

8 APPENDICES: Air Quality

APPENDIX 8.1 AIR QUALITY STANDARDS & OBJECTIVES

A summary of the current air quality objectives for the seven pollutants detailed in the *Air Quality Regulations 2000 and (Amendment) Regulations 2002* for the purpose of Local Air Quality Management is provided below.

Air Quality Objectives currently included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the purpose of Local Air Quality Management (LAQM)						
Pollutant	Applies to	Standard		Objective		EU AQ Daughter Directive
		Concentration	Measured as	Annual exceedences allowed	Target date	
Benzene (C ₆ H ₆)	All UK	16.25µg/m ³	running annual mean		31.12.2003	
	England and Wales	5µg/m ³	annual mean		31.12.2010	As standard. target: 01.01.2010
	Scotland	3.25µg/m ³	running annual mean		31.12.2010	
1,3-Butadiene (C ₄ H ₆)	All UK	2.25µg/m ³	running annual mean		31.12.2003	
Carbon monoxide (CO)	All UK	10mg/m ³	maximum daily running 8 hour mean		31.12.2003	As standard. target: 01.01.2005
Lead (Pb)	All UK	0.5µg/m ³	annual mean		31.12.2004	As standard. target: 01.01.2005 ⁸
	All UK	0.25µg/m ³	annual mean		31.12.2008	
Nitrogen dioxide (NO ₂)	All UK	200µg/m ³	1 hour mean	18	31.12.2005	As objective. target: 01.01.2010
	All UK	40µg/m ³	annual mean		31.12.2005	As standard. target: 01.01.2010
Particulate Matter (PM ₁₀) (gravimetric) ¹	All UK	40µg/m ³	annual mean		31.12.2004	As standard. target: 01.01.2005
	All UK	50µg/m ³	24 hour mean	35	31.12.2004	As objective. target: 01.01.2005
	Scotland	50µg/m ³	24 hour mean	7	31.12.2010	As objective. target: 01.01.2010
	Scotland	18µg/m ³	annual mean		31.12.2010	
Sulphur dioxide (SO ₂)	All UK	266µg/m ³	15 minute mean	35	31.12.2005	
	All UK	350µg/m ³	1 hour mean	24	31.12.2004	As objective. target: 01.01.2005
	All UK	125µg/m ³	24 hour mean	3	31.12.2004	As objective. target: 01.01.2005

Provisional Air Quality Objectives currently NOT included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the purpose of Local Air Quality Management (LAQM)						
Pollutant	Applies to	Standard		Objective		EU AQ Daughter Directive
		Concentration	Measured as	Annual exceedences allowed	Target date	
Polycyclic aromatic hydrocarbons (PAHs) ²	All UK	0.25ng/m ³ B[a]P ³	annual mean		31.12.2010	
Particulate Matter (PM _{2.5}) (gravimetric) ^{1,2}	UK (except Scotland)	25µg/m ³	annual mean	-	2020	As standard Target 2010
	Scotland	12µg/m ³	annual mean	-	2020	25µg/m ³ Target 2015
	UK urban areas	Target of 15% reduction in concentrations at urban background	annual mean	-	Between 2010 and 2020	Target 20% reduction in concentrations at urban background Target Between 2010 and 2020

Other Air Quality Strategy Objectives						
Pollutant	Applies to	Standard		Objective		EU AQ Daughter Directive
		Concentration	Measured as	Annual exceedences allowed	Target date	
For the protection of human health						
Ozone (O ₃) ⁴	All UK	100µg/m ³	maximum daily running 8 hour mean	10	31.12.2005	As objective; but 25 annual exceedences target: 01.01.2010
For the protection of vegetation and ecosystems ⁵						
Nitrogen oxides (NO _x) ⁶		30µg/m ³	annual mean		31.12.2000 ⁷	As standard. target: 19.07.2001
Sulphur dioxide (SO ₂)		20µg/m ³	annual mean		31.12.2000 ⁷	As standard. target: 19.07.2001
		20µg/m ³	winter mean (1 October to 31 March)		31.12.2000 ⁷	As standard. target: 19.07.2001

Explanation:

ng/m³ = nanogram per cubic metre;

µg/m³ = microgram per cubic metre;

mg/m³ = milligrams per cubic metre (i.e. microgram per cubic meter x 1,000);

- 1 Measured using the European gravimetric transfer sampler or equivalent.
- 2 Objective to be set in regulations in the future.
- 3 Concentration of Benzo[a]pyrene (B[a]P) to be measured as a marker for the total mixture of PAHs.
- 4 The objective for this pollutant is provisional and must be tackled at a national level due to its trans-boundary nature.
- 5 Only applies to those parts of the UK > 20km from an agglomeration; and > 5km from Part A processes, motorways and built up areas of > 5,000 people.
- 6 Assuming NO_x is taken as NO₂.
- 7 These objectives have successfully been achieved.
- 8 Also an EU AQ Directive Limit Value of 1µg/m³ to be achieved by 01.01.2010 in the immediate vicinity (1000 m) of certain named industrial sources situated on sites contaminated by decades of industrial activities.

The Air Quality Strategy states that further review and assessment and consultation in relation to air quality will be a rolling process, with additional revisions to the objectives for selected pollutants as appropriate, or where there is new evidence in relation to the effects of pollutants on health or ecosystems. New pollutants may be introduced through future reviews.

APPENDIX 8.2 SUMMARY OF TRAFFIC DATA USED IN THE ASSESSMENT

The tables below show the data that was used in the assessment of traffic impacts on local air quality. The emission factors were obtained from spreadsheet available on DEFRA's website.

