

Calibrating Defra's 2017-based Background NO_x and NO₂ Maps against 2018 Measurements



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Introduction

This note compares Defra's 2017-based background mapped NOx and NO₂ concentrations for 2018¹ against 2018 annual mean measured background concentrations at Automatic Urban and Rural Network (AURN)² sites with more than 75% data capture.

The NOx and NO₂ uplift factors to be applied to Defra's 2017-based mapped concentrations when using 2018 as a base year are set out in Table 1. Mapped concentrations should simply be multiplied by the relevant factor. The derivation of these values is explained in the next section. At the time that this note was produced, 2018 was the most recent full calendar year of available measurements and so uplift factors for subsequent years cannot be derived.

Table 1: Uplifts to be Applied to Total Background Concentrations

Base Year	Concentration Uplift Factors	
	NOx	NO ₂
2018	1.0223	1.0488

Derivation of Factors

The mapped NOx values in 2018 have been calibrated against the 58 suitable background AURN sites with more than 75% data capture (Figure 1). This shows that the maps under-predict the background concentrations by 2.23%, on average (i.e. $1/0.9782 = 1.0223$). The factor for calibrating Defra's background maps for NOx for 2018 is thus 1.0223.

Figure 2 shows the same comparison for NO₂; again there is under-prediction in the maps. The factor for calibrating Defra's background maps for NO₂ for 2018 is 1.0488 (i.e. $1/0.9535 = 1.0488$).

¹ These maps cover the whole country on a 1x1 km grid and are published for each year from 2017 until 2030, and can be downloaded from <https://uk-air.defra.gov.uk/data/laqm-background-home>

² Defra AURN Archive, Available: <http://aurn.defra.gov.uk/>

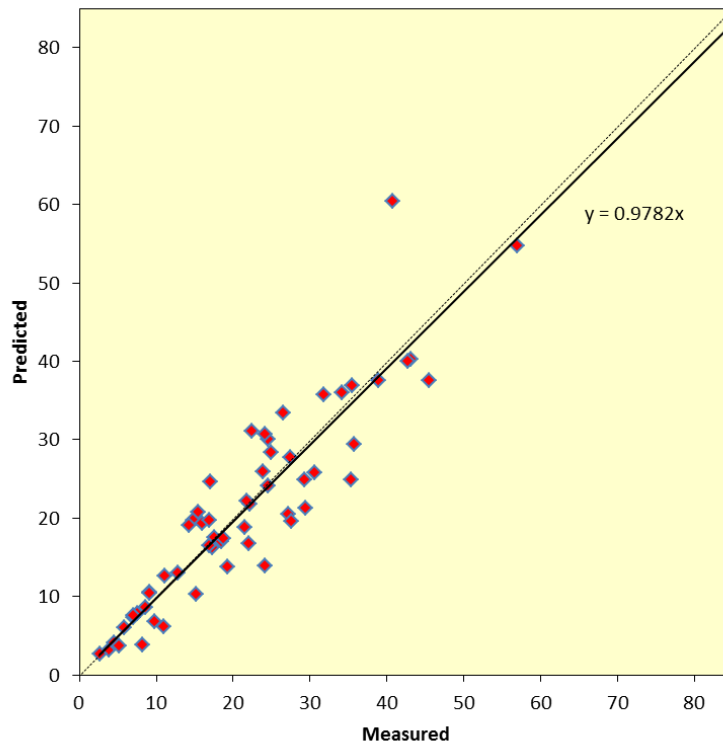


Figure 1: Predicted Mapped versus Measured NOx Concentrations at AURN Background Sites in 2018

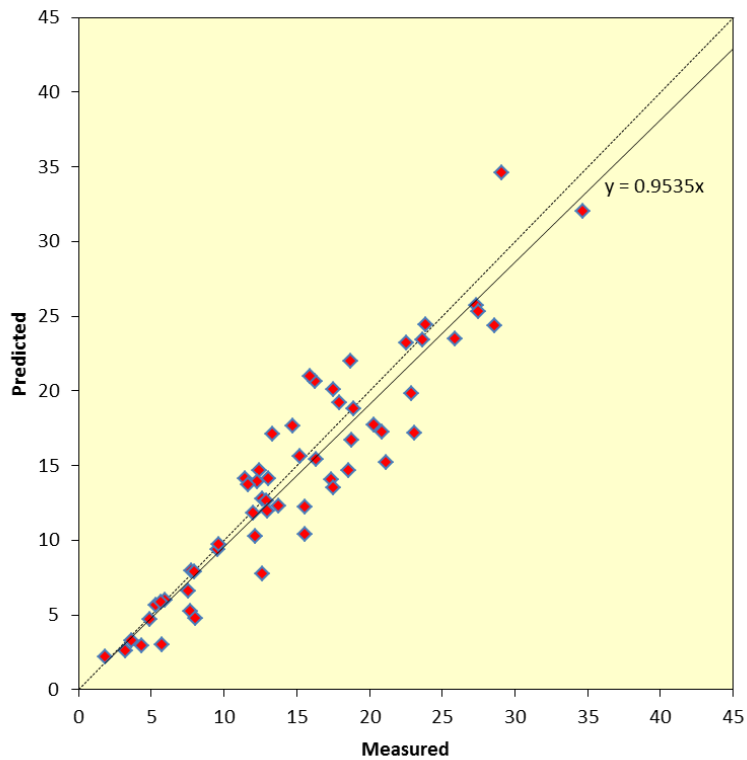


Figure 2: Predicted Mapped versus Measured NO₂ Concentrations at AURN Background Sites in 2018

