

# **Great Yarmouth Third River Crossing Application for Development Consent Order**

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## **Document 6.2: Environmental Statement Volume II: Technical Appendix 6E: Scheme- Specific Air Quality Monitoring**

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**Planning Act 2008**

**The Infrastructure Planning (Applications: Prescribed Forms and Procedure)  
Regulations 2009 (as amended) (“APFP”)**

APFP regulation Number: 5(2)(a)

Planning Inspectorate Reference Number: TR010043

Author: Norfolk County Council

Document Reference: 6.2 – Technical Appendix 6E

Version Number: 0 – Revision for Submission

Date: 30 April 2019

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# 1 Scheme-Specific Air Quality Monitoring

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## 1.1 Introduction

**1.1.1** A Scheme-specific programme of NO<sub>2</sub> diffusion tube monitoring was undertaken for five months to establish the baseline condition and for model verification purposes. The monitoring started in August 2017 and ended in January 2018.

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## 1.2 Monitoring Locations

**1.2.1** A total of 40 sites were selected for diffusion tube monitoring. Details of the site locations are provided in Table 1.1 and the monitoring results are presented in Table 1.2.

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## 1.3 Bias Adjustment

**1.3.1** Monitoring of NO<sub>2</sub> using diffusion tubes is demonstrated to have a degree of uncertainty of +/- 25% when compared to automatic ambient monitoring data (Ref 6.9), known as systematic bias. However, diffusion tubes are a low-cost method of monitoring suitable to give an indication of average NO<sub>2</sub> concentrations and can be deployed at many locations over a wide area.

**1.3.2** A bias adjustment factor, which can be derived using local or national data, is applied to the diffusion tube results to adjust for any systematic bias. Detailed guidance on bias correction for NO<sub>2</sub> diffusion tubes is given in LAQM TG(16) (Ref 6.5).

**1.3.3** To facilitate local bias adjustment, the guidance recommends that co-located diffusion tubes are sited at the inlet of a continuous analyser for each month of the monitoring programme. The closest continuous analyser to the monitoring area is the Norwich Lakenfields urban background continuous analyser, which is managed by Defra as part of the Automatic Urban and Rural Network (AURN). The AURN is the main network of air quality monitoring stations used by Defra for compliance reporting against the Ambient Air Quality Directives (Ref 6.10).

**1.3.4** The Bias Adjustment Factor obtained from the collocation of diffusion tubes with the Norwich Lakenfields continuous analyser was 0.77 as calculated in the AEA precisions and accuracy spreadsheet downloaded from the Defra website.

**1.3.5** Annualisation was undertaken following the procedure given in TG(16) Box 7.9. AURN sites situated within 50 miles of the diffusion tube NO<sub>2</sub> monitoring

locations are considered ideal where the data capture is at least 85% for the appropriate year of measurement. The locations given below represent the most suitable continuous analyser locations within 50 miles with adequate data capture. A factor of 1.04 was calculated using 2017 data from the following continuous analysers;

- Cambridge Roadside AURN
- Norwich Lakenfields AURN
- Wicken Fen AURN

## 1.4 Monitoring Results

**1.4.1** The bias adjusted and annualised results show that 2017 NO<sub>2</sub> annual mean concentrations ranged from 10.7 µg/m<sup>3</sup> to 32.8 µg/m<sup>3</sup>. The monitoring has not identified an exceedance of the annual mean NO<sub>2</sub> objective of 40 µg/m<sup>3</sup> at any of the monitoring locations, all of which included triplicate tube sampling. The highest annual mean concentration of NO<sub>2</sub> was identified at location WSP12 on South Quay Great Yarmouth.

*Table 1.1: Scheme-Specific NO<sub>2</sub> Diffusion Tube Monitoring Location Site Details*