2010 Verification

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV	Emission rate g/km/veh
				NO _x
1. Wakefield Road north	48	618	5.0	0.4329
2. Carlton Road	48	415	3.3	0.3624
3. Smithies Lane	48	316	4.3	0.4038
4. Wakefield Road south	48	746	4.2	0.4003
5. Burton Road	48	621	2.0	0.3112
6. Old Mill Lane north	48	1260	4.2	0.4001
7. Twibell Street	20	41	0.0	0.2982
8. Dryden Road	20	224	0.2	0.3173
9. Harborough Hill Road (south of gyratory)	48	1072	2.1	0.3126
10. Meadow Street	20	16	0.0	0.2730
11. Old Mill Lane south	48	862	4.0	0.3925
12. Canal Way	20	601	0.3	0.3193
13. Sheffield Road south	48	1374	4.3	0.4030
14. West Way	48	1375	1.9	0.3080
15. Sheffield Road north	20	289	1.5	0.3993
16. Burton Road Bypass (west of site access)	48	0	0.0	0.0000
17. Burton Road Bypass (east of site access)	48	0	0.0	0.0000
18. Burton Road East of Bypass	48	621	2.0	0.3112
19. Harborough Hill Road (south of gyratory) (Northbound)	48	561	1.6	0.2938
20. Harborough Hill Road (south of gyratory) (Northbound)	48	561	1.6	0.2938
21. Harborough Hill Road (south of gyratory) (Southbound)	20	511	2.6	0.4751
22. Huddersfield Road	48	548	3.1	0.3530

2011 Baseline

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV	Emission rate g/km/veh	
				NO _x	PM ₁₀
1. Wakefield Road north	48	620	5.0	0.3885	0.0366
2. Carlton Road	48	299	3.8	0.3468	0.0355
3. Smithies Lane	48	316	4.3	0.3634	0.0358
4. Wakefield Road south	48	633	4.6	0.3757	0.0362
5. Burton Road	48	30	18.1	0.8797	0.0513
6. Old Mill Lane north	48	1264	4.2	0.3594	0.0357
7. Twibell Street	20	95	0.0	0.2738	0.0347
8. Dryden Road	20	224	0.2	0.2881	0.0351
9. Harborough Hill Road (south of gyratory)	48	1100	2.0	0.2787	0.0334
10. Meadow Street	20	16	0.0	0.2693	0.0341
11. Old Mill Lane south	48	869	4.0	0.3514	0.0355
12. Canal Way	20	601	0.3	0.2897	0.0351
13. Sheffield Road south	48	1388	4.2	0.3607	0.0358
14. West Way	48	1388	1.9	0.2759	0.0333
15. Sheffield Road north	20	290	1.4	0.3622	0.0371
16. Burton Road Bypass (west of site access)	48	755	1.2	0.2509	0.0326
17. Burton Road Bypass (east of site access)	48	716	1.3	0.2534	0.0327
18. Burton Road East of Bypass	48	746	2.0	0.2780	0.0334
19. Harborough Hill Road (south of gyratory) (Northbound)	48	570	1.6	0.2622	0.0329
20. Harborough Hill Road (south of gyratory) (Northbound)	48	570	1.6	0.2622	0.0329
21. Harborough Hill Road (south of gyratory) (Southbound)	20	530	2.5	0.4263	0.0389
22. Huddersfield Road	48	548	3.1	0.3173	0.0345

2016 Baseline

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV	Emission rate g/km/veh	
				NO _x	PM ₁₀
1. Wakefield Road north	48	641	4.9	0.2144	0.0303
2. Carlton Road	48	308	3.7	0.1942	0.0294
3. Smithies Lane	48	327	4.2	0.2028	0.0298
4. Wakefield Road south	48	653	4.5	0.2080	0.0300
5. Burton Road	48	31	17.5	0.4415	0.0402
6. Old Mill Lane north	48	1305	4.1	0.2006	0.0297
7. Twibell Street	20	98	0.0	0.1773	0.0283
8. Dryden Road	20	231	0.2	0.1840	0.0285
9. Harborough Hill Road (south of gyratory)	48	1136	2.0	0.1633	0.0281
10. Meadow Street	20	17	0.0	0.1796	0.0287
11. Old Mill Lane south	48	898	3.9	0.1968	0.0295
12. Canal Way	20	621	0.3	0.1851	0.0286
13. Sheffield Road south	48	1434	4.1	0.2012	0.0297
14. West Way	48	1433	1.9	0.1620	0.0281
15. Sheffield Road north	20	300	1.4	0.2197	0.0298
16. Burton Road Bypass (west of site access)	48	780	1.2	0.1502	0.0276
17. Burton Road Bypass (east of site access)	48	739	1.3	0.1512	0.0276
18. Burton Road East of Bypass	48	770	1.9	0.1627	0.0281
19. Harborough Hill Road (south of gyratory) (Northbound)	48	589	1.5	0.1557	0.0278
20. Harborough Hill Road (south of gyratory) (Northbound)	48	589	1.5	0.1557	0.0278
21. Harborough Hill Road (south of gyratory) (Southbound)	20	547	2.4	0.2494	0.0308
22. Huddersfield Road	48	548	3.1	0.1825	0.0289

2016 with development

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV	Emission rate g/km/veh	
				NO _x	PM ₁₀
1. Wakefield Road north	48	856	3.6	0.1926	0.0294
2. Carlton Road	48	305	3.8	0.1954	0.0295
3. Smithies Lane	48	327	4.2	0.2028	0.0298
4. Wakefield Road south	48	865	3.4	0.1886	0.0292
5. Burton Road	48	31	17.5	0.4415	0.0402
6. Old Mill Lane north	48	1620	3.3	0.1867	0.0291
7. Twibell Street	20	12	0.0	0.1752	0.0280
8. Dryden Road	20	230	0.2	0.1842	0.0285
9. Harborough Hill Road (south of gyratory)	48	1307	1.7	0.1588	0.0280
10. Meadow Street	20	20	0.0	0.1771	0.0283
11. Old Mill Lane south	48	991	3.5	0.1904	0.0293
12. Canal Way	20	465	0.3	0.1876	0.0287
13. Sheffield Road south	48	1448	4.1	0.2006	0.0297
14. West Way	48	1364	2.0	0.1637	0.0282
15. Sheffield Road north	20	297	1.4	0.2203	0.0298
16. Burton Road Bypass (west of site access)	48	1533	0.6	0.1397	0.0271
17. Burton Road Bypass (east of site access)	48	840	1.1	0.1485	0.0275
18. Burton Road East of Bypass	48	871	1.7	0.1588	0.0279
19. Harborough Hill Road (south of gyratory) (Northbound)	48	680	1.3	0.1521	0.0277
20. Harborough Hill Road (south of gyratory) (Northbound)	48	680	1.3	0.1521	0.0277
21. Harborough Hill Road (south of gyratory) (Southbound)	20	627	2.1	0.2402	0.0305
22. Huddersfield Road	48	548	3.1	0.1825	0.0289

