APPENDIX 5-1

RELEVANT AIR POLLUTANTS

APPENDIX 5.1 RELEVANT AIR POLLUTANTS

NITROGEN OXIDES (NO_X)

NOx comprise nitrogen monoxide (NO) and nitrogen dioxide (NO_2). It is a product of fuel combustion in air. High concentrations of NOX can damage vegetation. NO_X is also important in ozone formation and acid deposition.

NITROGEN DIOXIDE (NO_2)

NO_2 is a product of fuel combustion and oxidation of nitrogen monoxide in air. Concentrations in excess of ambient air quality standards can harm human health by affecting the respiratory system.

PARTICULATE MATTER OF 10 MICROMETRES (µm) IN DIAMETER OR LESS (PM_{10})

PM_{10} is generated by fuel combustion and from vehicle brake and tyre wear. Construction activities such as earth moving also generate PM_{10}. Concentrations in excess of ambient air quality standards can harm human health by affecting the respiratory and cardiovascular systems.

CARBON DIOXIDE

Carbon dioxide (CO_2) is a greenhouse gas and is used as an indicator of the wider scale, non-local effects of transport schemes. CO_2 doe s not affect human health at ambient levels and so is not significant as a local pollutant but is important for its national and international role in climate change.

APPENDIX 5-2

HUMAN RECEPTORS

APPENDIX 5.2 HUMAN RECEPTORS

RECEPTOR ID	ROAD NAME	X	Y	HEIGHT (M)	LOCAL AUTHORITY
1	Hailsham Road	557873	105372	1.5	Wealden
2	Ranscombe Hill	543279	108784	1.5	Lewes
3	Folkington Lane	556851	104773	1.5	Wealden
4	Dover Road	558947	104881	1.5	Wealden
5	Brookside Avenue	557762	105096	1.5	Wealden
6	The Village	550877	106049	1.5	Wealden
7	Lewes Road	549502	107452	1.5	Wealden
8	High Street	558167	105033	1.5	Wealden
9	High Street	558190	105039	1.5	Wealden
10	Station Road	558238	105044	1.5	Wealden
11	Albert Place	558159	105070	1.5	Wealden
12	Station Road	558203	105097	1.5	Wealden
13	Hailsham Road	558137	105133	1.5	Wealden
14	Hailsham Road	558088	105122	1.5	Wealden
15	Old School Close	558326	105040	1.5	Wealden
16	High Street	558179	104968	1.5	Wealden
17	Reynoldstown Lane	557817	104676	1.5	Wealden
18	Grand Parade	557767	104693	1.5	Wealden
19	Old Drive	557869	104696	1.5	Wealden
20	Lewes Road	557687	104713	1.5	Wealden
21	Old Drive	557837	104750	1.5	Wealden
22	Gosford Way	557790	104843	1.5	Wealden
23	Old Drive	557923	104669	1.5	Wealden
24	Wannock Road	557974	104483	1.5	Wealden
25	Eastbourne Road	558057	104490	1.5	Wealden
26	Eastbourne Road	558092	104512	1.5	Wealden
27	Eastbourne Road	558036	104519	1.5	Wealden
28	Bernhard Gardens	557957	104515	1.5	Wealden
29	Wannock Road	558011	104529	1.5	Wealden
30	Bernhard Gardens	557970	104543	1.5	Wealden
31	High Street	558056	104584	1.5	Wealden
32	Bernhard Gardens	557961	104576	1.5	Wealden
33	Bernhard Gardens	557939	104594	1.5	Wealden
34	High Street	558009	104605	1.5	Wealden
35	High Street	558055	104558	1.5	Wealden
36	Church Road	558077	104620	1.5	Wealden
37	Bay Tree Lane	557715	105721	1.5	Wealden
38	Sayerland Road	558154	105647	1.5	Wealden
39	Nightingale Close	557788	105420	1.5	Wealden

