used for verification	i
1.1 Sites used for verification	i
References	vi

Table of Tables

Table 1-1 Monitoring sites removed from the verification process
Table 1-2 Model performance

1 Air quality sites used for verification

1.1 Sites used for verification

- 1.1.1 Verification of the air quality spreadsheet model has been completed using 15 monitoring sites across the study area. Where appropriate, the locations of the monitoring sites were updated following location reviews.
- 1.1.2 Verification followed the methodology outlined in the *Local Air Quality Management Technical Guidance* (LAQM TG.16) [1]. The following method has been used:
- Comparison of the modelled road nitrogen oxides (NO_x) versus the monitored road NO_x. Road NO_x measured at the diffusion tube monitoring sites was calculated using the latest Department for Environment, Food and Rural Affairs (Defra) NO_x to nitrogen dioxide (NO₂) calculator [2], available on the Local Air Quality Management (LAQM) website.
 - A verification factor was calculated based on the regression equation defined in LAQM TG.16 and this was applied to the modelled road NO_x concentrations.
 - The adjusted modelled road NO_x contribution was then used to calculate the total NO₂ using the Defra NO_x to NO₂ calculator.
- 1.1.3 The air quality monitoring data collected as part of this assessment was reviewed to determine the suitability of each of the monitoring 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 is outlined below:
- All monitoring locations were required to be within 200m of a road within the study area.
 - Monitoring data from 2019 was required to have a data capture rate of ≥75%.
 - Monitoring data influenced by major road emissions sources which were missing from the traffic model, and hence could not be included in the dispersion model was excluded.
 - Monitoring data from sites where the exact location could not be accurately identified or validated was excluded.
- 1.1.4 Seven monitoring sites were not used in the verification process, and the reasons for this are detailed in Table 1-1.
- 1.1.5 Table 1-2 provides the verification details. Graphs showing the model performance are shown in Figure 1-1 and Figure 1-2 of this appendix.

Table 1-1 Monitoring sites removed from the verification process

Site ID	Location	Reason
2	Henlade East	The NO ₂ concentrations in this area are well represented by a number of monitoring locations. The concentrations at this location are 17µ/m ³ (micrograms per cubic metre) lower than other tubes along the same road. Trends and reasons for the lower concentrations at this location have been reviewed and it is unclear why NO ₂ is lower at this location. In order to represent concentrations along this road the site has been removed as the other sites are considered representative of the receptors in the area.
16	Park Gate	The model has not been set up to replicate streetscape at the location.
45	East Street	The monitoring tube is located next to a bus stop which has not been accounted for in traffic data provided.
DT5	Market Place, Willand	The monitoring tube is obstructed from road by tall hedges. The model has not been set up to replicate the complex streetscape.
DT1 3	Rooksbridge M5 bridge	The monitoring tube location could not be determined.
N60	Sowton Lodge (Nearest)	The monitoring tube is obstructed from road by tall hedges. The model has not been set up to replicate the complex streetscape.
N61	Sowton Lodge (Furthest)	No monitoring data was available for 2019.

Table 1-2 Model performance

East Reach		Wider affected road network (ARN)	
Adjustment factor –	1	Adjustment factor –	1.304
Within +10%	1	Within +10%	2
Within -10%	0	Within -10%	0
Within +/-10%	1	Within +/-10%	2
Within +10 to 25%	2	Within +10 to 25%	0
Within -10 to 25%	0	Within -10 to 25%	3
Within +/-10 to 25%	2	Within +/-10 to 25%	3
Over +25%	0	Over +25%	0
Under -25%	0	Under -25%	0
Greater +/-25%	0	Greater +/-25%	0
Within +/-25%	3	Within +/-25%	5
Total	3	Total	5
Uncertainties assessment		Uncertainties assessment	
Correlation	1.00	Correlation	0.99
Root Mean Square Error ($\mu\text{g}/\text{m}^3$)	0.99	Root Mean Square Error ($\mu\text{g}/\text{m}^3$)	0.95
Fractional bias	-0.11	Fractional bias	0.06