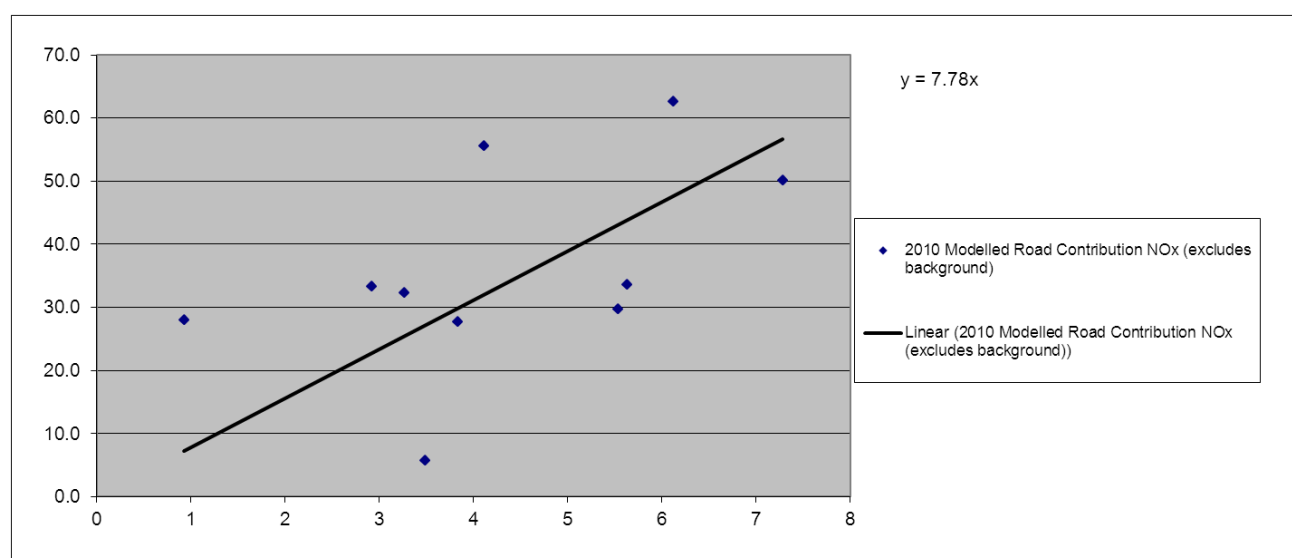
APPENDIX 8.3 MODEL VERIFICATION CALCULATIONS

Model Verification Calculations

NO₂

Model verification has been undertaken following the methodology specified in Annex 3 of the Technical Guidance LAQM.TG(09). The NO_x:NO₂ calculator available from DEFRA's website was used to calculate the roadside NO_x component of the annual mean NO₂ concentrations measured at the diffusion tube sites summarised in the table below.

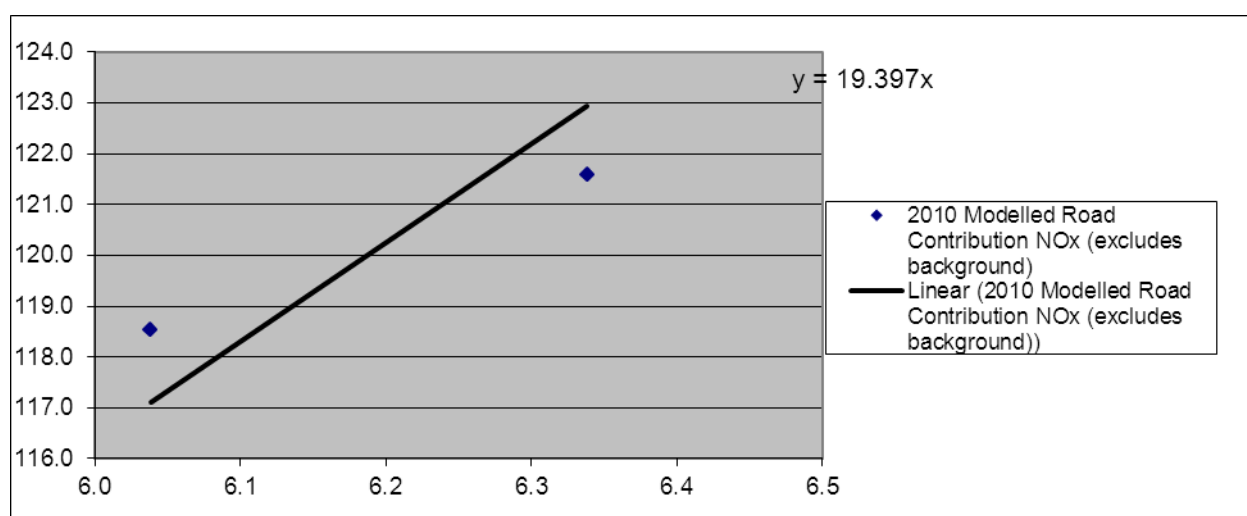
Site ID		2010 Monitored Total NO ₂	2010 Monitored Total NO _x	2010 Monitored Background NO ₂	2010 Monitored Background NO _x	2010 Monitored Road Contribution NO ₂ (total - background)	2010 Monitored Road Contribution NO _x (total - background)	2010 Modelled Road Contribution NO _x (excludes background)
103	113 Harborough Hills	45.8	90.2	25.0	40.0	20.8	50.2	7.3
102	Harboro' Hills Rd / Redfearn St	39.6	73.5	25.0	40.0	14.6	33.5	5.6
45	Canal Street	27.7	45.7	25.0	40.0	2.7	5.7	3.5
101	Harboro' Hills Rd / Meadow St	38.1	69.8	25.0	40.0	13.1	29.8	5.5
47	Burton Road	39.1	72.3	25.0	40.0	14.1	32.3	3.3
39	Wakefield Road - Burton Rd Junc.	50.1	102.7	25.0	40.0	25.1	62.7	6.1
99	Mottram Street / Eldon Street	37.4	68.0	25.0	40.0	12.4	28.0	0.9
93	Pontefract Road / Queens Road	39.5	73.3	25.0	40.0	14.5	33.3	2.9
42	Victoria Rd / Huddersfield Rd	37.3	67.8	25.0	40.0	12.3	27.8	3.8
35	Wakefield Rd / Smithies Lane	47.70	79.5	25.0	40.0	22.7	55.6	4.1