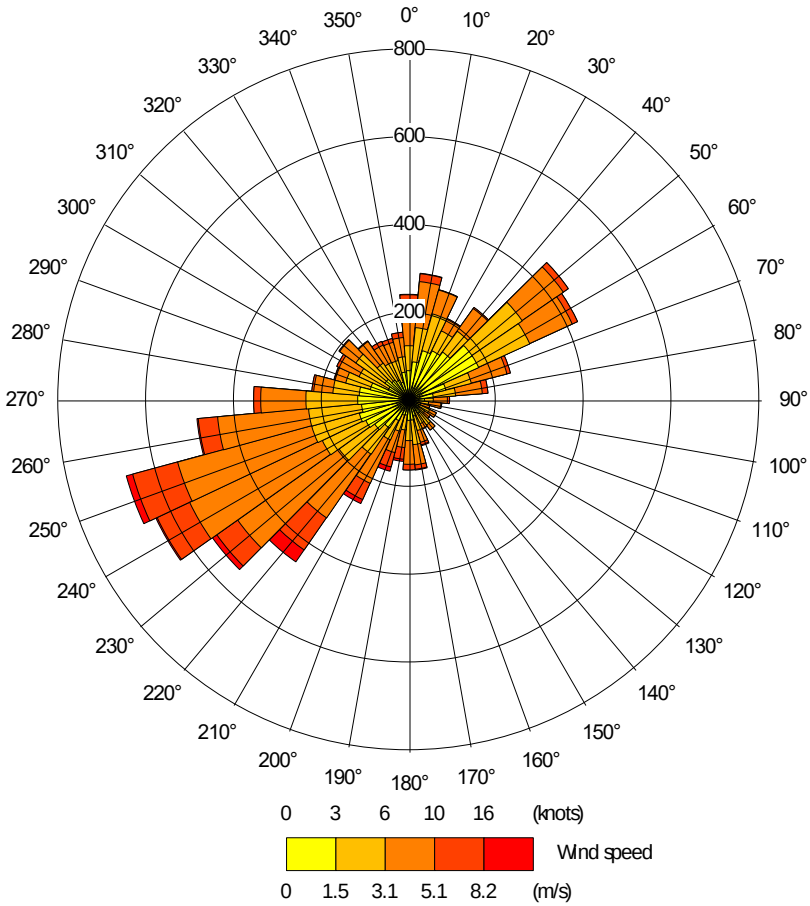
RECEPTOR ID	ROAD NAME	X	Y	HEIGHT (M)	LOCAL AUTHORITY
40	Dittons Road	560414	104597	1.5	Wealden
41	Dittons Road	560584	104580	1.5	Wealden
42	Dittons Road	560067	104693	1.5	Wealden
43	Dittons Road	560060	104722	1.5	Wealden
44	Gainsborough Lane	557452	104746	1.5	Wealden
45	Gainsborough Lane	557482	104751	1.5	Wealden
46	Gainsborough Lane	557489	104765	1.5	Wealden
47	The Street	554661	104796	1.5	Wealden
48	The Street	554625	104811	1.5	Wealden
49	Lewes Road	554773	104824	1.5	Wealden
50	The Street	554639	104837	1.5	Wealden
51	Lewes Road	554843	104871	1.5	Wealden
52	Thornwell Road	554681	104962	1.5	Wealden
53	The Street	554620	104728	1.5	Wealden
54	Lewes Road	553884	105039	1.5	Wealden
55	Lewes Road	553856	105054	1.5	Wealden
56	Milton Street	553788	104889	1.5	Wealden
57	Alfriston Road	552431	105124	1.5	Wealden
58	Alfriston Road	552460	105148	1.5	Wealden
59	The Village	552041	105333	1.5	Wealden
60	Pound Lane	552264	105493	1.5	Wealden
61	Alfriston Road	552435	105065	1.5	Wealden
62	Station Road	552554	106473	1.5	Wealden
63	Station Road	552590	106495	1.5	Wealden
64	Cornford Crescent	552569	106583	1.5	Wealden
65	Chilver Bridge Road	552743	106434	1.5	Wealden
66	Station Road	552561	106201	1.5	Wealden
67	Common Lane	551747	106479	1.5	Wealden
68	Lewes Road	550693	106660	1.5	Wealden
69	Lewes Road	550658	106675	1.5	Wealden
70	Bopeep Lane	550625	106452	1.5	Wealden
71	Lewes Road	550759	106551	1.5	Wealden
72	The Street	550751	106726	1.5	Wealden
73	Heighton Street	548335	107980	1.5	Lewes
74	Ripe Lane	548434	108067	1.5	Lewes
75	Ripe Lane	548474	108070	1.5	Lewes
76	Wick Street	547584	108130	1.5	Lewes
77	Wick Street	547402	108018	1.5	Lewes
78	Wick Street	546670	107840	1.5	Lewes
79	Wick Street	546724	107814	1.5	Lewes
80	The Street	546650	107649	1.5	Lewes
81	Ripe Lane	548481	108146	1.5	Lewes

RECEPTOR ID	ROAD NAME	X	Y	HEIGHT (M)	LOCAL AUTHORITY
82	Ranscombe Lane	543940	108606	1.5	Lewes
83	Station Road	545763	108156	1.5	Lewes
84	Farm Lane	544597	107978	1.5	Lewes
85	Farm Lane	544682	107995	1.5	Lewes
86	Church Lane	544548	107863	1.5	Lewes
87	Mill Lane	546275	108126	1.5	Lewes
88	A22	557741	106431	1.5	Wealden
89	A22	557974	107676	1.5	Wealden