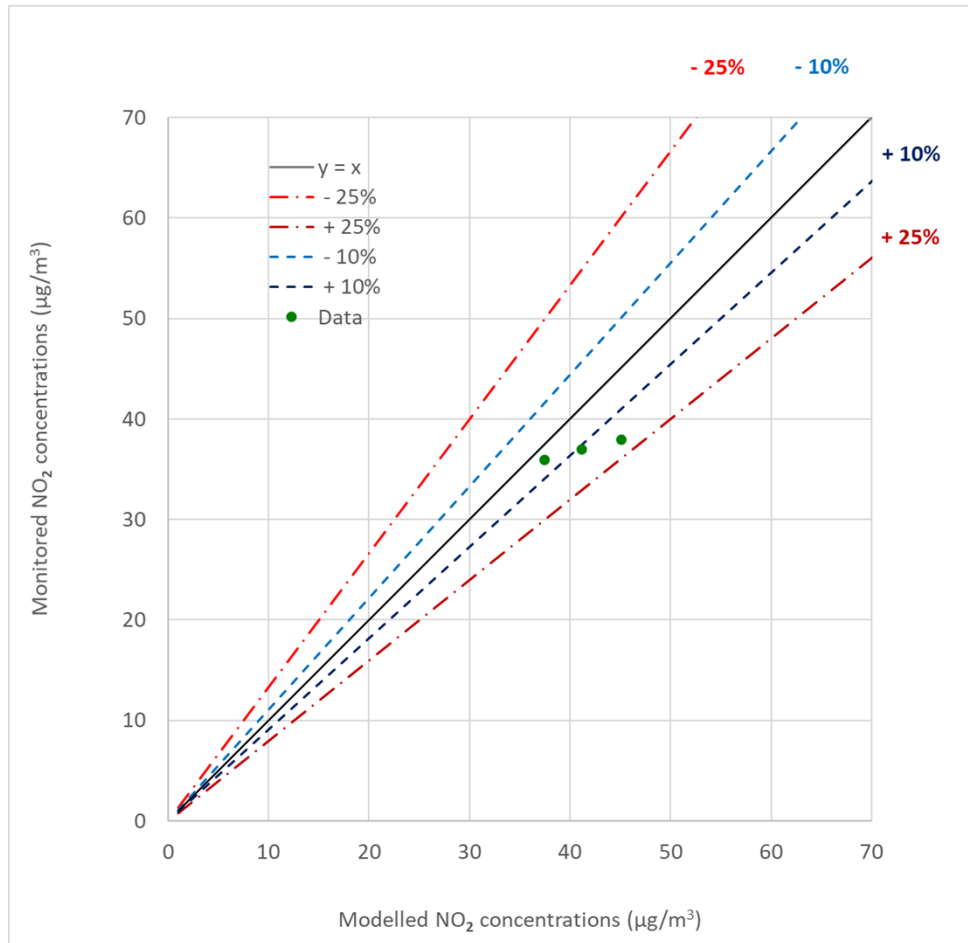


Figure 1-1 Model performance for East Reach (no adjustment required)

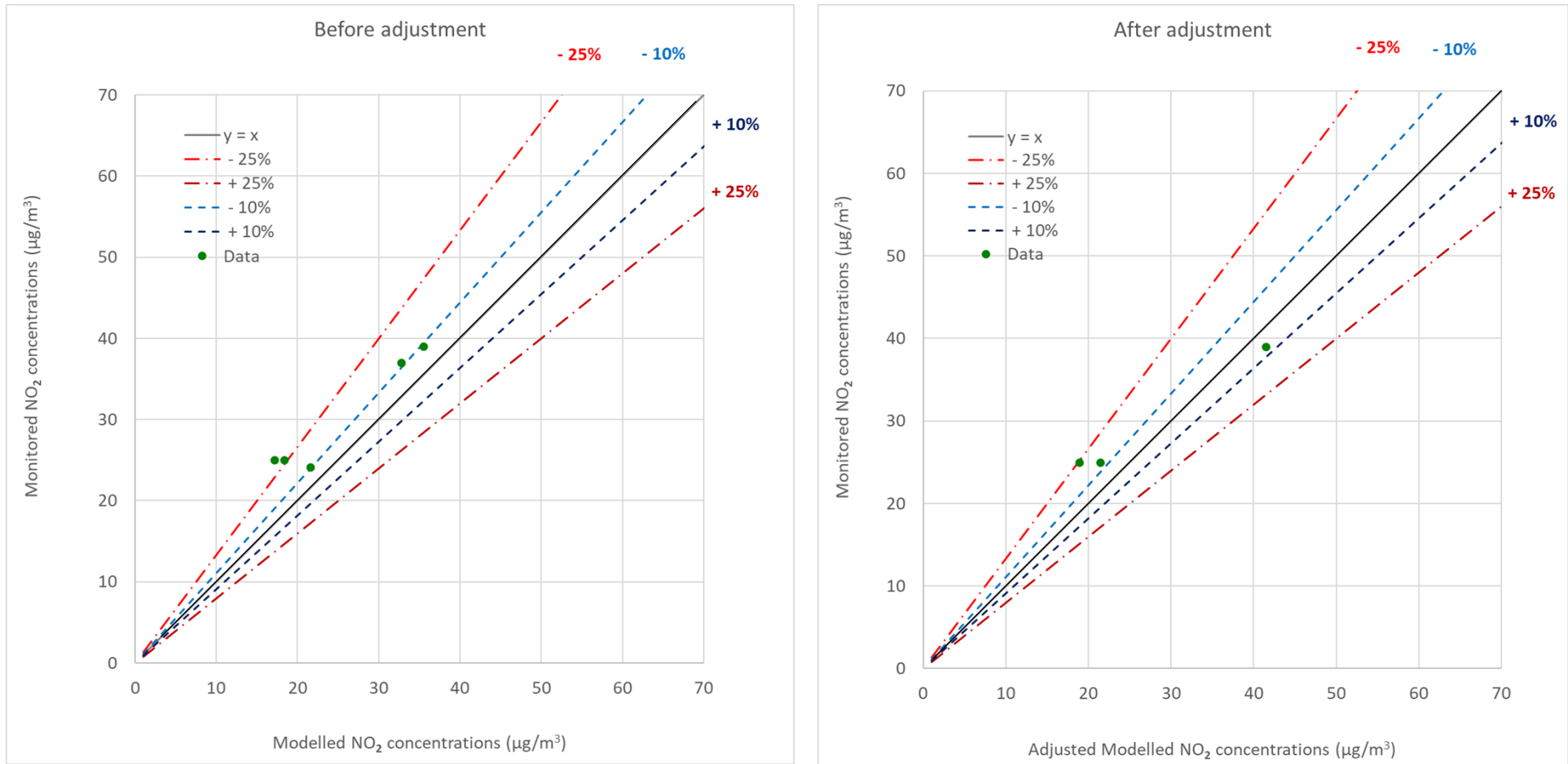


Figure 1-2 Model performance for the wider ARN

References

- [1] Department for Environment Food & Rural Affairs, “Local Air Quality Management Tehcnical Guidance (TG16),” 2018.
- [2] Department for Environment Food & Rural Affairs, “NOx to NO2 calculator,” [Online]. Available: <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOXNO2calc>. [Accessed April 2021].