Appendix A1

Derivation of Factors for 2015-based Maps

A comparison of Defra's 2015-based background mapped NOx and NO₂ concentrations for 2018¹ has also been undertaken against 2018 annual mean measured background concentrations at the same AURN sites included in the analysis above.

The NOx and NO₂ uplift factors to be applied to Defra's 2015-based mapped concentrations when using 2018 as a base year are set out in Table A1. Graphs of the comparisons are shown in Figure A1 and Figure A2.

Table A1: Uplifts to be Applied to Total Background Concentrations

Base Year	Concentration Uplift Factors	
	NOx	NO ₂
2018	1.0762	1.0707

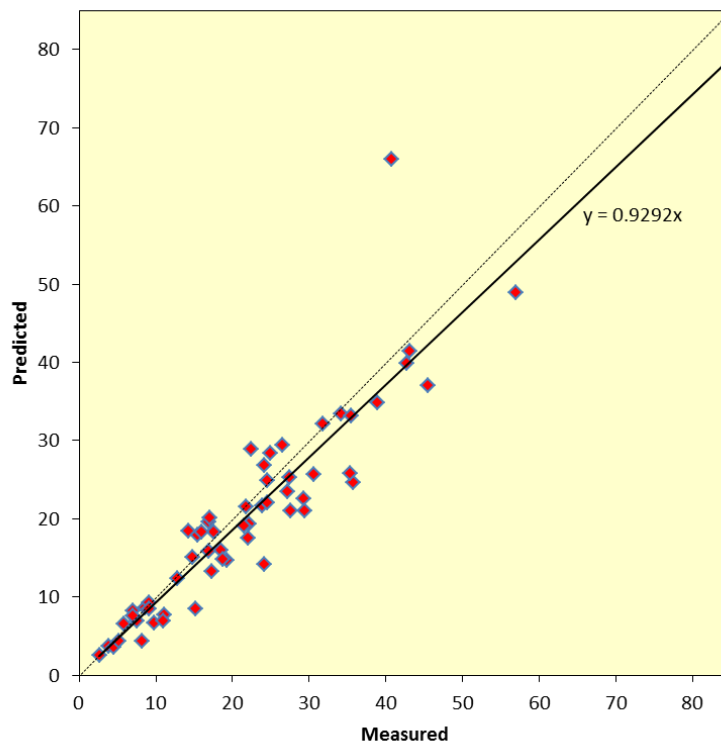


Figure A1: Predicted 2015-Base Mapped versus Measured NOx Concentrations at AURN Background Sites in 2018

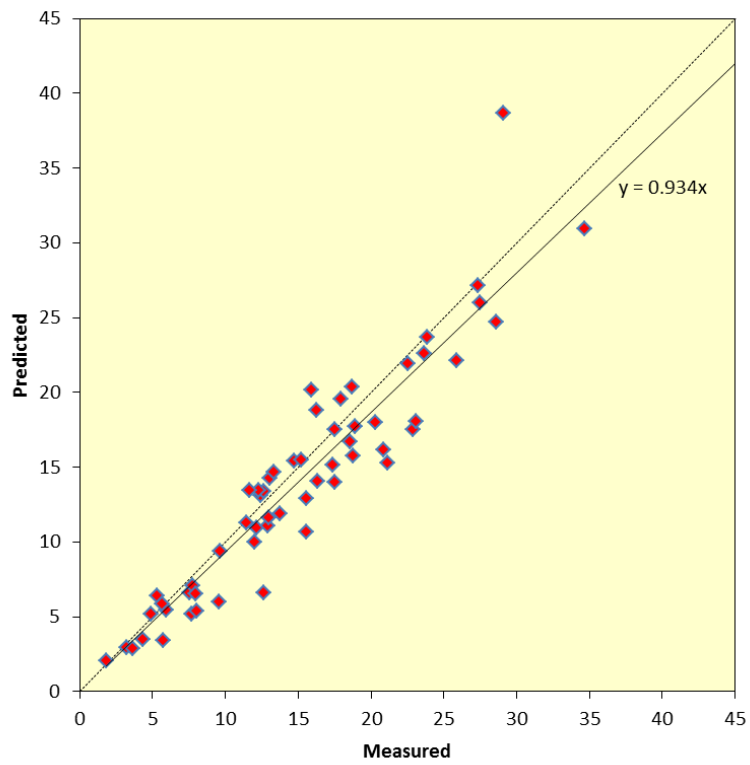


Figure A2: Predicted 2015-Base Mapped versus Measured NO₂ Concentrations at AURN Background Sites in 2018