APPENDIX 5-3

ADMS-ROADS MODEL SETTINGS

APPENDIX 5.3 ADMS-ROADS MODEL SETTINGS

PARAMETER	COMMENTARY
Dispersion Model	ADMS version 4.1.1.0
Traffic Data	Input to emissions model by period of the day AM Peak= 0700 – 1000; Inter Peak = 1000 – 1600; PM Peak = 1600 – 1900; Off Peak = 1900 to 0700
Emissions	Time varying (AM, IP, PM, OP) following IAN 185 Speed Banded Emissions(EFT v8).
Road Geometry	All roads set to true road widths (kerb to kerb /edge of travelled lanes); road heights set to zero
Meteorological data	Herstmonceaux 2016  Roughness length set to 0.3m (Agricultural areas (max)) Minimum Monin-Obukhov Length – 1m
Receptors	As Appendix C5.2
Model Output	Annual mean NO_X and PM_{10}
Post Processing	Verification based on NO_x/NO_2 (see Appendix C5.5) NO_x to NO_2 conversion using Defra's calculator v6.1 Gap Analysis (following IAN 170, with LTTE6 factors)

APPENDIX 5-4

DEFRA BACKGROUND MAPS

APPENDIX 5.4 DEFRA BACKGROUND MAPS

Annual mean concentrations (µg/m^3)
Source: Defra

GRID SQUARE (X,Y)	2016		2022	
	NO_2	PM_{10}	NO_2	PM_{10}
543500,108500	10.4	12.7	8.3	12.4
544500,107500	9.9	12.5	8.2	12.2
544500,108500	10.3	12.3	8.4	11.9
545500,108500	9.3	12.4	7.7	12.1
546500,107500	8.5	12.6	7.1	12.3
546500,108500	9.8	13.5	7.9	13.3
547500,108500	9.3	12.7	7.6	12.4
548500,107500	8.4	12	7	11.7
548500,108500	8.5	12.3	7	12
549500,107500	8.9	13	7.3	12.7
550500,106500	8.9	12.2	7.3	11.9
551500,106500	7.8	12.9	6.5	12.5
552500,105500	8.7	12.8	7.1	12.5
552500,106500	7.9	12.6	6.5	12.3
553500,104500	7.5	12.5	6.3	12.1
553500,105500	8.6	13	7	12.7
554500,104500	8.5	12.3	7	12
556500,104500	9	12.1	7.2	11.8
557500,104500	10	12.7	8	12.4
557500,105500	10.1	12.2	8.1	11.8
558500,104500	10.2	12.7	8.3	12.4
558500,105500	10.9	13.2	8.8	12.8
560500,104500	11.8	13.4	9.4	13.1

APPENDIX 5-5

MODEL VERIFICATION

APPEMDIX 5.5 MODEL VERIFICATION

Verification has been carried out using local authority and Highways England NO_2 diffusion tube data for 2016. This has been undertaken following the guidance on verification given in Defra's technical guidance LAQM.TG(16).

TABLE C5-5.1 - COMPARISON OF MODELLED AND MEASURED NO_2 CONCENTRATIONS (µG/M^3) BEFORE ROAD NOX ADJUSTMENT

SITE ID	MEASURED NO_2	MODELLED NO_2	MODELLED-MEASURED	%DIFFERENCE	MODEL PERFORMANCE (<10% = GOOD, 10 – 25% = REASONABLE, >25% = POOR)
Atk1	15.2	16.8	1.6	10.2	Reasonable
Atk2	27.9	30.0	2.1	7.6	Good
Atk4	22.2	19.4	-2.8	-12.8	Reasonable
Atk5	19.9	23.0	3.1	15.7	Reasonable
Atk6	38.4	28.3	-10.1	-26.3	Poor
Atk7	11.4	11.8	0.4	3.7	Good
Atk8	12.5	15.1	2.6	20.6	Reasonable
Atk10	22	24.8	2.8	12.6	Reasonable
Atk11	22.3	17.7	-4.6	-20.6	Reasonable
Atk12	20.2	17.6	-2.7	-13.1	Reasonable
Atk14	23.2	24.5	1.3	5.6	Good
Atk15	39.8	28.2	-11.6	-29.2	Poor
Atk16	12.7	14.7	2.0	15.5	Reasonable
Atk17	24.7	24.1	-0.6	-2.4	Good
Atk18	19.5	23.3	3.8	19.6	Reasonable
Atk19	22.6	26.5	3.9	17.2	Reasonable
Atk20	29.6	33.5	3.9	13.2	Reasonable
Atk21	27.7	24.2	-3.5	-12.8	Reasonable
W5	29.3	33.6	4.3	14.7	Reasonable
Atk13	14.6	19.3	4.7	31.9	Poor

Table C5-5.2 - Comparison of modelled and measured NO_x concentrations (**µg/m^3**)

Site ID	Measured - Road NO_X	Modelled road NO_X	Modelled-Measured	measured/modelled
Atk1	8.9	11.8	2.9	0.8
Atk2	34.3	38.8	4.5	0.9
Atk4	26.1	20.5	-5.7	1.3
Atk5	20.7	27.0	6.3	0.8
Atk6	60.6	38.0	-22.6	1.6
Atk7	4.6	5.3	0.8	0.9
Atk8	6.6	11.4	4.8	0.6
Atk10	25.3	31.0	5.7	0.8
Atk11	25.9	16.8	-9.1	1.5
Atk12	21.7	16.5	-5.2	1.3
Atk14	28.0	30.6	2.7	0.9
Atk15	64.7	38.3	-26.4	1.7
Atk16	7.7	11.4	3.7	0.7
Atk17	30.3	30.0	-0.3	1.0
Atk18	17.8	27.4	9.6	0.6
Atk19	24.0	31.9	8.0	0.8
Atk20	38.1	47.1	8.9	0.8
Atk21	34.3	26.7	-7.5	1.3
W5	37.5	47.1	9.6	0.8
Atk13	11.1	20.1	9.0	0.6

The adjustment factor for modelled road NOx has been determined to be 1, and therefore the modelled results are not required to be adjusted.

