

Great Yarmouth Third River Crossing

Application for Development Consent Order

Document 6.2: Environmental Statement Volume II: Technical Appendix 6D: Compliance Risk Assessment

Planning Act 2008

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

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1 Compliance Risk Assessment

1.1 DEFRA Pollution Climate Mapping

- 1.1.1 The Scheme Study Area for the traffic related air quality assessment incorporates road links included in Defra's Pollution Climate Mapping (PCM) model, which is a national-scale model designed to fulfil part of the UK's EU Directive (2008/50/EC) requirements to report on the concentrations of particular pollutants in the atmosphere, including annual mean NO₂.
- 1.1.2 The EU Directive on ambient air quality (2008/50/EC) sets out a range of mandatory Limit Values (LVs) for different pollutants including nitrogen dioxide (NO₂) and particulate matter less than 10 microns in aerodynamic diameter (PM₁₀).

Table 1.1 Limit Values for NO₂ and PM₁₀

Pollutant	Air Quality Limit Value	Measured As
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a calendar year	1-hour mean
	40 µg/m ³	Annual mean
Particles (PM ₁₀) (gravimetric)	50 µg/m ³ not to be exceeded more than 35 times a calendar year	Daily mean
	40 µg/m ³	Annual mean

- 1.1.3 Defra assesses and reports the status of UK air quality on an annual basis to the European Commission. For the assessment, the UK is split up into 43 zones. Of the 43 zones, only six zones were compliant with the NO₂ annual mean LV in 2017 (Ref 6.12).
- 1.1.4 To assess the status of UK air quality, Defra run a Pollution Climate Mapping (PCM) model for each pollutant within the EU Air Quality Directive for the base year and future projections. The PCM provides outputs at 1 x 1 km grid of the UK for background concentrations and at approximately 9,000 roadside locations.
- 1.1.5 Following a High Court ruling in November 2016 on Defra's national air quality plan – targeted at reducing concentrations of NO₂ within towns and cities – the proceedings concluded that the PCM model produced by Defra was over optimistic, requiring a revision to both the model and the timetable for achieving compliance with the EU annual mean limit value for NO₂. The latest updated PCM projections for concentrations of NO₂ and NO_x across

the UK in the years 2017 – 2030 were published by Defra in September 2017 (Ref 6.13).

1.2 The Compliance Risk Assessment

1.2.1 The compliance risk assessment has been completed in accordance with Interim Advice Note (IAN) 175/13 (Ref 6.6) as an update to DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA207/07). The IAN is used to undertake and report the risk of a scheme being non-compliant with the EU Air Quality Directive (2008/50/EC). A new version of IAN 175/13 is pending from Highways England, in the absence of updated guidance the original 2013 guidance has been applied.

1.2.2 The compliance risk assessment looks at the maximum measured concentration along a section of road as well as the maximum change in concentration as a result of the Scheme, and compares these values with the PCM model.

Data Requirements

1.2.3 To complete the assessment the following data was required:

- Defra's modelled road network from their EU Directive submission, including PCM modelled links and concentrations for the latest reported year and reference years;
- Defra's zone maps; and
- Outputs from the Local Air Quality Assessment for the Scheme.

Identifying the Compliance Risk Road Network

1.2.4 The road network used was defined by overlaying the affected road network as defined by DMRB HA207/07, as explained in Section 6.4 with the road network from the PCM model. Where the two road networks intersect throughout the Study Area, this subset of links becomes the Study Area for the Compliance Risk Road Network (CRRN). If no links intersect, then the assessment can be screened out.

1.2.5 The roads that comprise the CRRN were overlaid on a map of the 43 UK zones as defined by Defra. The zone reference and current status (compliant or non-compliant) of the zone were established for each link.

Calculating the Opening Year Total No₂ Concentrations from DEFRA's PCM Model

1.2.6 Defra provides an update of the UK's air quality status on an annual basis. Defra also provides projections for a number of reference years. The total predicted NO₂ concentration is available for each PCM road link.

1.2.7 Where the Scheme opening year coincides with a reference year, then the NO₂ concentration from the PCM model can be used directly. Where the Scheme opening year falls outside a reference year, then the equivalent opening year concentrations need to be calculated, for this Scheme the reference years provided by Defra have been used, calculation of an equivalent opening year was not required.

