Appendix 6.1
Air Quality Modelling and Impacts

Impact Significance Criteria

Table AQ1 Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations

Magnitude of Change	Annual Mean NO_2 / PM_{10}	Days PM_{10} >50 $\mu g/m^3$
Very large	Increase/decrease > 25%	Increase/decrease > 25 days
Large	Increase/decrease 15-25%	Increase/decrease 15-25 days
Medium	Increase/decrease 10-15%	Increase/decrease 10-15 days
Small	Increase/decrease 5-10%	Increase/decrease 5-10 days
Very Small	Increase/decrease 1-5%	Increase/decrease 1-5 days
Extremely Small	Increase/decrease <1%	Increase/decrease <1 days

Table AQ1.2 Air Quality Impact Significance Criteria

Absolute Concentration in Relation to Objective	Change in Concentration					
	Extremely Small	**Very Small**	**Small**	**Moderate**	**Large**	**Very Large**
Decrease with Scheme						
Above Objective with Scheme	slight beneficial	slight beneficial	substantial beneficial	substantial beneficial	very substantial beneficial	very substantial beneficial
Above Objective in Do-min Below with Scheme	slight beneficial	moderate beneficial	substantial beneficial	substantial beneficial	very substantial beneficial	very substantial beneficial
Below (but not well below) Objective in Do-min	negligible	slight beneficial	slight beneficial	moderate beneficial	moderate beneficial	substantial beneficial
Well Below Objective in Do-min	negligible	negligible	slight beneficial	slight beneficial	slight beneficial	moderate beneficial
Increase with Scheme						
Above Objective in Do-min	slight adverse	slight adverse	substantial adverse	substantial adverse	very substantial adverse	very substantial adverse
Below Objective in Do-min Above with Scheme	slight adverse	moderate adverse	substantial adverse	substantial adverse	very substantial adverse	very substantial adverse
Below (but not well below) Objective with Scheme	negligible	slight adverse	slight adverse	moderate adverse	moderate adverse	substantial adverse
Well Below Objective with Scheme	negligible	negligible	slight adverse	slight adverse	slight adverse	moderate adverse

Well below the objective = < 75% of the objective level.
Below objective is effectively below or equal to objective.

Dispersion Modelling Methodology

1.1.1 Traffic Data

SIAS have supplied traffic data from the Central Scotland Transport Model for four separate scenarios: 1) 2001 baseline; 2) 2010 Committed Do-Minimum (CDM); 3) 2010 Raith Reference Case (RMN); and 4) 2010 With Scheme. The baseline year for the air quality assessment is 2004. Following a methodology provided by SIAS, 2004 traffic flows for each link have been derived by link-specific interpolation between 2001 and the 2010 CDM. In the rare event that a road was present in 2004, but was not present in 2001, the 2010 CDM data for that link were factored using the average interpolation factors derived from the entire road network. Average speeds and fleet composition statistics were appropriately flow-weighted.

The dispersion model requires a diurnal profile of traffic flows. These data were unavailable from the traffic model and locally-specific data were not deemed appropriate to use. A diurnal traffic profile from Dft (2005) which represents a UK average was thus used.

The traffic data were supplied both as annual average daily flows and as peak-hour data. The dispersion model requires peak-hour traffic data, but because the primary concern for air quality is long-term concentrations, and because the relationship between peak-hour flow and annual average flow is not constant, the air quality modelling used a pseudo-peak-hour flow, which was derived from the annual average daily flow, using the diurnal profile described above.

1.1.2 Background Concentrations

These have been taken from the 2006 editions of the national maps supplied by Defra and the DAs (2006). The specific background concentration for the particular grid square in which each receptor lies has been used. Because these background maps already include road transport sources there will inevitably be some double counting.

1.1.3 Meteorological Data

A full year of hourly meteorological data from the Glasgow Meteorological Office station from 2004 was used for each of the model runs.

1.1.4 Model Set-Up

All of the roads explicitly included in the model (as described within the main report) were assigned real-world geography by LandAspects.

SIAS provided average speeds for each link in the road model. However, in order to take account of the reduced speeds around some road junctions, the following approach was taken. For each road where (based on a review of the junction shape, maps and aerial photographs) it was judged that vehicles would slow on approach to the junction (or accelerate on departure from the junction), a 50m buffer was drawn along the road. Each section of a road within such a buffer was assigned a speed one third of that of the remainder of the link. The application of this rule was based on professional judgement, because it would clearly have been inappropriate to apply it to very short links.

1.1.5 Model Verification

The algorithms on which the AAQuIRE dispersion model is based have undergone extensive international validation. This validation has not, however, been performed for this specific geographical area and these specific input data. It is thus important to verify the model results by comparing them with local measurements. By adjusting the model to agree closely with the measured data, any inherent uncertainties can be minimised. The model verification has followed the approach set out in the M8 Baillieston to Newhouse Stage 3 Assessment, but as noted above, different background concentrations have been used. The verification does, however, use the same measurements and apply the same methodology as set out in the M8 Baillieston to Newhouse Stage 3 Assessment. For this reason, some of the monitoring sites used for model verification are outside of the current local air quality study area.