Table C5-5.2 – model uncertainty

Number of comparisons	Number within +/-25% of monitoring concentration	Root Mean Square Error ($\mu g/m^3$)
20	17	4.5

APPENDIX 5-6

RESULTS FOR HUMAN RECEPTORS

APPENDIX 5.6 RESULTS FOR HUMAN RECEPTORS

TABLE C5-6-1 – ANNUAL MEAN NO_2 CONCENTRATIONS (µg/m^3)

RECEPTOR ID	AS PER DEFRA EFT (VERSION 8)				AS PER GAP ANALYSIS (USED IN IMPACT ASSESSMENT)				IMPACT BASED ON GAP ANALYSIS AS WORST-CASE
	2016 BASELINE	2022 WITHOUT SCHEME	2022 WITH SCHEME	CHANGE	PROJECTED BASELINE	2022 WITHOUT SCHEME	2022 WITH SCHEME	CHANGE	
1	18.6	14.3	14.8	0.5	13.3	16.0	16.6	0.6	Small (increase)
2	17.0	12.6	12.7	0.1	12.2	14.1	14.2	0.1	Imperceptible (increase)
3	24.7	20.0	20.3	0.3	17.2	23.0	23.4	0.3	Imperceptible (increase)
4	15.6	12.0	11.9	-0.1	11.7	12.8	12.7	-0.1	Imperceptible (decrease)
5	23.0	17.1	17.9	0.8	16.2	19.5	20.4	0.9	Small (increase)
6	17.3	13.7	13.7	0.0	12.4	15.3	15.3	0.0	Imperceptible (no change)
7	22.9	17.4	17.8	0.4	16.0	20.0	20.4	0.5	Small (increase)
8	21.2	16.0	15.6	-0.4	15.3	17.8	17.3	-0.4	Small (decrease)
9	20.3	15.3	14.9	-0.4	14.7	16.9	16.5	-0.4	Small (decrease)
10	18.4	14.0	13.9	-0.1	13.5	15.3	15.2	-0.1	Imperceptible (decrease)
11	18.4	14.1	14.0	-0.1	13.4	15.5	15.4	-0.1	Imperceptible (decrease)
12	18.4	14.1	14.0	-0.1	13.4	15.5	15.4	-0.1	Imperceptible (decrease)
13	16.3	12.8	12.9	0.1	12.1	13.8	13.9	0.1	Imperceptible (increase)
14	16.7	13.1	13.3	0.2	12.3	14.3	14.5	0.2	Imperceptible (increase)
15	19.3	14.6	14.4	-0.2	14.1	16.0	15.8	-0.2	Imperceptible (decrease)
16	23.3	17.4	16.7	-0.7	16.6	19.6	18.8	-0.8	Small (decrease)
17	23.2	17.4	17.9	0.5	16.2	20.0	20.5	0.6	Small (increase)
18	26.8	19.9	20.6	0.7	18.4	23.2	24.1	0.8	Small (increase)
19	25.4	19.4	19.9	0.5	17.9	22.1	22.6	0.6	Small (increase)
20	27.2	20.2	22.0	1.8	18.7	23.6	25.7	2.1	Medium (increase)
21	23.0	17.4	17.9	0.5	16.1	19.9	20.5	0.6	Small (increase)
22	20.6	15.3	16.2	0.9	14.5	17.4	18.4	1.0	Small (increase)
23	21.6	16.4	16.7	0.3	15.3	18.6	18.9	0.3	Imperceptible (increase)
24	18.8	14.1	14.2	0.1	13.6	15.6	15.7	0.1	Imperceptible (increase)
25	24.9	18.9	19.1	0.2	17.8	21.2	21.4	0.2	Imperceptible (increase)
26	22.7	17.2	17.4	0.2	16.3	19.2	19.4	0.2	Imperceptible (increase)
27	26.5	20.0	20.3	0.3	18.8	22.6	22.9	0.3	Imperceptible (increase)
28	18.6	14.0	14.1	0.1	13.4	15.6	15.7	0.1	Imperceptible (increase)
29	23.6	17.8	17.9	0.1	16.9	19.9	20.0	0.1	Imperceptible (increase)

TABLE C5-6-1 – ANNUAL MEAN NO_2 CONCENTRATIONS (µg/m^3)

