



Appendix 11.8

MODEL VERIFICATION

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Modelled results have been verified against monitored concentrations in the vicinity of the site. Data from both local authority monitoring sites and from the site specific monitoring survey carried out by Buro Happold has been used. The verification process follows the methodology set out in Defra LAQM TG22.

Verification sites

The verification sites used in the assessment are presented in Figure 1, with photos presented in Figure 2. This includes CDC diffusion tubes on Langford Lane and Oxford Road. Buro Happold monitoring sites BID 2 on Woodstock Road (A44) and BID2 on Sandy Lane were also used.

Other Buro Happold monitoring sites were not selected to be used for verification. BID 1 in Begbroke Science Park was not near to any significant road sources and therefore would not be suitable for verifying road NOx. BID 3, BID 6 and BID 7 were not used as there were roadworks along this section of Woodstock Road during the monitoring study. BID 4 was not used due to uncertainty potentially arising from the trainline and level crossing adjacent to it.

Where assumptions have been made in the verification process they have generally ensured that the outcome is a larger verification factor. This will ensure the assessment is worst case and precautionary.

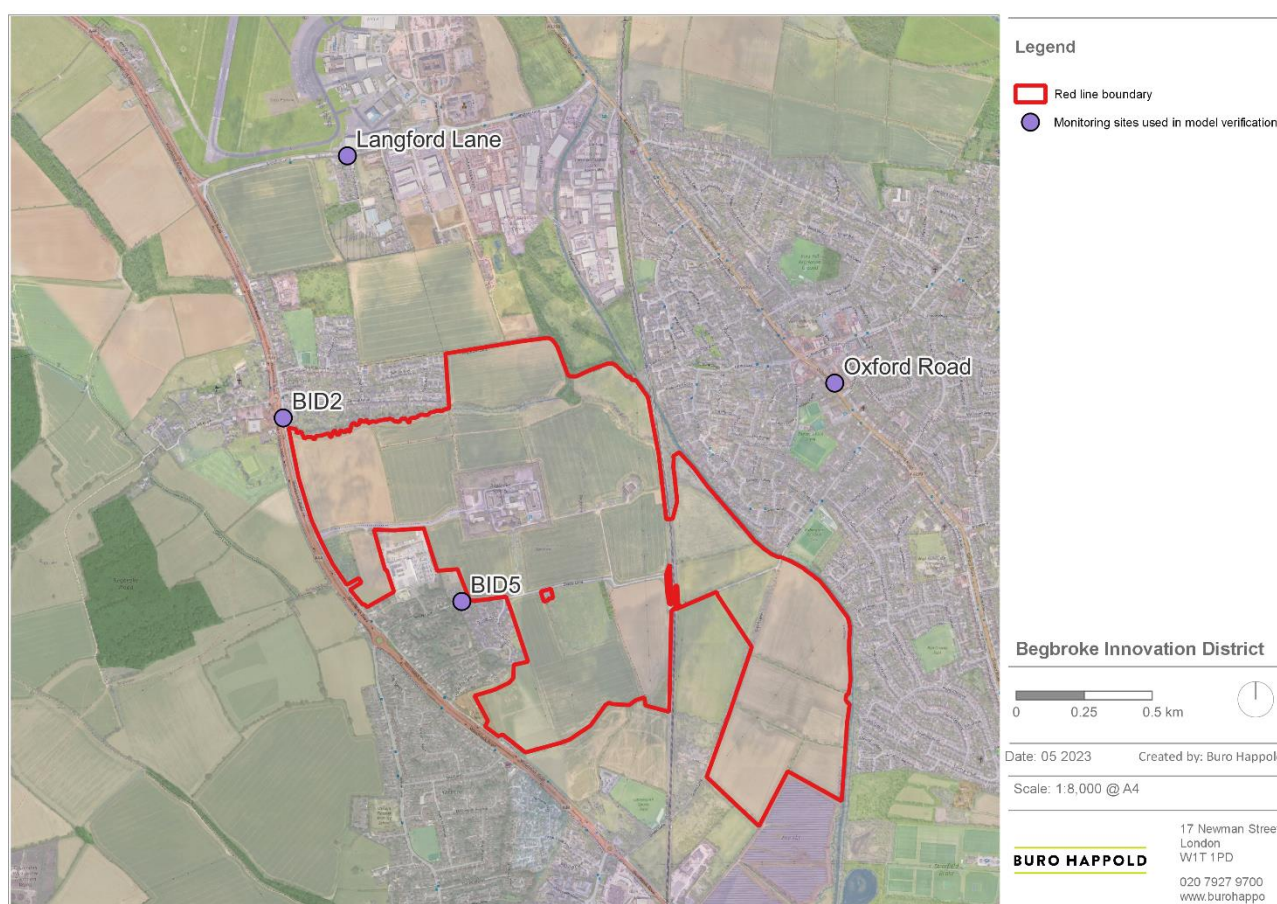


Figure 1 Air quality monitoring sites used in model verification



Figure 2 Photos of monitoring sites used for model verification (Clockwise from top right: BID2, BID5, Langford Lane, Oxford Road)

The micro siting of these sites has been appraised on site visits and using street view imagery to ensure the location of the monitoring sites within the model is as representative of actual conditions as possible.