Calculating the Equivalent Scheme NO₂ Concentration Consistent with the PCM Model

1.2.8 As the CRRN intersects the DMRB affected road network, sensitive receptors within 200m of each link have been identified in the Local Air Quality Assessment. Modelled results will therefore be available which show the impact of the Scheme, i.e. the changes in annual mean NO₂ concentrations at each receptor between the Do-Minimum and the Do-Something scenarios in the opening year.

1.2.9 Receptors with the largest change in annual mean NO₂ concentration as a result of the Scheme (both positive and negative) located within 200m of each of the road links in the CRRN were selected. The equivalent Scheme NO₂ was then calculated by taking the equivalent PCM opening year concentration (as calculated above) and adding the largest change in modelled concentrations.

1.2.10 Steps 1-3 below outline the approach followed for each CRRN link identified to calculate the equivalent Scheme NO₂ concentration;

- **Step One:** Calculate the equivalent Scheme PCM NO₂ concentration for each of the links in the CRRN.
- **Step Two:** For those road links where the equivalent opening year PCM or the equivalent Scheme PCM modelled total NO₂ concentrations are greater than the LV (40 µg/m³), then for each road link record the change in concentrations.
- For those road links where NO₂ concentrations are less than 40 µg/m³, but the outcomes of the local air quality assessment predict increases in NO₂ concentrations, also record these road links where there is a risk of creating a new exceedance of the LV. For example, where the air

quality assessment indicates a change of $+3\mu\text{g}/\text{m}^3$, but the PCM model concentration is $25\mu\text{g}/\text{m}^3$ then this link does not need to be included.

- **Step Three:** If the change in NO_2 concentrations is less than $0.4\mu\text{g}/\text{m}^3$, then those roads can be scoped out of the compliance risk assessment, as the changes are considered to be imperceptible.

Determining the Scheme's Compliance Risk Rating

1.2.11 To determine whether the Scheme is at risk of causing non-compliance, for each road within the CRRN, it was determined whether the change in NO_2 concentrations would result in:

- A compliant zone becoming non-compliant; and / or
- Delay Defra's date for achieving compliance for that zone; and / or
- An increase in the length of roads in exceedance in the zone which would be greater than 1% when compared with the previous total length; and / or
- An overall increase, decrease or no change in NO_2 concentrations Compliance Risk Assessment Output.

Compliance Risk Road Network

1.2.12 There is a total of 41 PCM road links that intersect the DMRB local air quality affected road network. They comprise sections of five major and trunk A-Roads as detailed in Table 1.2.

1.2.13 Base 2017 data obtained from Defra's PCM model indicated that none of the 41 PCM links are currently non-compliant with the European Commissions' Limit Value for annual mean NO_2 . The highest recorded concentration of $33.4\mu\text{g}/\text{m}^3$ is recorded for PCM link 38421, incorporating the existing crossing over the River Yare at the Breydon Bridge to the North of the Scheme. Details of all Base 2017 concentrations can be found in Table 1.2.

1.2.14 A map showing the CRRN transposed on top of the DMRB local affected road network is presented in Figure 6.20.

Table 1.2 Detail of PCM Links within the Identified Compliance Risk Road Network

Road Name	Defra Census ID	Zone Name	Zone ID	Base 2017 Road NO_2 ($\mu\text{g}/\text{m}^3$)*
A143	16669	Eastern	UK0029	15.5
A143	16669	Eastern	UK0029	15.5
A143	16669	Eastern	UK0029	15.5
A143	16669	Eastern	UK0029	15.5