RECEPTOR ID	AS PER DEFRA EFT (VERSION 8)				AS PER GAP ANALYSIS (USED IN IMPACT ASSESSMENT)				IMPACT BASED ON GAP ANALYSIS AS WORST-CASE
	2016 BASELINE	2022 WITHOUT SCHEME	2022 WITH SCHEME	CHANGE	PROJECTED BASELINE	2022 WITHOUT SCHEME	2022 WITH SCHEME	CHANGE	
30	20.0	15.0	15.1	0.1	14.3	16.8	16.9	0.1	Imperceptible (increase)
31	21.9	16.5	16.4	-0.1	15.7	18.4	18.3	-0.1	Imperceptible (decrease)
32	21.8	16.4	16.6	0.2	15.5	18.5	18.7	0.2	Imperceptible (increase)
33	21.8	16.4	16.7	0.3	15.5	18.5	18.8	0.3	Imperceptible (increase)
34	22.9	17.4	17.6	0.2	16.3	19.6	19.8	0.2	Imperceptible (increase)
35	23.8	18.1	18.2	0.1	17.1	20.2	20.3	0.1	Imperceptible (increase)
36	21.3	16.0	15.5	-0.5	15.4	17.7	17.2	-0.6	Small (decrease)
37	19.0	14.5	14.9	0.4	13.7	16.1	16.6	0.4	Small (increase)
38	20.0	15.6	15.8	0.2	14.4	17.4	17.6	0.2	Imperceptible (increase)
39	24.2	18.1	18.9	0.8	17.0	20.7	21.6	0.9	Small (increase)
40	23.2	17.8	17.8	0.0	16.8	19.7	19.7	0.0	Imperceptible (no change)
41	23.5	17.7	17.9	0.2	17.0	19.6	19.8	0.2	Imperceptible (increase)
42	19.4	14.7	14.5	-0.2	14.2	16.1	15.9	-0.2	Imperceptible (decrease)
43	19.5	14.7	14.5	-0.2	14.3	16.1	15.8	-0.2	Imperceptible (decrease)
44	20.1	15.6	16.3	0.7	14.2	17.7	18.5	0.8	Small (increase)
45	21.7	16.7	17.9	1.2	15.3	19.0	20.4	1.4	Small (increase)
46	26.7	20.6	22.9	2.3	18.5	23.8	26.5	2.7	Medium (increase)
47	13.8	10.8	10.9	0.1	10.2	11.7	11.8	0.1	Imperceptible (increase)
48	14.2	11.0	11.1	0.1	10.4	12.0	12.1	0.1	Imperceptible (increase)
49	19.1	15.3	14.7	-0.6	13.5	17.4	16.7	-0.7	Small (decrease)
50	17.0	13.0	13.1	0.1	12.1	14.6	14.8	0.1	Imperceptible (increase)
51	16.4	13.2	13.7	0.5	11.8	14.7	15.3	0.6	Small (increase)
52	11.9	9.4	9.7	0.3	9.0	10.0	10.3	0.3	Imperceptible (increase)
53	11.8	9.4	9.5	0.1	8.9	10.0	10.1	0.1	Imperceptible (increase)
54	22.1	16.8	17.9	1.1	15.4	19.3	20.6	1.3	Small (increase)
55	17.8	13.8	14.2	0.4	12.6	15.6	16.1	0.5	Small (increase)
56	10.8	8.6	8.8	0.2	8.2	9.1	9.3	0.2	Imperceptible (increase)
57	14.7	11.4	11.4	0.0	10.7	12.6	12.6	0.0	Imperceptible (no change)
58	15.2	11.8	11.6	-0.2	11.0	13.1	12.8	-0.2	Imperceptible (decrease)
59	15.4	12.2	12.1	-0.1	11.2	13.4	13.3	-0.1	Imperceptible (decrease)
60	10.7	8.7	8.6	-0.1	8.3	9.0	8.9	-0.1	Imperceptible (decrease)
61	13.1	10.2	10.3	0.1	9.8	10.9	11.0	0.1	Imperceptible (increase)

TABLE C5-6-1 – ANNUAL MEAN NO_2 CONCENTRATIONS (µg/m^3)