Comparison of modelled and monitored NO_x concentrations at verification sites are presented Table 1. Results indicate that the model under-predicts road NO_x contribution, and therefore it is necessary to apply an adjustment factor of 2.426 (Figure 3) in order to obtain more accurate modelled concentrations.

The adjustment factor has subsequently been applied to all modelled road NO_x concentrations (**Error! Reference source not found.**). Adjusted NO_x plotted against monitored NO_x is presented in Figure 4. The adjusted modelled road contribution NO_x is within 25% of the monitored at all sites.

The root mean square error (RMSE) in the modelled NO₂ is 0.97 µg/m³, which equates to an error percentage of 2.4% of the annual average NO₂ objective. Defra LAQM TG22 states that ideally the RMSE will be within 10% of air quality objective. Therefore, the level of error complies with this quality check.

This adjustment factor has also been applied to PM₁₀ and PM_{2.5} concentrations in the absence of appropriate verification sites for these pollutants.

Table 1 Unadjusted modelled NOx compared to monitored NOx

Monitoring Site ID	Modelled road NOx (µg/m³)	Monitored road NOx (µg/m³)	% Difference
BID2	10.14	26.44	-61.64
BID5	2.78	8.63	-67.74
Langford Lane	7.53	15.59	-51.73
Oxford Road	9.88	23.59	-58.10