Site ID	Monitor Location	Ratio of monitored road Contribution NO _x /modelled road contribution	Adjustment factor for modelled road contribution	Adjusted modelled road contribution NO _x	Adjusted modelled total NO _x (incl background NO _x)	Modelled total NO ₂ (based on empirical NO _x :NO ₂ relationship)	Monitored Total NO ₂	% Difference [(modelled - monitored) / monitored] x100
103	113 Harborough Hills	6.9	7.78	56.7	96.7	48.1	45.8	5
102	Harboro' Hills Rd / Redfearn St	6.0		43.8	83.8	43.5	39.6	10
45	Canal Street	1.6		27.1	67.1	37.0	27.7	34
101	Harboro' Hills Rd / Meadow St	5.4		43.0	83.0	43.2	38.1	13
47	Burton Road	9.9		25.4	65.4	36.3	39.1	-7
39	Wakefield Road - Burton Rd Junc.	10.2		47.7	87.7	44.9	50.1	-10
99	Mottram Street / Eldon Street	30.2		7.2	47.2	28.4	37.4	-24
93	Pontefract Road / Queens Road	11.4		22.7	62.7	35.2	39.5	-11
42	Victoria Rd / Huddersfield Rd	7.2		29.9	69.9	38.1	37.3	2
35	Wakefield Rd / Smithies Lane	13.5		32.0	72.0	39.0	47.7	-18
			7.78					

A correction factor of 7.78 was obtained during the verification process for the roadside diffusion tube locations. This factor has been applied to the modelled Road-NO_x contribution before addition of the appropriate background concentration to determine total predicted annual mean NO₂ concentrations of all roadside receptor locations. It should be noted that the diffusion tubes located in Harborough Hills Road and 49 Harborough Hill Road were also included in the early stages of the verification process however the ratio between modelled and monitored NO_x concentrations was considerably higher than for the remaining monitoring sites; these tube was therefore removed from the verification process. Following consultation with BMBC it was highlighted that concentrations within the A61 southbound carriageway AQMA were being elevated due to the impact of the gradient, therefore a further verification was undertaken for the tubes located along the southbound carriageway and this factor was applied to the sensitive receptors located along this carriageway within the assessment. A correction factor of 19.4 was obtained for locations along the A61 southbound carriageway.

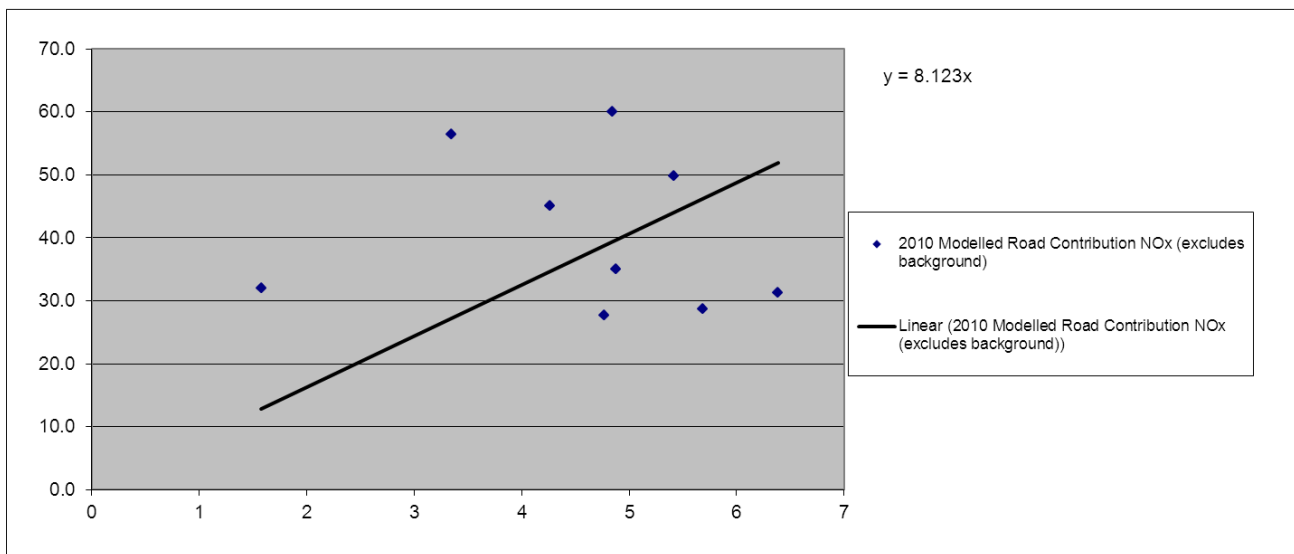
Site ID	Monitor Location	2010 Monitored Total NO ₂	2010 Monitored Total NO _x	2010 Monitored Background NO ₂	2010 Monitored Background NO _x	2010 Monitored Road Contribution NO ₂ (total - background)	2010 Monitored Road Contribution NO _x (total - background)	2010 Modelled Road Contribution NO _x (excludes background)
100	Harb'gh Hills Rd, adj ex-bakery	67.3	161.6	25.0	40.0	42.3	121.6	6.3
95	49 Harborough Hill Road	66.5	158.5	25.0	40.0	41.5	118.5	6.0



Site ID	Monitor Location	Ratio of monitored road Contribution Nox/modelled road contribution Nox	Adjustment factor for modelled road contribution	Adjusted modelled road contribution Nox	Adjusted modelled total Nox (incl background Nox)	Modelled total NO ₂ (based on empirical Nox/NO ₂ relationship)	Monitored Total NO ₂	% Difference [(modelled - monitored)/monitored] x100
100	Harb'gh Hills Rd, adj ex-bakery	19.18		122.94	162.9	67.65	67.3	1
95	49 Harborough Hill Road	19.63		117.12	157.1	66.12	66.5	-1
			19.40					

A correction factor of 8.12 was obtained during the verification process using the kerbside diffusion tube locations. This factor has been applied to the modelled Road-NO_x contribution before addition of the appropriate background concentration to determine total predicted annual mean NO₂ concentrations of all kerbside receptor locations.