Road Name	Defra Census ID	Zone Name	Zone ID	Base 2017 Road NO2 ($\mu\text{g}/\text{m}^3$)*
A143	16669	Eastern	UK0029	15.5
A143	16669	Eastern	UK0029	15.5
A143	16669	Eastern	UK0029	15.5
A143	16669	Eastern	UK0029	15.5
A143	16669	Eastern	UK0029	15.5
A143	16669	Eastern	UK0029	15.5
A143	16669	Eastern	UK0029	15.5
A143	16669	Eastern	UK0029	15.5
A12	29011	Eastern	UK0029	31.8
A12	29011	Eastern	UK0029	31.8
A12	29011	Eastern	UK0029	31.8
A12	29011	Eastern	UK0029	31.8
A12	29011	Eastern	UK0029	31.8
A12	29011	Eastern	UK0029	31.8
A12	38421	Eastern	UK0029	33.4
A12	38421	Eastern	UK0029	33.4
A12	38421	Eastern	UK0029	33.4
A12	38421	Eastern	UK0029	33.4
A149	48266	Eastern	UK0029	26.6
A149	48266	Eastern	UK0029	26.6
A149	48266	Eastern	UK0029	26.6
A149	48266	Eastern	UK0029	26.6
A149	48266	Eastern	UK0029	26.6
A149	48266	Eastern	UK0029	26.6
A149	48266	Eastern	UK0029	26.6
A1243	57026	Eastern	UK0029	19.3
A1243	57026	Eastern	UK0029	19.3
A1243	57026	Eastern	UK0029	19.3
A1243	57026	Eastern	UK0029	19.3
A1243	57026	Eastern	UK0029	19.3

Road Name	Defra Census ID	Zone Name	Zone ID	Base 2017 Road NO ₂ (µg/m ³)*
A1243	57026	Eastern	UK0029	19.3
A143	77159	Eastern	UK0029	18.7
A143	77159	Eastern	UK0029	18.7
A143	77159	Eastern	UK0029	18.7
A143	77159	Eastern	UK0029	18.7
A143	77159	Eastern	UK0029	18.7
A143	77159	Eastern	UK0029	18.7

*Values rounded to 1 d.p.

Equivalent Scheme NO₂ Concentrations

- 1.2.15** Equivalent opening year (2023) NO₂ concentrations for each PCM link within the CRRN and are detailed in Table 1.3. The concentrations show that all links are compliant with the European Commission's LV for annual mean NO₂, with a highest predicted concentration of 25.5 µg/m³.
- 1.2.16** Sensitive receptors within 200m of each CRRN link were identified and in each instance the worst-case receptor was selected. The change in NO₂ concentrations at the worst-case receptor has been added to the relative PCM Equivalent Opening Year concentration in order to calculate the PCM Equivalent Scheme concentration. Details of the calculations can be found in Table 1.3.
- 1.2.17** Of the 41 PCM links identified which intersect the local model, 30 have a sensitive receptor within the local air quality model upon which the compliance assessment can be made. None of the 30 PCM Equivalent Scheme NO₂ concentrations are in exceedance of the annual mean LV. Furthermore, the largest predicted increase in annual mean NO₂ concentrations as a result of the Scheme coming into operation is 1.1 µg/m³. Even when applying this concentration to each Equivalent Opening Year concentration, no link in the CRRN will become non-compliant as a result of the Scheme coming into operation.
- 1.2.18** As such, the Scheme is considered to be at Low Risk of causing noncompliance.
- 1.2.19** A summary of the compliance risk assessment outputs is provided in Table 1.4.

Table 1.3 Compliance Risk Assessment Equivalent Opening Year and Equivalent Scheme PCM Concentrations

Inputs				Defra PCM Model and Compliance Information					Receptor Result				
Scheme	Defra's PCM Data			Total NO ₂ (µg/m ³)			Compliance Info	Annual Mean NO ₂ Concentration (µg/m ³)					
				Proceedin g Year	Following Year	Opening Year							
Road Name	Defra Link Census ID	Zone Ref No.	Is it a Compliant Zone?	NO ₂ (2022)	NO ₂ (2023)	NO ₂ (2023)	Max Zone NO ₂ Concentrations	Projected Compliance Year	Receptor ID	DM	DS	Change (DS- DM)	Equivalent Scheme PCM
A143	16669	UK0029	Yes	13.2	12.7	12.7	57.4	2023	25161	17.2	18.3	1.1	<40
A143	16669	UK0029	Yes	13.2	12.7	12.7	57.4	2023	41131	16.8	17.7	0.9	<40
A143	16669	UK0029	Yes	13.2	12.7	12.7	57.4	2023	11119	15.7	16.5	0.8	<40
A143	16669	UK0029	Yes	13.2	12.7	12.7	57.4	2023	10578	18.1	19.1	1.0	<40
A143	16669	UK0029	Yes	13.2	12.7	12.7	57.4	2023	1783	24.4	25	0.6	<40
A143	16669	UK0029	Yes	13.2	12.7	12.7	57.4	2023	34298	18.4	19	0.6	<40
A143	16669	UK0029	Yes	13.2	12.7	12.7	57.4	2023	35893	16.6	17.1	0.5	<40
A143	16669	UK0029	Yes	13.2	12.7	12.7	57.4	2023	23925	14.2	14.5	0.3	<40
A143	16669	UK0029	Yes	13.2	12.7	12.7	57.4	2023	2104	13.4	13.8	0.4	<40
A143	16669	UK0029	Yes	13.2	12.7	12.7	57.4	2023	718	12.4	12.6	0.2	<40
A143	16669	UK0029	Yes	13.2	12.7	12.7	57.4	2023	20265	12.9	13.3	0.4	<40