Site ID	Description	X	Y	Height (m)	Type
<b>WSP1</b>	Runham Rd	651935	308536	2.4	Roadside
<b>WSP2</b>	School Rd	651964	308314	2.4	Roadside
<b>WSP3</b>	Northgate Street	652340	308077	2.6	Roadside
<b>WSP4</b>	Priory Gardens	652491	307941	2.6	Urban Background
<b>WSP5</b>	Nelson Rd N Jury St	652842	307991	2.8	Urban Background
<b>WSP6</b>	Nelson Rd N Trafalgar St	652850	307378	2.7	Roadside
<b>WSP7</b>	Nelson Rd N St Peters Rd	652873	307074	2.5	Roadside
<b>WSP8</b>	Queens Rd	652756	306572	2.5	Roadside
<b>WSP9</b>	Admiralty Rd	652769	306047	2.6	Roadside
<b>WSP10</b>	Sutton Rd	652658	306040	2.5	Roadside
<b>WSP11</b>	Southgates Rd	652611	306229	2.6	Roadside
<b>WSP12</b>	S Quay Nottingham Way	652468	307090	2.5	Roadside
<b>WSP13</b>	Yarmouth Way	652459	307304	2.5	Roadside

Site ID	Description	X	Y	Height (m)	Type
<b>WSP14</b>	Stonecutters Way	652178	307619	2.5	Roadside
<b>WSP15</b>	Greyfriars Way	652371	307422	2.6	Urban Background
<b>WSP16</b>	Trafalgar College Thamesfield Way	651732	306714	2.5	Roadside
<b>WSP17</b>	Gapton Hall Rd	651531	306309	2.5	Roadside
<b>WSP18</b>	Vincent Close	651517	307179	2.6	Urban Background
<b>WSP19</b>	Mill Rd	651627	307643	2.5	Urban Background
<b>WSP20</b>	Mill Rd jnc. Bridge Rd	652016	307412	2.6	Roadside
<b>WSP21</b>	Southtown Rd	652042	307298	2.6	Roadside
<b>WSP22</b>	Station Rd	651865	306968	2.8	Roadside
<b>WSP23</b>	Southtown Rd 2	652231	306856	2.5	Roadside
<b>WSP24</b>	Boundary Rd	652373	306231	2.6	Roadside
<b>WSP25</b>	Cromwell Rd	652386	306036	2.5	Roadside
<b>WSP26</b>	Queen Anne's Rd	652360	305868	2.8	Roadside
<b>WSP27</b>	Queen Anne's Rd 2	652166	305970	2.8	Roadside
<b>WSP28</b>	Southtown Rd 3	652408	305818	2.7	Roadside
<b>WSP29</b>	Manby Rd	652404	305357	2.8	Roadside
<b>WSP30</b>	Burgh Rd	652309	305188	2.7	Roadside
<b>WSP31</b>	Alpha Rd	652396	305674	2.8	Roadside
<b>WSP32</b>	A143	652071	304949	2.8	Roadside
<b>WSP33</b>	Plane Rd	651959	304891	2.8	Roadside
<b>WSP34</b>	Lynn Grove	651514	304700	2.6	Roadside
<b>WSP35</b>	Beccles Rd	651224	304384	2.7	Roadside
<b>WSP36</b>	Baliol Rd	652306	304368	2.6	Roadside
<b>WSP37</b>	Middleton Rd	652270	303862	2.8	Roadside
<b>WSP38</b>	Brasnose Avenue	652278	302742	2.8	Roadside
<b>WSP39</b>	Horsley Drive	651967	301967	2.3	Roadside
<b>WSP40</b>	Cormorant Way	650866	305188	2.8	Roadside

*Table 1.2: Monitored Annual Mean NO<sub>2</sub> Concentrations*

Site ID	P1 (µg/m <sup>3</sup> )	P2 (µg/m <sup>3</sup> )	P3 (µg/m <sup>3</sup> )	P4 (µg/m <sup>3</sup> )	P5 (µg/m <sup>3</sup> )	Bias Adjusted* Period Average Concentration (µg/m <sup>3</sup> )	2017 Annualised** Concentration (µg/m <sup>3</sup> )
<b>WSP1</b>	34.0	24.7	37.1	36.5	33.6	25.6	26.6
<b>WSP2</b>	24.7	25.4	29.6	38.4	30.6	22.9	23.8
<b>WSP3</b>	27.7	25.9	27.2	36.5	31.8	23.0	23.9
<b>WSP4</b>	21.7	20.9	26.2	32.7	25.2	19.5	20.3
<b>WSP5</b>	28.9	29.0	32.4	40.1	30.1	24.7	25.7
<b>WSP6</b>	26.4	27.0	31.5	43.6	35.9	25.3	26.4
<b>WSP7</b>	32.6	34.2	36.2	47.3	41.8	29.6	30.8
<b>WSP8</b>	23.0	19.2	27.7	40.0	29.0	21.4	22.3
<b>WSP9</b>	22.1	23.5	27.9	34.1	25.3	20.5	21.3
<b>WSP10</b>	23.6	26.1	No data	37.2	No Data	22.3	23.2
<b>WSP11</b>	25.5	26.1	27.6	33.8	25.3	21.3	22.2
<b>WSP12</b>	34.1	38.9	45.2	47.3	38.7	31.5	32.8
<b>WSP13</b>	30.0	33.1	33.8	43.6	37.2	27.4	28.5
<b>WSP14</b>	32.1	29.9	31.6	34.9	31.7	24.7	25.7

