

The Lake Lothing (Lowestoft) Third Crossing Order 201[*]



Lake Lothing
**THIRD
CROSSING**

**Document 6.3: Environmental Statement
Volume 3 Appendices**

Appendix 8C

Compliance Risk Assessment

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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 0-1 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 6 zones were compliant with the NO₂ annual mean LV in 2017¹.

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 2017².

¹ Defra (2017) UK Plan for tackling roadside nitrogen dioxide concentrations Technical Report July 2017.

² Defra (2017) 2017 NO₂ projections data (2015 reference year), <https://uk-air.defra.gov.uk/library/no2ten/2017-no2-projections-from-2015-data> as accessed on 08/01/17.

1.2 The Compliance Risk Assessment

1.2.1 The compliance risk assessment has been completed in accordance with Interim Advice Note (IAN) 175/13³ 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 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 local affected links as defined by DMRB HA207/07 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 outcome of the assessment was used in conjunction with IAN 174/13 'Assessment of Significant Air Quality Effects'⁴ to inform the judgement of significant effects as a result of the Scheme coming into operation.

1.2.6 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

1.2.7 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.

1.2.8 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.

³ Highways England (2013) Interim Advice Note 175/13, <http://www.standardsforhighways.co.uk/ha/standards/ians/> as accessed on 08/01/17.

⁴ Highways England (2013) Interim Advice Note 174/13, <http://www.standardsforhighways.co.uk/ha/standards/ians/> as accessed 08/01/18.

Calculating the equivalent Scheme NO₂ Concentration consistent with the PCM Model

- 1.2.9 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.
- 1.2.10 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.
- 1.2.11 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 +3µg/m³, but the PCM model concentration is 25µg/m³ then this link does not need to be included.
 - **Step Three:** If the change in NO₂ concentrations is less than 0.4µg/m³, 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

- 1.2.12 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 NO₂ 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 NO₂ concentrations Compliance Risk Assessment Output.

Compliance Risk Road Network

- 1.2.13 There are a total of 18 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 0-2.
- 1.2.14 Base 2016 data obtained from Defra's PCM model indicated that none of the 18 PCM links are currently non-compliant with the European Commissions' Limit Value for annual mean

NO₂. The highest recorded concentration of 32.3 µg/m³ is recorded for PCM link 37595, incorporating the existing crossing over Lake Lothing to the West of the Scheme. Details of all Base 2016 concentrations can be found in Table 0-2.

1.2.15 A map showing the CRRN transposed on top of the DMRB local affected links is presented in Figure 8.19.

Table 0-2 Details of PCM Links within the Identified Compliance Risk Road Network

Road Name	Defra Census ID	Zone Name	Zone ID	Base 2016 Road NO ₂ (µg/m ³) [*]
A1117	86018	Eastern	UK0029	12.4
A1117	6689	Eastern	UK0029	27.3
A1117	37595	Eastern	UK0029	32.3
A1117	47557	Eastern	UK0029	20.6
A1117	27558	Eastern	UK0029	25.5
A1144	27570	Eastern	UK0029	19.6
A1145	81168	Eastern	UK0029	20.2
A12	77170	Eastern	UK0029	21.7
A12	16189	Eastern	UK0029	22.6
A12	57892	Eastern	UK0029	23.0
A12	47844	Eastern	UK0029	26.3
A12	83043	Eastern	UK0029	21.4
A12	28560	Eastern	UK0029	26.7
A12	81156	Eastern	UK0029	25.5
A12	77171	Eastern	UK0029	20.0
A143	77159	Eastern	UK0029	19.4
A146	36726	Eastern	UK0029	20.0
<i>*values rounded to 1d.p</i>				

Equivalent Scheme NO₂ Concentrations

1.2.16 Equivalent opening year (2022) NO₂ concentrations for each PCM link within the CRRN and are detailed in Table 0-3. The concentrations show that all links are compliant with the European Commissions' LV for annual mean NO₂, with a highest predicted concentration of 24.9 µg/m³.

1.2.17 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 0-3.

- 1.2.18 None of the 18 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 0.5 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.
- 1.2.19 As such, the Scheme is considered to be at Low Risk of causing noncompliance.
- 1.2.20 A summary of the compliance risk assessment outputs is provided in Table 0-4.