Site ID	Monitor Location	2010 Monitored Total NO2	2010 Monitored Total NOx	2010 Monitored Background NO2	2010 Monitored Background NOx	2010 Monitored Road Contribution NO2 (total - background)	2010 Monitored Road Contribution NOx (total - background)	2010 Modelled Road Contribution NOx (excludes background)
46	Burton Road	49.2	100.0	25.0	40.0	24.2	60.0	4.8
44	Old Mill Lane / Eldon Street	37.7	68.8	25.0	40.0	12.7	28.8	5.7
43	Old Mill Lane / Honeywell St	45.7	89.9	25.0	40.0	20.7	49.9	5.4
38	W'field Rd, approach Burton Rd	40.2	75.1	25.0	40.0	15.2	35.1	4.9
37	W'field Rd, approach Burton Rd	38.7	71.3	25.0	40.0	13.7	31.3	6.4
94	Slip Road / Harborough Hills Rd	37.3	67.8	25.0	40.0	12.3	27.8	4.8
92	Pontefract Road / Clyde Street	39.0	72.0	25.0	40.0	14.0	32.0	1.6
41	Victoria Rd / Huddersfield Rd	44.0	85.2	25.0	40.0	19.0	45.2	4.3
48	B'ton Road - Rotherham Rd Junc.	48.0	96.4	25.0	40.0	23.0	56.4	3.3



Site ID	Monitor Location	Ratio of monitored road Contribution Nox/modelled road contribution Nox	Adjustment factor for modelled road contribution	Adjusted modelled road contribution Nox	Adjusted modelled total Nox (incl background Nox)	Modelled total NO2 (based on empirical Nox/NO2 relationship)	Monitored Total NO2	% Difference [(modelled - monitored) / monitored] x100
46	Burton Road	12.4	8.12	39.3	79.3	41.8	49.2	-15
44	Old Mill Lane / Eldon Street	5.1		46.2	86.2	44.4	37.7	18
43	Old Mill Lane / Honeywell St	9.2		44.0	84.0	43.6	45.7	-5
38	W'field Rd, approach Burton Rd	7.2		39.6	79.6	41.9	40.2	4
37	W'field Rd, approach Burton Rd	4.9		51.9	91.9	46.4	38.7	20
94	Slip Road / Harborough Hills Rd	5.8		38.7	78.7	41.6	37.3	12
92	Pontefract Road / Clyde Street	20.3		12.8	52.8	30.9	39.0	-21
41	Victoria Rd / Huddersfield Rd	10.6		34.6	74.6	40.0	44.0	-9
48	B'ton Road - Rotherham Rd Junc.	16.9		27.1	67.1	37.0	48.0	-23
			8.12					

APPENDIX 8.4 RECEPTOR LOCATIONS USED IN THE ASSESSMENT

Receptor No.	Receptor Name	Grid Reference	Height above ground level (m)
1	113 Harborough Hills	435047, 407033	1.8
2	Harborough Hills Road / Redfearn Street	434951, 407003	1.8
3	Canal Street	434885, 407072	1.8
4	Harborough Hills Road / Meadow Street	434979, 406918	1.8
5	Burton Road	435290, 407382	1.8
6	Burton Road	435211, 407443	1.8
7	Old Mill Lane / Eldon Street	434778, 406988	1.8
8	Old Mill Lane / Honeywell Street	434757, 406995	1.8
9	Harborough Hills Road, adj. ex-bakery	434955, 406769	1.8
10	Wakefield Road - Burton Rd Junction	435172, 407506	1.8
11	Wakefield Rd, approach Burton Road	435146, 407568	1.8
12	49 Harborough Hill Road	434933, 406695	1.8
13	Mottram Street / Eldon Street	434727, 406753	1.8
14	Wakefield Road, approach Burton Road	435108, 407676	1.8
15	Slip Road / Harborough Hills Road	434876, 406491	1.8
16	Pontefract Road / Queens Road	434879, 406413	1.8
17	Victoria Rd / Huddersfield Road	434346, 406846	1.8
18	Pontefract Road / Clyde Street	434920, 406277	1.8
19	Victoria Rd / Huddersfield Road	434274, 406887	1.8
20	Burton Road - Rotherham Road Junction	436072, 407320	1.8
21	Wakefield Rd / Smithies Lane	435027, 408104	1.8
22	135 Wakefield Road	435087, 407847	1.8
23	23 Twibell Road	435120, 407058	1.8
24	123 Old Mill Lane	435051, 407056	1.8
25	113 Old Mill Lane	435047, 407034	1.8
26	14 Burton Road	435211, 407463	1.8
27	1 Wakefield Road	435185, 407488	1.8
28	21 Wakefield Road	435168, 407524	1.8
29	42 Wakefield Road	435093, 407679	1.8
30	121 Wakefield Road	435093, 407807	1.8
31	1 to 11 Smithies Lane	435021, 408687	1.8
32	120 Smithies Lane	434848, 408160	1.8
33	7 Carlton Road	435055, 408232	1.8

34	20 Carlton Road	435119, 408263	1.8
35	167 Wakefield Road	435023, 408240	1.8
36	199 Wakefield Road	435014, 408404	1.8
37	6 Meadow Street	434972, 406906	1.8
38	1 Meadow Street	434974, 406918	1.8
39	107 Hillborough Hill	434976, 406820	1.8
40	134 Old Mill Lane	434807, 407022	1.8
41	47 Old Mill Lane	434742, 406972	1.8
42	74 Old Mill Lane	434671, 406959	1.8
43	23 Old Mill Lane	434658, 406934	1.8
44	92 Sheffield Road	434900, 405863	1.8
45	56 Sheffield Road	434844, 405984	1.8

APPENDIX 8.5 SIGNIFICANCE CRITERIA USED IN THE ASSESSMENT

The following criteria relate to changes in annual mean NO₂/PM₁₀ concentrations and 24-hour mean PM₁₀ concentrations resulting from the redevelopment.