Site ID	P1 ( $\mu\text{g}/\text{m}^3$ )	P2 ( $\mu\text{g}/\text{m}^3$ )	P3 ( $\mu\text{g}/\text{m}^3$ )	P4 ( $\mu\text{g}/\text{m}^3$ )	P5 ( $\mu\text{g}/\text{m}^3$ )	Bias Adjusted* Period Average Concentration ( $\mu\text{g}/\text{m}^3$ )	2017 Annualised** Concentration ( $\mu\text{g}/\text{m}^3$ )
<b>WSP15</b>	27.4	30.0	35.4	43.3	37.6	26.8	27.9
<b>WSP16</b>	28.3	No Data	32.0	42.3	28.0	25.1	26.2
<b>WSP17</b>	26.3	25.5	24.7	32.5	29.2	21.3	22.2
<b>WSP18</b>	23.6	23.8	No Data	35.9	32.3	22.3	23.2
<b>WSP19</b>	15.9	14.7	17.7	22.6	19.6	13.9	14.5
<b>WSP20</b>	35.2	32.8	35.4	36.0	No data	21.5	22.4
<b>WSP21</b>	30.7	28.7	No Data	No data	32.5	17.7	18.4
<b>WSP22</b>	19.1	18.3	23.2	28.3	27.7	17.9	18.7
<b>WSP23</b>	25.4	27.4	28.3	36.3	29.6	22.7	23.6
<b>WSP24</b>	27.3	27.0	29.9	32.1	33.7	23.1	24.1
<b>WSP25</b>	29.6	23.4	30.0	36.7	33.1	23.5	24.5
<b>WSP26</b>	20.3	24.7	22.5	30.0	No Data	18.8	19.6
<b>WSP27</b>	18.6	25.0	30.0	38.2	No Data	21.5	22.4
<b>WSP28</b>	34.0	34.1	34.0	43.3	38.0	28.2	29.4
<b>WSP29</b>	23.4	No Data	26.8	32.4	26.3	21.0	21.8



Site ID	P1 ( $\mu\text{g}/\text{m}^3$ )	P2 ( $\mu\text{g}/\text{m}^3$ )	P3 ( $\mu\text{g}/\text{m}^3$ )	P4 ( $\mu\text{g}/\text{m}^3$ )	P5 ( $\mu\text{g}/\text{m}^3$ )	Bias Adjusted* Period Average Concentration ( $\mu\text{g}/\text{m}^3$ )	2017 Annualised** Concentration ( $\mu\text{g}/\text{m}^3$ )
<b>WSP30</b>	24.5	26.2	27.4	30.9	25.9	20.8	21.6
<b>WSP31</b>	23.0	20.3	21.3	29.0	22.8	17.9	18.7
<b>WSP32</b>	32.9	35.9	33.7	47.5	36.1	28.6	29.8
<b>WSP33</b>	16.7	18.6	19.0	24.4	22.2	15.5	16.2
<b>WSP34</b>	0.0	23.2	25.8	34.9	29.1	17.4	18.1
<b>WSP35</b>	20.5	21.1	23.7	28.5	28.1	18.8	19.6
<b>WSP36</b>	16.4	19.3	20.9	0.0	19.1	11.7	12.1
<b>WSP37</b>	19.5	19.6	20.9	25.8	27.9	17.5	18.2
<b>WSP38</b>	27.8	26.0	31.6	33.7	16.0	20.8	21.7
<b>WSP39</b>	16.3	15.0	15.0	20.3	0.0	10.3	10.7
<b>WSP40</b>	16.2	15.3	18.4	23.9	21.9	14.8	15.4

\*Bias Adjustment Factor 0.77.

\*\* Annualisation Factor 1.04.