Environmental Statement – Chapter 7: Air Quality
Appendix 7.3: Vehicular Pollutant Assessment Sensitivity

Further Assessment – Modelling Sensitivities

In order to provide further assessment and sensitivities on the assessment inputs, an additional scenario has been considered based as described above which considers:

- 2015 background concentrations from the DEFRA mapping study (as presented within **Error! Reference source not found.**); and
- NOx emission factors obtained from EFT v8.0.1 for 2017.

The results of this sensitivity modelling are presented in the following subsections.

Nitrogen Dioxide Annual Mean Modelling Results: 2015 Assessment Sensitivity

Predicted annual mean ground level NO_2 concentrations were assessed against the AQO of 40µg/m^3, as displayed in Table Error*! No text of specified style in document.***.1**. Exceedences of the AQO are highlighted in bold.

For completeness, predicted annual mean concentrations are additionally presented at NO_2 air quality monitoring locations within the development locale and the dispersion modelling domain (i.e. monitoring locations WH7, WH19, WH22, WH25 and WH26).

Table Error! No text of specified style in document.**.1: Summary of Predicted Annual Mean NO_2 Concentrations: Road Vehicle Emissions: 2015 Assessment Sensitivity**

Receptor	2028 (µg/m^3) [A]		Change (µg/m^3)	Change as a Percentage of the AQO (%)	Impact
	'Do-minimum'	'Do-something'			
R1 [A]	22.4	22.5	+0.11	0.27	Negligible
R2 [B]	24.0	24.2	+0.15	0.38	Negligible
R3 [B]	22.8	23.0	+0.17	0.42	Negligible
R4 [B]	27.2	27.5	+0.24	0.60	Negligible
R5 [C]	36.4	37.2	+0.80	2.00	Slight
R6 [A]	16.8	16.9	+0.04	0.10	-
R7 [D]	20.0	20.4	+0.37	0.93	Negligible
R8 [E]	13.7	13.8	+0.05	0.12	Negligible
R9 [C]	30.3	30.6	+0.30	0.75	Negligible
R10 [F]	30.3	30.7	+0.35	0.88	Negligible
R11 [F]	28.8	29.1	+0.29	0.72	Negligible
R12 [F]	27.8	28.1	+0.26	0.65	Negligible
R13 [C]	31.2	31.3	+0.13	0.32	Negligible
R14 [G]	29.8	29.9	+0.11	0.28	Negligible
R15 [H]	21.6	22.1	+0.52	1.30	Negligible
R16 [G]	24.2	24.5	+0.31	0.77	Negligible
R17 [G]	27.9	28.4	+0.47	1.18	Negligible
R18 [G]	28.3	28.8	+0.47	1.18	Negligible
R19 [I]	**42.6**	**42.8**	+0.25	0.63	Moderate
R20 [I]	**47.4**	**47.8**	+0.40	1.00	Substantial

Receptor	2028 (µg/m³) (A)		Change (µg/m³)	Change as a Percentage of the AQO (%)	Impact
	'Do-minimum'	'Do-something'			
R21 (I)	**42.5**	**43.0**	+0.44	1.10	Moderate
R22 (I)	33.6	34.0	+0.39	0.98	Negligible
R23 (I)	32.3	32.7	+0.35	0.88	Negligible
R24 (C)	29.7	30.0	+0.32	0.80	Negligible
R25 (C)	29.5	29.8	+0.34	0.85	Negligible
R26 (C)	30.3	31.8	+1.46	3.65	Slight
R27 (C)	30.7	33.2	+2.53	6.33	Moderate
R28 (C)	28.7	31.0	+2.33	5.83	Moderate
R29 (B)	18.6	20.4	+1.78	4.45	Negligible
R30 (B)	18.3	20.0	+1.72	4.30	Negligible
R31 (C)	26.8	28.1	+1.27	3.18	Negligible
R32 (B)	18.0	19.3	+1.27	3.18	Negligible
R34 (G)	20.5	20.6	0.12	0.30	Negligible
WH19 (I)	**47.4**	**47.5**	+0.10	0.25	-
WH22 (G)	**44.1**	**45.2**	+1.03	2.57	-
WH25 (I)	**58.0**	**58.2**	+0.22	0.55	-
WH26 (I)	**45.2**	**46.0**	+0.83	2.08	-
WH7 (C)	**49.5**	**49.7**	+0.19	0.47	-

Note:

(A) Scenario modelled as an assumed 2015 development opening year, with 2017 emission factors and 2015 mapped background pollutant concentrations.

(B) Annual mean concentrations inclusive of background concentration of 15.0µg/m³.

(C) Annual mean concentrations inclusive of background concentration of 14.3µg/m³.

(D) Annual mean concentrations inclusive of background concentration of 22.2µg/m³.

(E) Annual mean concentrations inclusive of background concentration of 11.7µg/m³.