Oxides of Nitrogen

Most nitrogen dioxide (NO_2) is produced in the atmosphere by reaction from the primary pollutant, nitrogen oxides (NOx), with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions. The model has been run to predict annual mean concentrations of NOx during 2004 at the five automatic monitoring sites run by North Lanarkshire Council for which the Council were able to supply precise locations. The sites included are discussed below. Because pollutant concentrations can vary considerably over a short distance, it was decided to exclude the other two sites (Calder Court and Kirk o' Shotts), for which precise locations were unavailable. Overall, the effect of this detail would have been negligible.

Of the five sites, 3 were run for 6 months during 2004, one was run for 12 months during 2004, and one was only run for 2 months during 2004. North Lanarkshire Council supplied all of the data available to them, and these have been used to derive the most appropriate model adjustment possible. The following approach was used.

Motherwell Civic Centre; Motherwell Roadside; and Wishaw. Approximately 6 months of nitrogen dioxide and NOx measurements from each site (3 months summer and 3 months winter), adjusted to a 2004 annual mean equivalent by North Lanarkshire Council.

Hirst Road, Harthill. 12 months of measurements during 2004. The Council supplied measured NOx concentrations. This site has been assigned twice the weight of each of the other sites in calculating the best-fit relationship between the measurements and the modelled results, simply because the monitoring period was twice as long and the measured annual mean concentrations are thus more reliable.

Chapelhall. Only 2 months of measurements during 2004. However, the Council's 2005 air quality Progress Report (North Lanarkshire, 2005) also presents nitrogen dioxide measurements from this site up to the end of March, 2005. The same approach as that used by the Council[1] has been used to derive a 2004 annual mean equivalent nitrogen

[1] i.e. adjusting the short-term mean in line with long-term trends at the Glasgow Centre AURN site.

dioxide concentration. The NOx from NO_2 calculator published by Defra and the DAs (2005a) was then used to predict the corresponding NOx concentration.

The raw model outputs relate to road-NOx (i.e. the component of total NOx coming from road traffic). This has been compared with the measured road-NOx by subtracting the estimated background NOx concentrations from the total measured NOx. The result of this comparison is shown in Figure AQ1.1. There is considerable scatter around the 1:1 line, and overall, the model appears to under-predict concentrations (i.e. most of the data lie below the 1:1 line). Applying ordinary least squares regression (forced through zero) the best fit relationship between the data points in Figure AQ1.1 can be described by:

measured road-NOx = modelled road NOx x 1.918.

The raw modelled road-NOx concentrations have therefore been multiplied by 1.918.

The adjusted modelled road-NOx was then added to the predicted background NOx for each receptor, before road-NO_2 concentrations were calculated following the relationship advised by Defra and the DAs (2003b):

road-NO_2 = -0.068 x LN total-NOx + 0.53 x road-NOx

Total-NO_2 concentrations were then derived by summing the road-NO_2 with the predicted background NO_2 for the relevant receptor. Figure AQ1.2 shows how the adjusted total NO_2 concentrations compare with the relevant measured (annual mean equivalent) values. The fit is generally good, but it does appear that the adjusted model may tend to over-predict concentrations toward the lower end of the measured range and to under-predict the higher concentrations.

PM_{10}

It has not been possible to apply the same approach to verifying PM_{10} as was used for NOx because of uncertainty surrounding predictions of background PM_{10} concentrations. An alternative approach has thus been applied which makes use of the conclusions of the NOx verification described above.

PM_{10} is not measured at Wishaw and so the PM_{10} verification relied on just four monitoring sites. As with nitrogen dioxide, the data from Chapelhall were augmented with those from the additional monitoring period and the annual mean was subsequently derived using the same method as that used by North Lanarkshire Council. Data from Hirst Road were not assigned double-weight (as they were for nitrogen dioxide) because there was quarrying in the vicinity of the monitor and it is not known whether this will have influenced the data.

The same processes that act on emissions and dispersion of road-NOx will also act on road-PM_{10}. Road-PM_{10} has thus been adjusted by the same factor as road-NOx (1.918). Not to do this would risk underestimating PM_{10} concentrations.

It is well-known that in this region, the previous background pollutant maps that were published by Defra and the DAs (2005a) could often over-predict PM_{10} concentrations. While the new background maps offer an improvement, they still over-predict in some locatons. This is easily demonstrated by the fact that the predicted background concentration around Motherwell (17 $\mu g/m^3$ in 2004) is greater than the measured (adjusted to annual mean) concentration at Motherwell Roadside (13 $\mu g/m^3$ in 2004). The predicted background concentrations have been adjusted in line with the measured data as follows:

1) Road-PM_{10} was multiplied by 1.918 (as described above).

2) Background-PM_{10} was multiplied by unknown "A".

3) The adjusted road-PM_{10} and adjusted background-PM_{10} were summed to give adjusted total-PM_{10}.

4) The best fit relationship between measured PM_{10} and adjusted total-PM_{10} (ordinary least squares regression, forced through zero) was calculated.