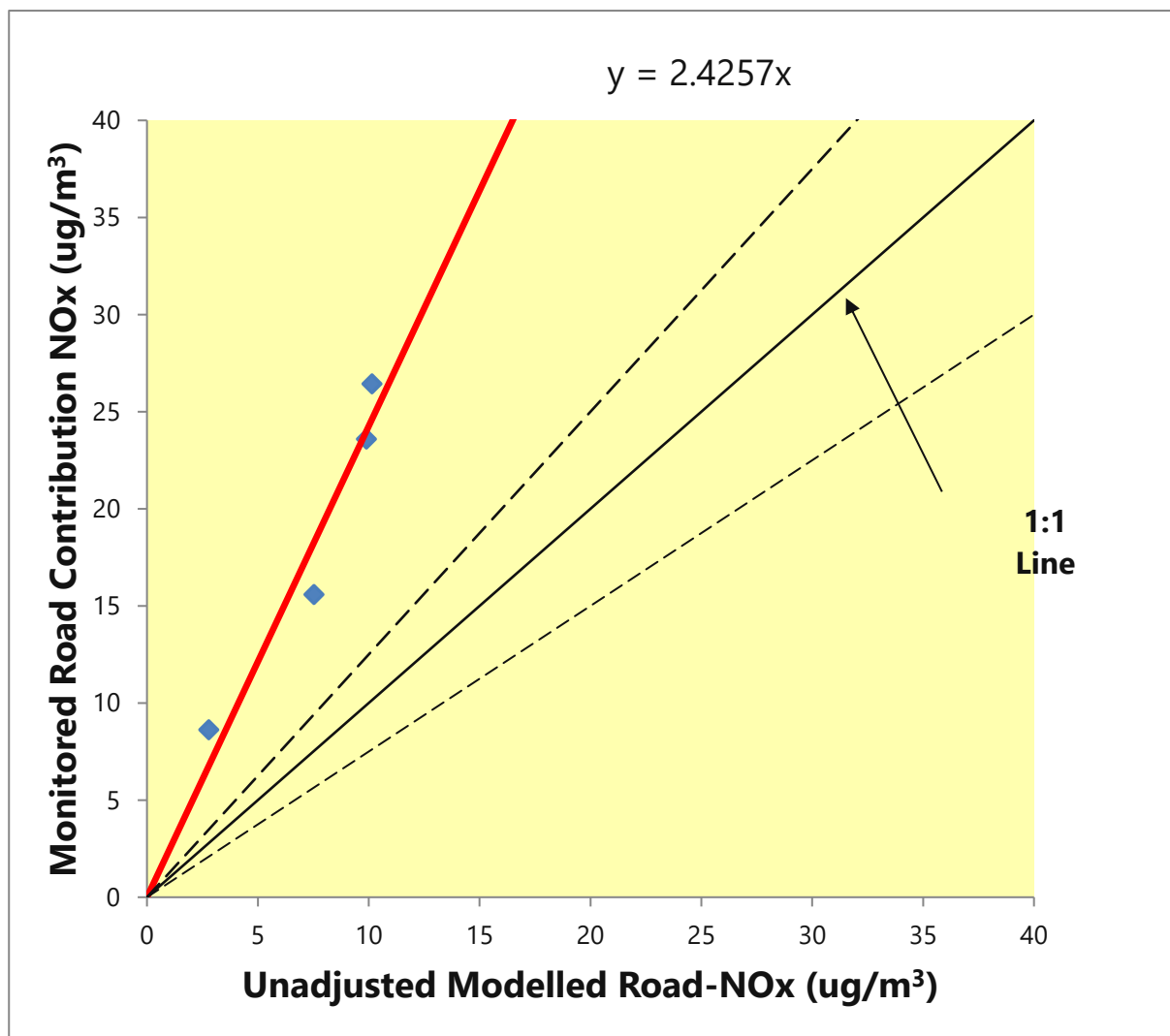


Figure 3 Monitored and unadjusted modelled road NOx

Table 2 Adjusted modelled NOx and NO2 concentrations

Monitoring Site ID	Background ($\mu\text{g}/\text{m}^3$)		Monitored Road NOx ($\mu\text{g}/\text{m}^3$)	Adjusted Modelled Road NOx ($\mu\text{g}/\text{m}^3$)	% Difference after Adjustment	Difference between monitored and adjusted modelled road contribution NO ₂ ($\mu\text{g}/\text{m}^3$)	RMSE ($\mu\text{g}/\text{m}^3$)
	NOx	NO2					
BID2	14.5	10.9	26.4	24.6	-6.9	0.9	0.97
BID5	14.5	10.9	8.6	6.8	-21.7	1.0	
Langford Lane	14.5	10.9	15.6	18.3	17.1	-1.4	
Oxford Road	14.5	10.9	23.6	24.0	1.6	-0.2	

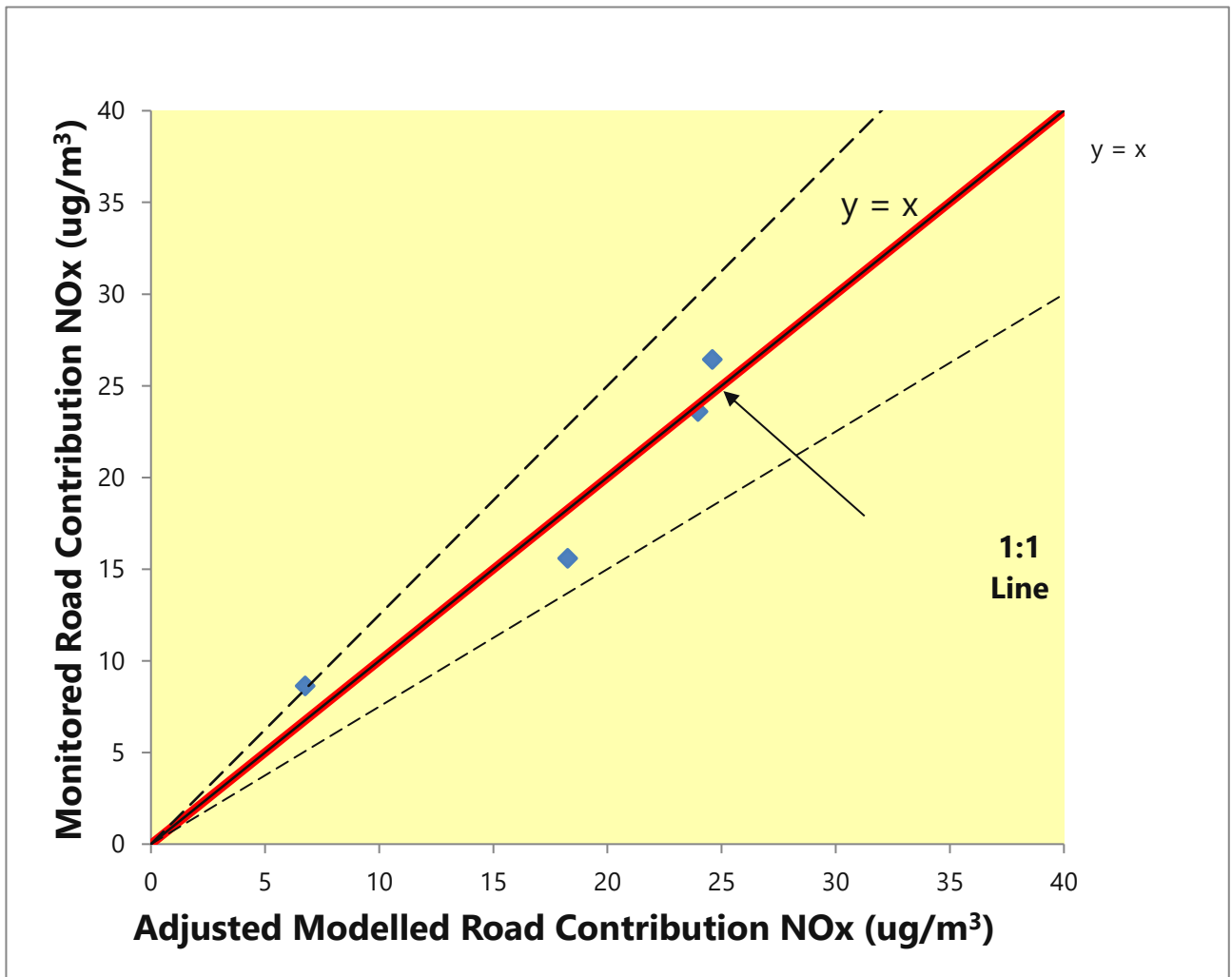


Figure 4 Monitored and modelled road NOx with verification factor applied to modelled concentrations.