ANNUAL MEAN NO₂ AND PM₁₀ CONCENTRATIONS

Significance criteria	Definition
NEUTRAL	The development causes no change in concentrations.
NEGLIGIBLE IMPACT	The development gives rise to a IMPERCEPTIBLE change in concentrations or; The development gives rise to a SMALL change in concentrations and predicted concentrations are below 36µg/m ³ ; or The development gives rise to a MEDIUM change in concentrations and predicted concentrations are below 30µg/m ³ ;
A SLIGHT ADVERSE IMPACT	The development gives rise to a SMALL increase in concentrations and predicted concentrations with the development in place are above 36µg/m ³ ; or The development gives rise to a MEDIUM increase in concentrations and predicted concentrations with the development in place are between 30-36µg/m ³ ; or The development gives rise to a LARGE increase in concentrations and predicted concentrations with the development in place are less than 36µg/m ³ .
A MODERATE ADVERSE IMPACT	The development gives rise to a MEDIUM increase in concentrations and predicted concentrations with the development in place are above 36µg/m ³ ; or The development gives rise to a LARGE increase in concentrations and predicted concentrations with the development in place are between 36-40µg/m ³ .
A SUBSTANTIAL ADVERSE IMPACT	The development gives rise to a LARGE increase in concentrations and predicted concentrations with the development in place exceed the objective level of 40µg/m ³ .
A SLIGHT BENEFICIAL IMPACT	The development gives rise to a SMALL decrease in concentrations and predicted concentrations without the development in place are above 36µg/m ³ ; or The development gives rise to a MEDIUM decrease in concentrations and predicted concentrations without the development in place are between 30-36µg/m ³ ; or The development gives rise to a LARGE decrease in concentrations and predicted concentrations without the development in place are less than 36µg/m ³ .
A MODERATE BENEFICIAL IMPACT	The development gives rise to a MEDIUM decrease in concentrations and predicted concentrations without the development in place are above 36µg/m ³ ; or The development gives rise to a LARGE decrease in concentrations and predicted concentrations without the development in place are between 36-40µg/m ³ .
A SUBSTANTIAL BENEFICIAL IMPACT	The development gives rise to a LARGE decrease in concentrations and predicted concentrations without the development in place exceed the objective level of 40µg/m ³ .

Where the magnitude of change in concentration **for annual mean NO₂ and PM₁₀** has been defined as follows:

An IMPERCEPTIBLE change is a change of <0.4µg/m³;

A SMALL change is a change of less than 0.4 – 2µg/m³;

A MEDIUM change is a change of 2 - 4µg/m³; and

A LARGE change is a change of > 4µg/m³.

An EXCEEDENCE is defined as a concentration that is predicted to be above the standard (40µg/m³) in, or after the objective achievement year (2005 for NO₂ and 2004 for PM₁₀) at a location where members of the public are likely to be exposed over the averaging period (1 year).

DAILY MEAN PM₁₀ CONCENTRATIONS

Significance criteria	Definition
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NEUTRAL	The development causes no change in the number of days of exceedence.
NEGLECTIBLE IMPACT	The development gives rise to a IMPERCEPTIBLE change in the number of days of exceedence; or The development gives rise to a SMALL change and the predicted number of days of exceedence is below 32 days; or The development gives rise to a MEDIUM change and the predicted number of days of exceedence is below 26 days.
A SLIGHT ADVERSE IMPACT	The development gives rise to a SMALL increase and the predicted number of days of exceedence is above 32 days; or The development gives rise to a MEDIUM increase and the predicted number of days of exceedence is between 26 and 32 days; or The development gives rise to a LARGE increase and the predicted number of days of exceedence is below 32 days.
A MODERATE ADVERSE IMPACT	The development gives rise to a MEDIUM increase and the predicted number of days of exceedence is above 32 days; or The development gives rise to a LARGE increase and the predicted number of days of exceedence is between 32 and 35 days.
A SUBSTANTIAL ADVERSE IMPACT	The development gives rise to a LARGE increase and the number of days of exceedence with the development in place is above 35 days.
A SLIGHT BENEFICIAL IMPACT	The development gives rise to a SMALL decrease and the predicted number of days of exceedence without the development is above 32 days; or The development gives rise to a MEDIUM decrease and the predicted number of days of exceedence without the development is between 26 and 32 days; or The development gives rise to a LARGE decrease and the predicted number of days of exceedence without the development is between 32 and 35 days.
A MODERATE BENEFICIAL IMPACT	The development gives rise to a MEDIUM decrease and the predicted number of days of exceedence without the development is above 32 days; or The development gives rise to a LARGE decrease and the predicted number of days of exceedence without the development is between 32 and 35 days.
A SUBSTANTIAL BENEFICIAL IMPACT	The development gives rise to a LARGE decrease and the number of days of exceedence without the development in place is above 35 days.

Where the magnitude of change is defined as the number of days of exceedence of a **daily mean PM₁₀ concentration** of 50µg/m³:

An IMPERCEPTIBLE change is a change of < 1 day;

A SMALL change is a change of 1- 2 days;

A MEDIUM change is a change of 2 - 4 days; and

A LARGE change is a change of > 4 days.

An EXCEEDENCE is defined as predicted 24-hour mean concentrations in excess of 50µg/m³ for more than 35 days per year, in, or after the objective achievement year (2004) at a location where members of the public are likely to be exposed over the averaging period (24-hours).