RECEPTOR ID	AS PER DEFRA EFT (VERSION 8)				AS PER GAP ANALYSIS (USED IN IMPACT ASSESSMENT)				IMPACT BASED ON GAP ANALYSIS AS WORST-CASE
	2016 BASELINE	2022 WITHOUT SCHEME	2022 WITH SCHEME	CHANGE	PROJECTED BASELINE	2022 WITHOUT SCHEME	2022 WITH SCHEME	CHANGE	
62	9.3	7.6	7.4	-0.2	7.3	7.8	7.6	-0.2	Imperceptible (decrease)
63	9.3	7.6	7.4	-0.2	7.4	7.7	7.5	-0.2	Imperceptible (decrease)
64	9.2	7.5	7.4	-0.1	7.3	7.6	7.5	-0.1	Imperceptible (decrease)
65	8.6	7.1	7.0	-0.1	6.9	7.1	7.0	-0.1	Imperceptible (decrease)
66	9.1	7.6	7.4	-0.2	7.3	7.6	7.4	-0.2	Imperceptible (decrease)
67	8.8	7.5	7.1	-0.4	7.1	7.5	7.1	-0.4	Imperceptible (decrease)
68	32.0	25.2	26.8	1.6	22.0	29.4	31.2	1.9	Small (increase)
69	24.9	18.9	19.5	0.6	17.3	21.8	22.5	0.7	Small (increase)
70	11.5	9.2	9.3	0.1	8.8	9.6	9.7	0.1	Imperceptible (increase)
71	21.6	17.2	18.1	0.9	15.1	19.7	20.8	1.0	Small (increase)
72	13.0	10.2	10.4	0.2	9.8	10.8	11.1	0.2	Imperceptible (increase)
73	14.8	11.5	11.8	0.3	10.8	12.6	13.0	0.3	Imperceptible (increase)
74	14.1	11.1	11.2	0.1	10.4	12.1	12.2	0.1	Imperceptible (increase)
75	13.4	10.6	10.7	0.1	10.0	11.4	11.5	0.1	Imperceptible (increase)
76	15.2	11.7	12.0	0.3	11.1	12.8	13.2	0.3	Imperceptible (increase)
77	15.0	11.5	11.8	0.3	11.0	12.6	12.9	0.3	Imperceptible (increase)
78	10.4	8.5	8.6	0.1	8.3	8.5	8.6	0.1	Imperceptible (increase)
79	10.3	8.4	8.5	0.1	8.2	8.5	8.6	0.1	Imperceptible (increase)
80	9.8	8.1	8.1	0.0	7.9	8.1	8.1	0.0	Imperceptible (no change)
81	11.6	9.3	9.3	0.0	8.9	9.7	9.7	0.0	Imperceptible (no change)
82	15.5	11.6	11.7	0.1	11.3	12.8	12.9	0.1	Imperceptible (increase)
83	12.8	10.2	10.2	0.0	9.8	10.7	10.7	0.0	Imperceptible (no change)
84	22.9	16.5	16.7	0.2	15.6	19.4	19.7	0.2	Imperceptible (increase)
85	23.0	17.3	17.6	0.3	16.1	19.8	20.2	0.3	Imperceptible (increase)
86	17.9	13.2	13.2	0.0	12.6	15.0	15.0	0.0	Imperceptible (no change)
87	21.4	16.6	16.9	0.3	15.1	18.9	19.2	0.3	Imperceptible (increase)
88	26.1	19.9	20.2	0.3	18.5	22.5	22.8	0.3	Imperceptible (increase)
89	28.6	21.8	22.1	0.3	20.3	24.6	25.0	0.3	Imperceptible (increase)

Notes:

Concentrations shown in **bold** exceed the criterion threshold of 40µg/m^3

TABLE 5.6.2 - ANNUAL MEAN NO_2: SUMMARY OF IMPACTS

MAGNITUDE OF CHANGE IN CONCENTRATION	AS PER DEFRA EFT (VERSION 8)	AS PER GAP ANALYSIS (USED IN IMPACT ASSESSMENT)
Increase		
Large (>4)	0	0
Medium (>2 to 4)	1	2
Small (0.4 to 2)	17	18
Imperceptible (<=0.4)	42	40
Imperceptible increase (no change)	7	7
Decrease		
Large (>4)	0	0
Medium (>2 to 4)	0	0
Small (0.4 to 2)	3	5
Imperceptible (<=0.4)	19	17
Total Receptors	89	89

MAGNITUDE OF CHANGE IN ANNUAL MEAN NO_2 ($\mu g/m^3$)	NUMBER OF RECEPTORS WITH …			
	AS PER DEFRA EFT (VERSION 8)		AS PER GAP ANALYSIS (USED IN IMPACT ASSESSMENT)	
	WORSENING AT RECEPTORS ALREADY ABOVE THE OBJECTIVE OR CREATION OF NEW EXCEEDANCE	IMPROVEMENT AT RECEPTORS ALREADY ABOVE THE OBJECTIVE OR REMOVAL OF AN EXISTING EXCEEDANCE	WORSENING AT RECEPTORS ALREADY ABOVE THE OBJECTIVE OR CREATION OF NEW EXCEEDANCE	IMPROVEMENT AT RECEPTORS ALREADY ABOVE THE OBJECTIVE OR REMOVAL OF AN EXISTING EXCEEDANCE
Large (>4)	0	0	0	0
Medium (>2 to 4)	0	0	0	0
Small (>0.4 to 2)	0	0	0	0

Table 5.6.3 - ANNUAL MEAN PM_{10} CONCENTRATIONS (µg/m^3)

