

APPENDIX 6.3 – MODEL VERIFICATION

- Dispersion modelling is an inherently uncertain procedure with potential errors in the model output arising from either, or both, systematic or random errors.
- Systematic errors occur where a distinct trend is apparent in the model output i.e. a tendency to under or over predict known values. This type of error may arise where emissions have been underestimated, or unrepresentative meteorological data used. Whilst it is rarely possible to identify a specific reason for the systematic error, the errors can be quantified and allowed for by comparing modelled concentrations against monitored concentrations in order to derive a scaling factor. Monitored data itself has an associated uncertainty. Therefore, in the adjustment for systematic errors, it is best to calculate the scaling factor using the most appropriate monitoring sites in the area.
- Random errors, as the name suggests, do not show a distinct trend and result in a scatter of modelled concentrations about monitored data even after an allowance for systematic error has been made. The degree of uncertainty i.e. random error, in the model results may be estimated by calculating the standard deviation of the verified modelled results.
- Since the correction of the modelled results relates to the road-side component of the pollutant only, the scaling factor is calculated by first removing the background contribution to the monitored and modelled concentrations and then comparing the roadside components only.
- Following the methodology set out in LAQM TG(09), the verification is based on roadside nitrogen oxides. The Defra LAQM NO_x to NO₂ calculator has been used to calculate the roadside NO_x from the diffusion tube data.
- The model verification was based on Parsons Brinckerhoff project specific monitoring in the vicinity of the scheme, using both NO₂ and NO_x tubes
- The modelling showed consistent under prediction of concentrations at all sites. This is likely to be due to vehicle emissions factors under-representing real work emissions per vehicle
- Where tubes were installed as a triplicate, an average of all data was used for verification

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Table A6.3.1: Comparison of modelled versus monitored annual mean nitrogen oxide.

ID	Location	Monitored NO ₂ (µg/m ³)	Background NO ₂ (µg/m ³)	Road NO _x (µg/m ³)		Ratio: Monitored to Modelled	Used for Verification	Comment
				Modelled	Monitored			
STA01	Entrance to Grants Field	17.22	9.69	14.53	4.69	3.10	Y	1
STA02	Old Post Office, St Nicholas	32.46	9.69	47.82	14.55	3.29	Y	2
STA03	St Nicholas	38.20	9.69	62.09	14.71	4.22	Y	3
STA04	St Nicholas	18.02	9.69	16.13	9.80	1.65	Y	4
STA05	St Nicholas	25.64	9.69	32.18	13.25	2.43	Y	5
STA06	Bonvilston	52.45	9.69	102.52	10.31	9.94	N	Outside study area & influenced by traffic accelerating uphill 6
STA07	Bonvilston	36.46	9.69	57.64	11.37	5.07	Y	7
STA08	Bonvilston	27.59	9.69	36.51	10.94	3.34	y	8
STA09	Bonvilston	18.20	9.69	16.48	4.01	4.11	Y	
STA10	Junction A48 / Five Mile Lane	17.85	9.69	15.78	3.77	4.19	Y	
STA11	Junction A48 / Five Mile Lane	27.03	9.69	35.27	8.41	4.19	Y	
STA12	Junction A48 / Five Mile Lane	27.55	9.69	36.43	9.72	3.75	Y	
STA13	Junction A48 / Five Mile Lane	23.62	9.69	27.78	8.95	3.10	Y	
STA14	Five Mile Lane (Woods)	13.93	9.69	8.04	3.96	2.03	Y	
STA15	Five Mile Lane (Amelie)	14.94	9.69	10.01	3.09	3.24	Y	
STA16	Five Mile Lane (Dyffryn Road)	14.64	9.69	9.42	1.51	6.24	Y	
STA17	Five Mile Lane (Hawking Centre)	10.14	9.69	0.84	1.31	0.64	Y	
STA18 - 20	Roundabout Five Mile Lane/Port Road	9.69	63.12	11.51	5.49	Y	9.69	
STA21	Roundabout Five Mile Lane/Port Road	45.61	9.69	82.18	10.66	7.71	N	Kerbside side, high levels of HDV