APPENDIX 8.6 MODEL ASSESSMENT RESULTS

NO ₂ Annual Mean	2005	Source
AQS Objective (µg/m ³)	40	UK Air Quality Strategy

Receptor Number	Receptor Name/Description	2010 baseline	2015 without development	2015 with development	Change
<i>Existing Receptors</i>					
1	113 Harborough Hills Road (Roadside Diffusion Tube)	45.99	34.09	35.87	1.78
2	Harborough Hills Road / Redfearn Street (Roadside Diffusion Tube)	41.64	31.28	32.42	1.14
3	Canal Street (Roadside Diffusion Tube)	35.34	26.67	27.04	0.37
4	Harborough Hills Road / Meadow Street (Roadside Diffusion Tube)	41.37	31.19	32.44	1.25
5	Burton Road (Roadside Diffusion Tube)	29.37	22.51	23.04	0.53
6	Burton Road (Kerbside Diffusion Tube)	32.09	24.24	24.98	0.74
7	Old Mill Lane / Eldon Street (Diffusion Tube)	42.32	31.40	32.15	0.75
8	Old Mill Lane / Honeywell Street (Diffusion Tube)	41.55	30.85	31.57	0.72
9	Harborough Hills Road, adj ex-bakery (Roadside Diffusion Tube)	65.81	50.57	53.41	2.84
10	Wakefield Road - Burton Road Junction ((Roadside Diffusion Tube)	40.66	30.08	32.03	1.95
11	Wakefield Road, approach Burton Road (Diffusion Tube)	38.43	28.53	30.26	1.73
12	49 Harborough Hill Road (Roadside Diffusion Tube)	64.28	49.29	52.04	2.75
13	Mottram Street / Eldon Street (Roadside Diffusion Tube)	27.18	21.16	21.31	0.15
14	Wakefield Rd, approach Burton Road (Diffusion Tube)	42.32	31.22	33.44	2.22
15	Slip Road / Harborough Hills Road (Diffusion Tube)	39.92	30.10	31.20	1.10
16	Pontefract Road / Queens Road (Roadside Diffusion Tube)	33.70	25.66	26.30	0.64
17	Victoria Rd / Huddersfield Road (Roadside Diffusion Tube)	36.32	27.17	27.62	0.45
18	Pontefract Road / Clyde Street (Diffusion Tube)	29.61	22.82	23.12	0.30
19	Victoria Road / Huddersfield Road (Diffusion Tube)	38.07	28.33	28.39	0.06
20	Burton Road - Rotherham Road Junction (Diffusion Tube)	37.12	28.07	28.98	0.91
21	Wakefield Road / Smithies Lane (Roadside Diffusion Tube)	36.92	27.48	28.88	1.40
22	135 Wakefield Road	35.36	26.43	27.79	1.36
23	23 Twibell Road	31.86	24.34	24.14	-0.20
24	123 Old Mill Lane	43.94	32.64	33.83	1.19
25	113 Old Mill Lane	45.89	34.02	35.79	1.77
26	14 Burton Road	31.11	23.63	24.31	0.68
27	1 Wakefield Road	33.20	25.01	25.98	0.97
28	21 Wakefield Road	36.39	27.15	28.61	1.46
29	42 Wakefield Road	33.68	25.32	26.47	1.15
30	121 Wakefield Road	35.58	26.58	27.96	1.38
31	1 to 11 Smithies Lane	32.70	24.67	25.44	0.77
32	120 Smithies Lane	27.26	21.17	21.27	0.10
33	7 Carlton Road	34.03	25.58	26.05	0.47
34	20 Carlton Road	29.77	22.78	22.98	0.20
35	167 Wakefield Road	37.33	27.76	29.12	1.36
36	199 Wakefield Road	28.79	22.13	22.66	0.53
37	6 Meadow Street	36.91	27.93	28.81	0.88
38	1 Meadow Street	36.33	27.50	28.34	0.84
39	107 Harborough Hills Road	58.49	44.48	46.82	2.34
40	134 Old Mill Lane	37.45	28.00	28.54	0.54
41	47 Old Mill Lane	42.72	30.90	31.63	0.73
42	74 Old Mill Lane	37.23	27.81	28.36	0.55
43	23 Old Mill Lane	41.11	30.52	31.22	0.70
44	92 Sheffield Road	46.00	34.00	34.13	0.13
45	56 Sheffield Road	45.46	33.64	33.78	0.14

PM ₁₀ Annual Mean	2004	Source
AQS Objective (µg/m ³) 2004	40	UK Air Quality Strategy