RECEPTOR ID	2016 BASELINE	2022 WITHOUT SCHEME	2022 WITH SCHEME	CHANGE	IMPACT
1	13.3	12.9	13.0	0.1	Imperceptible (increase)
2	13.5	13.1	13.1	0.0	Imperceptible (no change)
3	14.3	14.0	14.2	0.2	Imperceptible (increase)
4	13.4	13.1	13.1	0.0	Imperceptible (no change)
5	13.8	13.3	13.5	0.1	Imperceptible (increase)
6	13.3	13.0	13.0	0.1	Imperceptible (increase)
7	14.9	14.6	14.7	0.1	Imperceptible (increase)
8	14.7	14.3	14.2	-0.1	Imperceptible (decrease)
9	14.5	14.1	14.0	-0.1	Imperceptible (decrease)
10	14.2	13.8	13.8	0.0	Imperceptible (no change)
11	14.2	13.8	13.8	0.0	Imperceptible (no change)
12	14.2	13.8	13.8	0.0	Imperceptible (no change)
13	13.9	13.5	13.6	0.0	Imperceptible (no change)
14	14.0	13.6	13.6	0.0	Imperceptible (no change)
15	14.4	14.0	13.9	0.0	Imperceptible (no change)
16	14.6	14.2	14.0	-0.2	Imperceptible (decrease)
17	14.2	13.9	14.0	0.1	Imperceptible (increase)
18	14.6	14.3	14.4	0.1	Imperceptible (increase)
19	14.7	14.4	14.5	0.1	Imperceptible (increase)
20	14.8	14.4	14.7	0.2	Imperceptible (increase)
21	14.2	13.9	14.0	0.1	Imperceptible (increase)
22	13.9	13.6	13.8	0.1	Imperceptible (increase)
23	14.4	14.1	14.2	0.1	Imperceptible (increase)
24	14.0	13.7	13.7	0.0	Imperceptible (no change)
25	15.0	14.7	14.8	0.1	Imperceptible (increase)
26	14.6	14.4	14.4	0.1	Imperceptible (increase)
27	15.3	15.0	15.0	0.1	Imperceptible (increase)
28	14.0	13.6	13.6	0.0	Imperceptible (no change)
29	14.8	14.4	14.5	0.0	Imperceptible (no change)
30	14.2	13.9	13.9	0.0	Imperceptible (no change)
31	14.5	14.1	14.1	0.0	Imperceptible (no change)
32	14.4	14.2	14.2	0.0	Imperceptible (no change)
33	14.4	14.2	14.2	0.1	Imperceptible (increase)
34	14.6	14.4	14.4	0.0	Imperceptible (no change)
35	14.8	14.5	14.6	0.0	Imperceptible (no change)
36	14.3	14.0	13.9	-0.1	Imperceptible (decrease)
37	13.3	12.8	12.9	0.1	Imperceptible (increase)
38	14.3	13.9	14.0	0.0	Imperceptible (no change)
39	13.9	13.5	13.6	0.1	Imperceptible (increase)
40	14.8	14.4	14.4	0.0	Imperceptible (no change)
41	14.9	14.5	14.6	0.0	Imperceptible (no change)
42	14.5	14.1	14.1	0.0	Imperceptible (no change)
43	14.5	14.1	14.1	0.0	Imperceptible (no change)
44	14.0	13.7	13.8	0.1	Imperceptible (increase)
45	14.2	13.9	14.1	0.2	Imperceptible (increase)
46	15.0	14.6	15.0	0.3	Imperceptible (increase)
47	13.0	12.6	12.7	0.0	Imperceptible (no change)
48	13.0	12.7	12.7	0.0	Imperceptible (no change)
49	13.7	13.4	13.4	0.0	Imperceptible (no change)
50	13.4	13.1	13.1	0.0	Imperceptible (no change)
51	13.3	13.0	13.1	0.2	Imperceptible (increase)

Table 5.6.3 - ANNUAL MEAN PM_{10} CONCENTRATIONS (µg/m^3)