Table 0-3 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)				
				Proceeding Year	Following Year	Opening Year							
Road Name	Defra Link Census ID	Zone Ref No.	Is it a Compliance Zone?	NO ₂ (2021)	NO ₂ (2023)	NO ₂ (2022)	Max Zone NO ₂ Concentrations	Projected Compliance Year	Receptor ID	DM	DS	Change (DS-DM)	Equivalent Scheme PCM
A1117	86018	UK0029	No	10.2	9.4	9.8	40	2022	34994	12.1	12.3	0.2	<40
A1117	86017	UK0029	No	14.5	13.2	13.8	40	2022	14179	12.1	12.6	0.5	<40
A1117	6689	UK0029	No	22.3	20.2	21.1	40	2022	19690	20.4	18.7	-1.7	<40
A1117	37595	UK0029	No	26.3	23.7	24.9	40	2022	4883	11.2	10.9	-0.3	<40
A1117	47557	UK0029	No	16.4	14.7	15.5	40	2022	1428	23.3	19.3	-4.0	<40
A1117	27558	UK0029	No	20.5	18.5	19.4	40	2022	23215	16.2	16.6	0.4	<40
A1144	27570	UK0029	No	16.3	14.8	15.5	40	2022	32031	18.7	18.4	-0.3	<40
A1145	81168	UK0029	No	15.8	14.2	14.9	40	2022	14999	13.5	13.6	0.1	<40
A12	77170	UK0029	No	17.2	15.4	16.2	40	2022	34669	11.1	11.1	0.0	<40
A12	16189	UK0029	No	18.1	16.3	17.1	40	2022	37993	14.6	14.2	-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)				
				Proceeding Year	Following Year	Opening Year							
Road Name	Defra Link Census ID	Zone Ref No.	Is it a Compliant Zone?	NO ₂ (2021)	NO ₂ (2023)	NO ₂ (2022)	Max Zone NO ₂ Concentrations	Projected Compliance Year	Receptor ID	DM	DS	Change (DS-DM)	Equivalent Scheme PCM
A12	57892	UK0029	No	19	17.2	18.0	40	2022	7156	19.6	18.3	-1.3	<40
A12	47844	UK0029	No	21.6	19.7	20.6	40	2022	37809	21.5	20.2	-1.3	<40
A12	83043	UK0029	No	17.2	15.5	16.3	40	2022	32050	16.6	14.9	-1.7	<40
A12	28560	UK0029	No	21.7	19.6	20.5	40	2022	31047	16.6	14.6	-2.0	<40
A12	81156	UK0029	No	20.5	18.5	19.4	40	2022	22113	18.4	17.6	-0.8	<40
A12	77171	UK0029	No	15.2	13.6	14.3	40	2022	857	10.7	10.8	0.1	<40
A143	77159	UK0029	No	15.4	13.9	14.6	40	2022	38292	12.4	12.4	0.0	<40
A146	36726	UK0029	No	16.3	14.8	15.5	40	2022	9916	10.5	10.6	0.1	<40

Table 0-4 Compliance Risk Assessment Outcome

Inputs				Compliance Descriptors					Outcome
Scheme	Defra PCM Data			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.	Is it a Compliant Zone?						
A1117	86018	UK0029	No	N/A	No	No	No	Yes	Low
A1117	86017	UK0029	No	N/A	No	No	No	Yes	Low
A1117	6689	UK0029	No	N/A	No	No	No	No	Low
A1117	37595	UK0029	No	N/A	No	No	No	No	Low
A1117	47557	UK0029	No	N/A	No	No	No	Yes	Low
A1117	27558	UK0029	No	N/A	No	No	No	No	Low
A1144	27570	UK0029	No	N/A	No	No	No	No	Low
A1145	81168	UK0029	No	N/A	No	No	No	No	Low
A12	77170	UK0029	No	N/A	No	No	No	No	Low
A12	16189	UK0029	No	N/A	No	No	No	No	Low
A12	57892	UK0029	No	N/A	No	No	No	No	Low
A12	47844	UK0029	No	N/A	No	No	No	No	Low
A12	83043	UK0029	No	N/A	No	No	No	No	Low
A12	28560	UK0029	No	N/A	No	No	No	No	Low
A12	81156	UK0029	No	N/A	No	No	No	No	Low

Inputs				Compliance Descriptors					Outcome
Scheme	Defra PCM Data			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.	Is it a Compliant Zone?						
A12	77171	UK0029	No	N/A	No	No	No	No	Low
A143	77159	UK0029	No	N/A	No	No	No	No	Low
A146	36726	UK0029	No	N/A	No	No	No	No	Low