(F) Annual mean concentrations inclusive of background concentration of 12.7µg/m³.

(G) Annual mean concentrations inclusive of background concentration of 20.3µg/m³.

(H) Annual mean concentrations inclusive of background concentration of 13.2µg/m³.

(I) Annual mean concentrations inclusive of background concentration of 20.2µg/m³.

- Receptor / Diffusion tube monitoring location is not relevant exposure to the annual mean AQO. Therefore, no impact descriptor presented.

As shown in Table Error*! No text of specified style in document.***.1**, there are no predicted exceedences of the annual mean AQO in both the 'do-minimum' and 'do-something' scenarios during the 2015 assessment sensitivity scenario.

The predicted percentage change of annual mean NO_2 concentrations ranges from between 5 – 10% of the AQO, 1 – 5% of the AQO to <1% of the AQO. An unmitigated substantial adverse impact is predicted at 1 receptor location (R20), a moderate adverse impact is predicted at 4 receptor locations (R19, R21, R27 and R28), a slight adverse impact is predicted at 2 receptor locations (R5 and R26) and a negligible impact is therefore predicted at all other receptor locations in accordance with the assessment methodology.

Nitrogen Dioxide 1-hour Mean Modelling Results: 2015 Assessment Sensitivity

The risk of exceeding the 1-hour mean AQO was assessed according to the guidance in LAQM.TG(16). This Guidance states that:

> "*authorities may assume that exceedences of the 1-hour mean objective for NO_2 are only likely to occur where annual mean concentrations are 60 µg/m^3 or above".*

The maximum annual mean NO_2 'do-something' concentration is 37.2µg/m^3 (predicted at R5). Whilst this location is not comparable to relevant exposure to the 1-hour mean NO_2 AQO, in accordance with DEFRA guidance the maximum predicted annual mean NO_2 concentration indicates that exceedences of the 1-hour mean NO_2 AQO are considered 'unlikely' at existing receptors as a result of proposed development trips.

Analysis of Assessment Sensitivities

Sensitivity modelling has been undertaken which utilises 2017 emission factors (EFT v8.0.1) and 2015 background concentrations (November 2017 DEFRA release, mapping base year) to reflect the 2028 development opening year. This scenario predicts a number of exceedances of the annual mean NO2. These exceedences are predicted to occur in both the 'do-minimum' and 'do-something' scenarios. Exceedences do not occur as a result of change in development trips.

The unmitigated impact is predicted to be 'substantial adverse' at 1 receptor location (R20), 'moderate adverse' at 4 receptor locations (R19, R21, R27 and R28), 'slight adverse' at 2 receptor locations and 'negligible' at all other receptor locations in accordance with the assessment methodology.

It is noted that this precautionary assessment assumes that road traffic emission factors and background concentrations in the 2028 development opening year will remain at the 2017 and 2015 base year level, respectively. Furthermore, the precautionary assessment assumes that road traffic flows predicted in the 2028 development opening year will occur in 2017.

DEFRA projections and the basis for future year road traffic emission factor reductions are based upon a number of assumptions, including the following:

- improvements in the fleet composition based on European emission factor standards from pre-Euro I/1 to Euro VI/6, resulting in lower exhaust emissions, particularly from September 2014 when all new vehicles are required to be Euro VI compliant;
- improvements in the quality of fuel and some degree of retrofitting, resulting in lower exhaust emissions; and
- improvements and conversions in the technology of National fleet vehicles, resulting in lower exhaust emissions.

It is considered that the 2017 modelling predictions presented within this sensitivity modelling are worst-case reflections to provide confidence in the modelling predictions, and do not reflect likely impacts from additional development trips in the development opening year. Actual impacts in the development opening year are likely to be lower than those predicted given the projected road traffic exhaust emission factor improvements, as indicated by the impact assessment scenario and modelled concentrations in the main body of the Air Quality Chapter.

DEFRA mapped background concentrations and their future year projections are based on a number of assumptions which include the following:

- all assumptions underlying the latest (2015) NOx emission projections for road transport, as detailed above;
- updated road transport forecasts for Great Britain from the DfT;
- updated assumptions on diesel car penetration rates provided by the DfT; and
- updated vehicle sales projections for cars and LGVs based on information provided by the DfT.

In relation to trends in air pollutant concentrations within WHC's area, including those of NO_2, a review of the WHC 2018 Air Quality Annual Status Report indicates a general downward trend in monitored annual mean NO_2 concentrations (particularly those of a 'background' classification) over the period 2012 to 2017.

On this basis, and given the witnessed reduction trend in annual mean NO_2 concentration within the WHC network, the precautionary approach of using 2015 mapped background concentrations to reflect the 2028 development opening year is considered likely to overestimate background concentrations in 2028. On this basis, compliance with the annual mean AQO is considered to be indicated by the impact assessment scenario and modelled concentrations in the main body of the Air Quality Chapter.