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								traffic accelerating away from r'bt
STA22	Port Road (Stirling Road)	32.07	9.69	46.88	11.95	3.92	Y	
STA23	Port Road (School)	34.26	9.69	52.17	7.57	6.89	N	Influenced by traffic to supermarket that is not represented in traffic data
STA24	Port Road (East Bound)	22.81	9.69	26.05	4.86	5.36	Y	
STA25	Port Road (West Bound)	21.06	9.69	22.36	5.56	4.02	Y	
STA26	Crematorium	20.42	9.69	21.03	4.46	4.72	Y	
STA27	Wenvoe	20.49	9.69	21.18	5.62	3.77	Y	
STA28	Wenvoe	17.33	9.69	14.75	5.51	2.68	Y	
STA29	Wenvoe	62.41	9.69	135.09	17.94	7.53	N	Kerbside side, high levels of HDV traffic accelerating away from r'bt
STA33	Layby on Five Mile Lane/Waycock Road	14.71	9.69	9.56	3.81	2.51	Y	
Value used for verification (from straight line fit through data)						3.757		

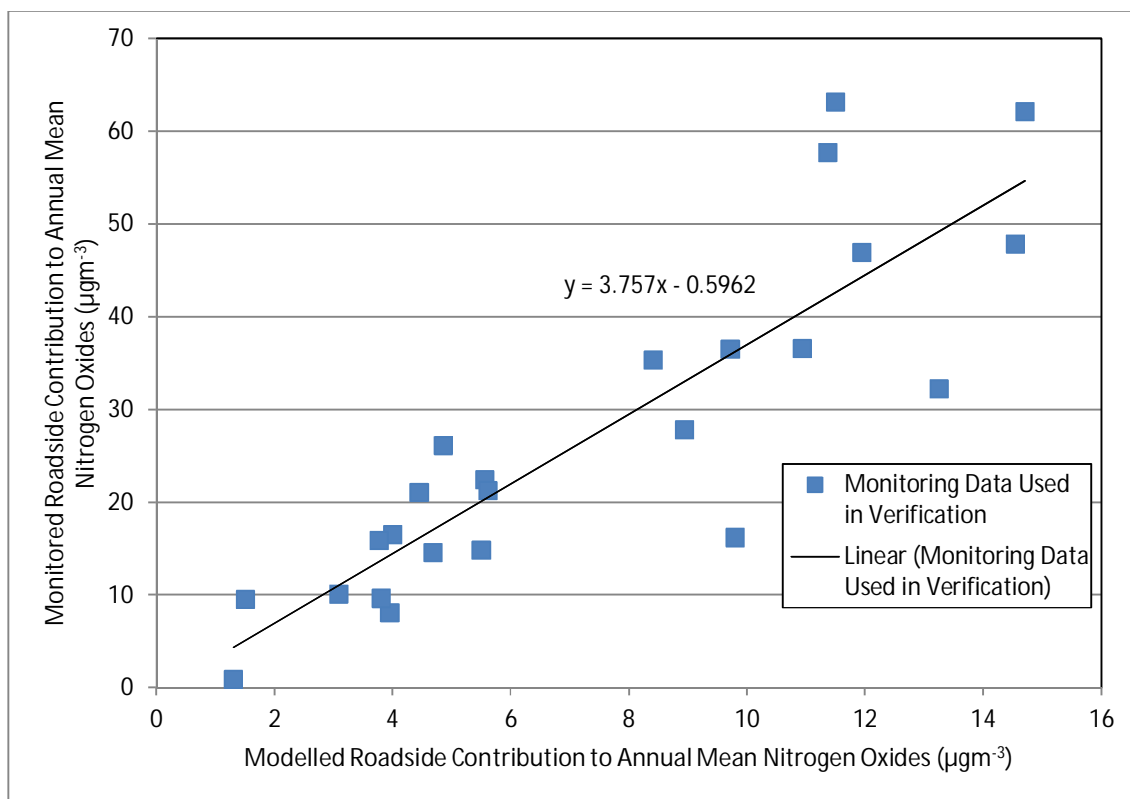


Figure A6.3.1: Comparison of modelled versus monitored road contribution to annual mean nitrogen oxides showing the best line fit through the location used for model verification.