RECEPTOR ID	2016 BASELINE	2022 WITHOUT SCHEME	2022 WITH SCHEME	CHANGE	IMPACT
52	12.7	12.4	12.4	0.0	Imperceptible (no change)
53	12.7	12.4	12.4	0.0	Imperceptible (no change)
54	14.8	14.5	14.6	0.2	Imperceptible (increase)
55	14.2	13.8	13.9	0.1	Imperceptible (increase)
56	12.9	12.5	12.5	0.0	Imperceptible (no change)
57	13.5	13.2	13.2	0.0	Imperceptible (no change)
58	13.6	13.3	13.3	0.0	Imperceptible (no change)
59	13.6	13.3	13.4	0.1	Imperceptible (increase)
60	13.0	12.8	12.8	0.0	Imperceptible (no change)
61	13.3	13.0	13.1	0.0	Imperceptible (no change)
62	12.8	12.5	12.5	0.0	Imperceptible (no change)
63	12.8	12.5	12.5	0.0	Imperceptible (no change)
64	12.8	12.5	12.5	0.0	Imperceptible (no change)
65	12.7	12.4	12.4	0.0	Imperceptible (no change)
66	12.7	12.5	12.5	0.0	Imperceptible (no change)
67	13.0	12.7	12.6	-0.1	Imperceptible (decrease)
68	15.5	15.2	15.3	0.2	Imperceptible (increase)
69	14.4	14.1	14.2	0.1	Imperceptible (increase)
70	12.5	12.2	12.2	0.0	Imperceptible (no change)
71	13.9	13.5	13.6	0.1	Imperceptible (increase)
72	12.7	12.4	12.4	0.0	Imperceptible (no change)
73	12.8	12.5	12.5	0.0	Imperceptible (no change)
74	13.0	12.7	12.7	0.0	Imperceptible (no change)
75	12.9	12.6	12.6	0.0	Imperceptible (no change)
76	13.4	13.1	13.1	0.0	Imperceptible (no change)
77	13.4	13.1	13.1	0.0	Imperceptible (no change)
78	12.8	12.5	12.5	0.0	Imperceptible (no change)
79	12.8	12.5	12.5	0.0	Imperceptible (no change)
80	12.8	12.5	12.5	0.0	Imperceptible (no change)
81	12.7	12.4	12.4	0.0	Imperceptible (no change)
82	13.3	13.0	13.0	0.0	Imperceptible (no change)
83	12.8	12.5	12.5	0.0	Imperceptible (no change)
84	14.1	13.7	13.7	0.0	Imperceptible (no change)
85	14.2	13.9	13.9	0.0	Imperceptible (no change)
86	13.5	13.1	13.2	0.0	Imperceptible (no change)
87	14.9	14.7	14.8	0.0	Imperceptible (no change)
88	14.0	13.5	13.6	0.1	Imperceptible (increase)
89	16.3	15.8	15.8	0.1	Imperceptible (increase)

Notes:
Concentrations shown in **bold** exceed the criterion threshold of 40µg/m^3.

Table 5.6.4 - 24-Hour Mean PM_{10} No Days (µg/m³)

RECEPTOR ID	2016 BASELINE	2022 WITHOUT SCHEME	2022 WITH SCHEME	CHANGE
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0

Table 5.6.4 - 24-Hour Mean PM_{10} No Days (µg/m^3)

RECEPTOR ID	2016 BASELINE	2022 WITHOUT SCHEME	2022 WITH SCHEME	CHANGE
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0
60	0	0	0	0
61	0	0	0	0
62	0	0	0	0
63	0	0	0	0
64	0	0	0	0
65	0	0	0	0
66	0	0	0	0
67	0	0	0	0
68	0	0	0	0
69	0	0	0	0
70	0	0	0	0
71	0	0	0	0
72	0	0	0	0
73	0	0	0	0
74	0	0	0	0
75	0	0	0	0
76	0	0	0	0
77	0	0	0	0
78	0	0	0	0
79	0	0	0	0
80	0	0	0	0
81	0	0	0	0
82	0	0	0	0
83	0	0	0	0
84	0	0	0	0
85	0	0	0	0
86	0	0	0	0
87	0	0	0	0
88	0	0	0	0
89	0	0	0	0

Notes:

Concentrations shown in **bold** exceed the criterion threshold of 35 Days > 50 µg/m^3.

APPENDIX 5-7

REGIONAL EMISSIONS

APPENDIX 5-7 REGIONAL EMISSIONS

SCENARIO	NO_X			PM_{10}			CO_2			VEHICLE KM
	KG/YEAR	CHANGE WITH MINUS WITHOUT	%	KG/YEAR	CHANGE WITH MINUS WITHOUT	%	TONNES/ YEAR	CHANGE WITH MINUS WITHOUT	%	
2016 Baseline	322.0	-	-	20.9	-	-	117,789	-	-	677,289,049
2022 Without Scheme	225.1	-	-	20.2	-	-	125,040	-	-	775,177,459
2022 With Scheme	226.0	0.9	0.4%	20.5	0.2	1.1%	125,544	505	0.4%	785,045,132
2037 Without Scheme	143.9	-	-	22.5	-	-	141,482	-	-	904,447,851
2037 With Scheme	144.4	0.5	0.4%	22.7	0.2	1.1%	141,683	200	0.1%	915,291,431

APPENDIX 5-8

HIGHWAYS ENGLAND ASSESSMENT OF SIGNIFICANCE – LOCAL AIR QUALITY

APPENDIX 5.8 HIGHWAYS ENGLAND ASSESSMENT OF SIGNIFICANCE- LOCAL AIR QUALITY

This section presents the overall significance of effects for the scheme.

The findings show that the effects associated with the scheme are not significant for air quality and can progress without any additional mitigation.

Key Criteria Questions	Yes/No
Is there a risk that environmental standards will be breached?	No – there are no modelled exceedances of the annual mean objective
Will there be a large change in environmental conditions?	No – the largest impact at any receptor is “Medium”.
Will the effect continue for a long time?	N/A as there are no significant effects anticipated
Will many people be affected?	N/A as there are no significant effects anticipated
Is there a risk that designated sites, areas, or features will be affected?	N/A as there are no designated sites within 200m of the ARN
Will it be difficult to avoid or reduce or repair or compensate for the effect?	No significant effects anticipated
On balance is the overall effect significant?	No.