Receptor Number	Receptor Name/Description	2010 baseline	2015 without development	2015 with development	Change
<i>Existing Receptors</i>					
1	113 Harborough Hills Road (<i>Roadside Diffusion Tube</i>)	19.20	17.91	18.73	0.82
2	Harborough Hills Road / Redfearn Street (<i>Roadside Diffusion Tube</i>)	18.55	17.30	17.83	0.52
3	Canal Street (<i>Roadside Diffusion Tube</i>)	16.61	15.63	15.82	0.19
4	Harborough Hills Road / Meadow Street (<i>Roadside Diffusion Tube</i>)	18.42	17.20	17.73	0.53
5	Burton Road (<i>Roadside Diffusion Tube</i>)	15.10	14.34	14.56	0.22
6	Burton Road (<i>Kerbside Diffusion Tube</i>)	15.61	14.78	15.09	0.31
7	Old Mill Lane / Eldon Street (<i>Diffusion Tube</i>)	18.25	17.02	17.39	0.37
8	Old Mill Lane / Honeywell Street (<i>Diffusion Tube</i>)	18.04	16.85	17.20	0.35
9	Harborough Hills Road, adj ex-bakery (<i>Roadside Diffusion Tube</i>)	25.53	23.09	24.36	1.27
10	Wakefield Road - Burton Road Junction (<i>Roadside Diffusion Tube</i>)	17.65	16.53	17.39	0.86
11	Wakefield Road, approach Burton Road (<i>Diffusion Tube</i>)	17.11	16.06	16.81	0.75
12	49 Harborough Hill Road (<i>Roadside Diffusion Tube</i>)	24.96	22.61	23.81	1.20
13	Mottram Street / Eldon Street (<i>Roadside Diffusion Tube</i>)	14.69	13.99	14.05	0.06
14	Wakefield Rd, approach Burton Road (<i>Diffusion Tube</i>)	18.03	16.85	17.83	0.99
15	Slip Road / Harborough Hills Road (<i>Diffusion Tube</i>)	17.64	16.47	16.86	0.39
16	Pontefract Road / Queens Road (<i>Roadside Diffusion Tube</i>)	16.17	15.24	15.46	0.22
17	Victoria Rd / Huddersfield Road (<i>Roadside Diffusion Tube</i>)	16.76	15.75	15.96	0.21
18	Pontefract Road / Clyde Street (<i>Diffusion Tube</i>)	15.24	14.45	14.56	0.11
19	Victoria Road / Huddersfield Road (<i>Diffusion Tube</i>)	17.40	16.26	16.29	0.03
20	Burton Road - Rotherham Road Junction (<i>Diffusion Tube</i>)	17.47	16.38	16.78	0.40
21	Wakefield Road / Smithies Lane (<i>Roadside Diffusion Tube</i>)	16.71	15.73	16.30	0.57
22	135 Wakefield Road	16.39	15.44	16.01	0.57
23	23 Twibell Road	15.79	14.94	14.93	-0.01
24	123 Old Mill Lane	18.68	17.45	18.03	0.59
25	113 Old Mill Lane	19.18	17.88	18.70	0.82
26	14 Burton Road	15.44	14.64	14.92	0.28
27	1 Wakefield Road	15.92	15.05	15.46	0.40
28	21 Wakefield Road	16.65	15.67	16.29	0.62
29	42 Wakefield Road	16.02	15.13	15.61	0.48
30	121 Wakefield Road	16.44	15.48	16.07	0.59
31	1 to 11 Smithies Lane	15.80	14.94	15.25	0.31
32	120 Smithies Lane	14.67	13.97	14.02	0.04
33	7 Carlton Road	16.15	15.24	15.42	0.19
34	20 Carlton Road	15.22	14.44	14.52	0.08
35	167 Wakefield Road	16.82	15.82	16.37	0.55
36	199 Wakefield Road	14.96	14.22	14.43	0.21
37	6 Meadow Street	17.12	16.07	16.43	0.36
38	1 Meadow Street	16.96	15.93	16.27	0.34
39	107 Harborough Hills Road	23.10	21.07	22.07	1.00
40	134 Old Mill Lane	17.03	15.99	16.25	0.26
41	47 Old Mill Lane	18.06	16.86	17.22	0.35
42	74 Old Mill Lane	16.96	15.92	16.18	0.26
43	23 Old Mill Lane	17.92	16.74	17.08	0.34
44	92 Sheffield Road	19.19	17.84	17.89	0.06
45	56 Sheffield Road	19.07	17.74	17.80	0.06

PM₁₀ Daily Mean	2004	Source
AQS Objective days allowed in exceedences per annum (50 µg/m³)	35	UK Air Quality Strategy

Receptor Number	Receptor Name/Description	2010 baseline	2015 without development	2015 with development	Change
<i>Existing Receptors</i>					
1	113 Harborough Hills Road (Roadside Diffusion Tube)	2	1	2	1
2	Harborough Hills Road / Redfearn Street (Roadside Diffusion Tube)	2	1	1	0
3	Canal Street (Roadside Diffusion Tube)	1	0	0	0
4	Harborough Hills Road / Meadow Street (Roadside Diffusion Tube)	2	1	1	0
5	Burton Road (Roadside Diffusion Tube)	0	0	0	0
6	Burton Road (Kerbside Diffusion Tube)	0	0	0	0
7	Old Mill Lane / Eldon Street (Diffusion Tube)	2	1	1	0
8	Old Mill Lane / Honeywell Street (Diffusion Tube)	1	1	1	0
9	Harborough Hills Road, adj ex-bakery (Roadside Diffusion Tube)	14	8	11	3
10	Wakefield Road - Burton Road Junction ((Roadside Diffusion Tube)	1	1	1	0
11	Wakefield Road, approach Burton Road (Diffusion Tube)	1	0	1	1
12	49 Harborough Hill Road (Roadside Diffusion Tube)	12	7	10	3
13	Mottram Street / Eldon Street (Roadside Diffusion Tube)	0	0	0	0
14	Wakefield Rd, approach Burton Road (Diffusion Tube)	1	1	1	0
15	Slip Road / Harborough Hills Road (Diffusion Tube)	1	0	1	1
16	Pontefract Road / Queens Road (Roadside Diffusion Tube)	0	0	0	0
17	Victoria Rd / Huddersfield Road (Roadside Diffusion Tube)	1	0	0	0
18	Pontefract Road / Clyde Street (Diffusion Tube)	0	0	0	0
19	Victoria Road / Huddersfield Road (Diffusion Tube)	1	0	0	0
20	Burton Road - Rotherham Road Junction (Diffusion Tube)	1	0	1	1
21	Wakefield Road / Smithies Lane (Roadside Diffusion Tube)	1	0	0	0
22	135 Wakefield Road	0	0	0	0
23	23 Twibell Road	0	0	0	0
24	123 Old Mill Lane	2	1	1	0
25	113 Old Mill Lane	2	1	2	1
26	14 Burton Road	0	0	0	0
27	1 Wakefield Road	0	0	0	0
28	21 Wakefield Road	1	0	0	0
29	42 Wakefield Road	0	0	0	0
30	121 Wakefield Road	0	0	0	0
31	1 to 11 Smithies Lane	0	0	0	0
32	120 Smithies Lane	0	0	0	0
33	7 Carlton Road	0	0	0	0
34	20 Carlton Road	0	0	0	0
35	167 Wakefield Road	1	0	0	0
36	199 Wakefield Road	0	0	0	0
37	6 Meadow Street	1	0	0	0
38	1 Meadow Street	1	0	0	0
39	107 Harborough Hills Road	8	5	6	1
40	134 Old Mill Lane	1	0	0	0
41	47 Old Mill Lane	1	1	1	0
42	74 Old Mill Lane	1	0	0	0
43	23 Old Mill Lane	1	1	1	0
44	92 Sheffield Road	2	1	1	0
45	56 Sheffield Road	2	1	1	0