Inputs				Defra PCM Model and Compliance Information					Receptor Result				
Scheme	Defra's PCM Data			Total NO ₂ (µg/m ³)			Compliance Info		Annual Mean NO ₂ Concentration (µg/m ³)				
				Precedin g Year	Following Year	Opening Year							
Road Name	Defra Link Census ID	Zone Ref No.	Is it a Compliant Zone?	NO ₂ (2022)	NO ₂ (2023)	NO ₂ (2023)	Max Zone NO ₂ Concentrations	Projected Compliance Year	Receptor ID	DM	DS	Change (DS- DM)	Equivalent Scheme PCM
A143	16669	UK0029	Yes	13.2	12.7	12.7	57.4	2023	18917	13.3	13.7	0.4	<40
A12	29011	UK0029	Yes	25.6	24.5	24.5	57.4	2023	33734	15.5	14.6	-0.9	<40
A12	29011	UK0029	Yes	25.6	24.5	24.5	57.4	2023	40648	21.8	22.2	0.4	<40
A12	29011	UK0029	Yes	25.6	24.5	24.5	57.4	2023	31124	21.4	21.7	0.3	<40
A12	29011	UK0029	Yes	25.6	24.5	24.5	57.4	2023	34298	18.4	19	0.6	<40
A12	29011	UK0029	Yes	25.6	24.5	24.5	57.4	2023	34298	18.4	19	0.6	<40
A12	29011	UK0029	Yes	25.6	24.5	24.5	57.4	2023	34298	18.4	19	0.6	<40
A12	38421	UK0029	Yes	25.6	25.5	25.5	57.4	2023	372	13.7	13.4	-0.3	<40
A12	38421	UK0029	Yes	25.6	25.5	25.5	57.4	2023	33711	18.6	17.8	-0.8	<40
A12	38421	UK0029	Yes	25.6	25.5	25.5	57.4	2023	27205	12.3	12	-0.3	<40
A149	48266	UK0029	Yes	22.1	21.1	21.1	57.4	2023	4210	18.8	17.5	-1.3	<40
A149	48266	UK0029	Yes	22.1	21.1	21.1	57.4	2023	20023	21	20.6	-0.4	<40

Inputs				Defra PCM Model and Compliance Information					Receptor Result				
Scheme	Defra's PCM Data			Total NO ₂ (µg/m ³)			Compliance Info		Annual Mean NO ₂ Concentration (µg/m ³)				
				Preceding Year	Following Year	Opening Year							
Road Name	Defra Link Census ID	Zone Ref No.	Is it a Compliant Zone?	NO ₂ (2022)	NO ₂ (2023)	NO ₂ (2023)	Max Zone NO ₂ Concentrations	Projected Compliance Year	Receptor ID	DM	DS	Change (DS-DM)	Equivalent Scheme PCM
A149	48266	UK0029	Yes	22.1	21.1	21.1	57.4	2023	20023	21	20.6	-0.4	<40
A149	48266	UK0029	Yes	22.1	21.1	21.1	57.4	2023	20657	21.2	19.5	-1.7	<40
A1243	57026	UK0029	Yes	15.9	15.2	15.2	57.4	2023	32519	13.5	12.5	-1.0	<40
A1243	57026	UK0029	Yes	15.9	15.2	15.2	57.4	2023	27370	16.9	15.4	-1.5	<40
A143	77159	UK0029	Yes	14.6	13.9	13.9	57.4	2023	19953	12.9	13.2	0.3	<40
A143	77159	UK0029	Yes	14.6	13.9	13.9	57.4	2023	31372	15.5	15.9	0.4	<40
A143	77159	UK0029	Yes	14.6	13.9	13.9	57.4	2023	8752	15.2	15.5	0.3	<40

Table 1.4 Compliance Risk Assessment Outcome

Inputs			Compliance Descriptors					Outcome	
Scheme	Defra PCM Data		Is it a Compliant Zone?	Change >1% of LV (0.4 µg/m ³)	Will Compliant Zone Become Non-compliant?	Delay Defra Compliance?	Change in Road Length that Currently Exceeds LV?	Does the Scheme Worsen Air Quality Overall?	Compliance Risk Rating (Low/Neutral/High)
Road Name	Defra Link Census ID	Zone Ref No.							
A143	16669	UK0029	Yes	No	No	No	No	Yes	Low
A143	16669	UK0029	Yes	No	No	No	No	Yes	Low
A143	16669	UK0029	Yes	No	No	No	No	Yes	Low
A143	16669	UK0029	Yes	No	No	No	No	Yes	Low
A143	16669	UK0029	Yes	No	No	No	No	Yes	Low
A143	16669	UK0029	Yes	No	No	No	No	Yes	Low
A143	16669	UK0029	Yes	No	No	No	No	Yes	Low
A143	16669	UK0029	Yes	No	No	No	No	Yes	Low
A143	16669	UK0029	Yes	No	No	No	No	Yes	Low
A143	16669	UK0029	Yes	No	No	No	No	Yes	Low
A143	16669	UK0029	Yes	No	No	No	No	Yes	Low
A143	16669	UK0029	Yes	No	No	No	No	Yes	Low

Inputs		Compliance Descriptors					Outcome		
Scheme	Defra PCM Data								
Road Name	Defra Link Census ID	Zone Ref No.	Is it a Compliant Zone?	Change >1% of LV (0.4 µg/m ³)	Will Compliant Zone Become Non-compliant?	Delay Defra Compliance?	Change in Road Length that Currently Exceeds LV?	Does the Scheme Worsen Air Quality Overall?	Compliance Risk Rating (Low/Neutral/High)
A12	29011	UK0029	Yes	No	No	No	No	No	Low
A12	29011	UK0029	Yes	No	No	No	No	Yes	Low
A12	29011	UK0029	Yes	No	No	No	No	Yes	Low
A12	29011	UK0029	Yes	No	No	No	No	Yes	Low
A12	29011	UK0029	Yes	No	No	No	No	Yes	Low
A12	29011	UK0029	Yes	No	No	No	No	Yes	Low
A12	38421	UK0029	Yes	No	No	No	No	No	Low
A12	38421	UK0029	Yes	No	No	No	No	No	Low
A12	38421	UK0029	Yes	No	No	No	No	No	Low
A149	48266	UK0029	Yes	No	No	No	No	No	Low
A149	48266	UK0029	Yes	No	No	No	No	No	Low
A149	48266	UK0029	Yes	No	No	No	No	No	Low
A149	48266	UK0029	Yes	No	No	No	No	No	Low

Inputs			Compliance Descriptors					Outcome	
Scheme	Defra PCM Data		Is it a Compliant Zone?	Change >1% of LV (0.4 µg/m ³)	Will Compliant Zone Become Non-compliant?	Delay Defra Compliance?	Change in Road Length that Currently Exceeds LV?	Does the Scheme Worsen Air Quality Overall?	Compliance Risk Rating (Low/Neutral/High)
Road Name	Defra Link Census ID	Zone Ref No.							
A1243	57026	UK0029	Yes	No	No	No	No	No	Low
A1243	57026	UK0029	Yes	No	No	No	No	No	Low
A143	77159	UK0029	Yes	No	No	No	No	Yes	Low
A143	77159	UK0029	Yes	No	No	No	No	Yes	Low
A143	77159	UK0029	Yes	No	No	No	No	Yes	Low