5) Unknown "A" was then varied until the best fit relationship described above became y = x. The optimal background adjustment factor was thus 0.7504.

In summary, total modelled PM_{10} is the sum of (modelled x 1.918) and (background x 0.7504). Figure AQ1.3 sets out how the adjusted modelled data and the measured data compare.

Since there is no reliable way to model the background component of 24-hour mean PM_{10} concentrations, the number of exceedences of 50 $\mu g/m^3$ as a 24-hour mean PM_{10} concentration has been calculated from the adjusted-modelled total annual mean concentration following the relationship advised by Defra and the DAs (2003b):

$$A = -18.5 + 0.00145\ B3 = 206/B$$

where A is the number of exceedences of 50 $\mu g/m^3$ as a 24-hour mean PM_{10} concentration and B is the annual mean PM_{10} concentration. The relationship is only applied to annual mean concentrations greater than 16.5 $\mu g/m^3$, below this concentration, the number of 24-hour exceedences is assumed to be zero.

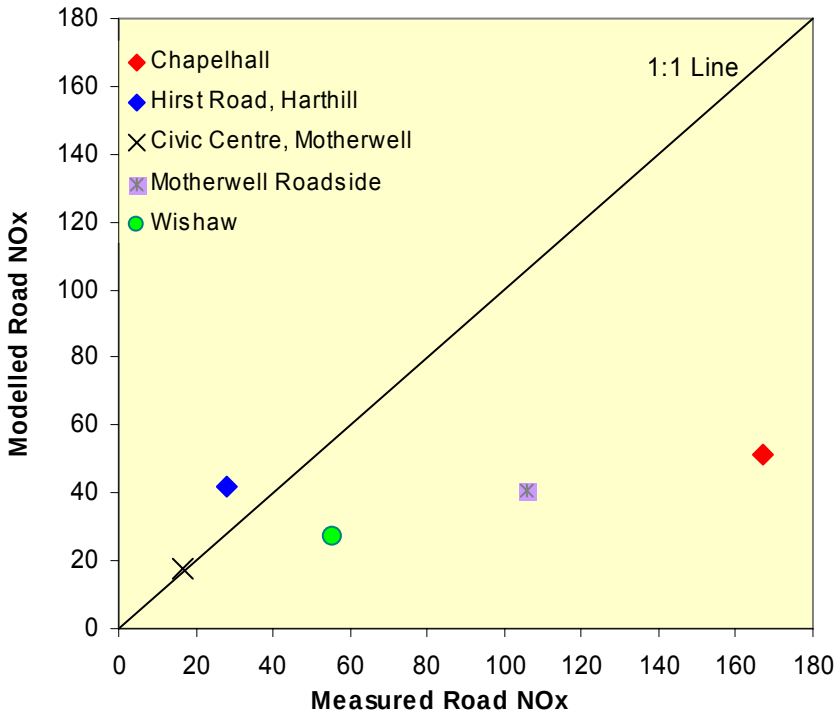

Figure AQ1.1 Measured vs Modelled Road-NOx (unadjusted**)**

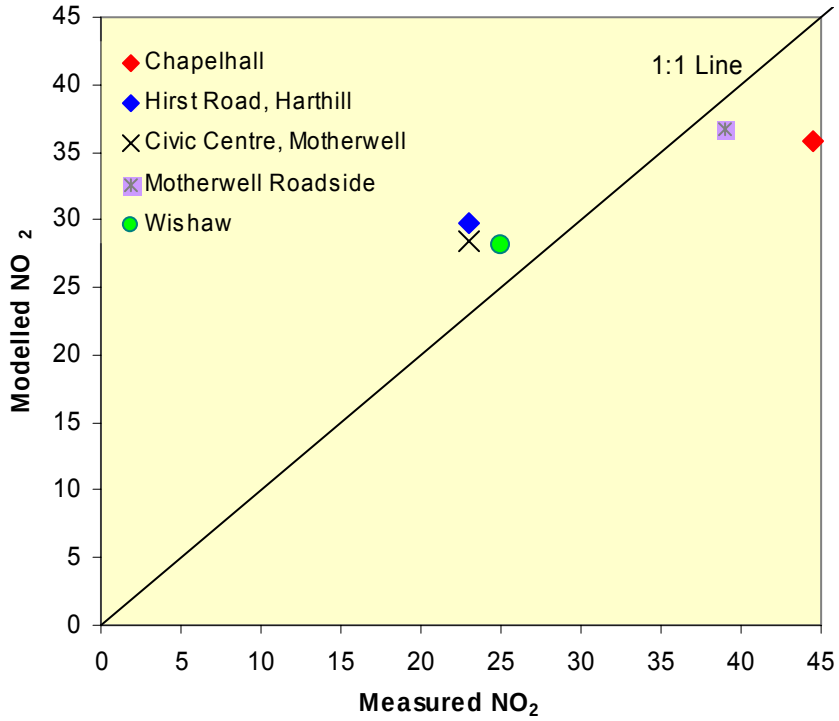

Figure AQ1.2 Measured vs Modelled Nitrogen Dioxide (adjusted)

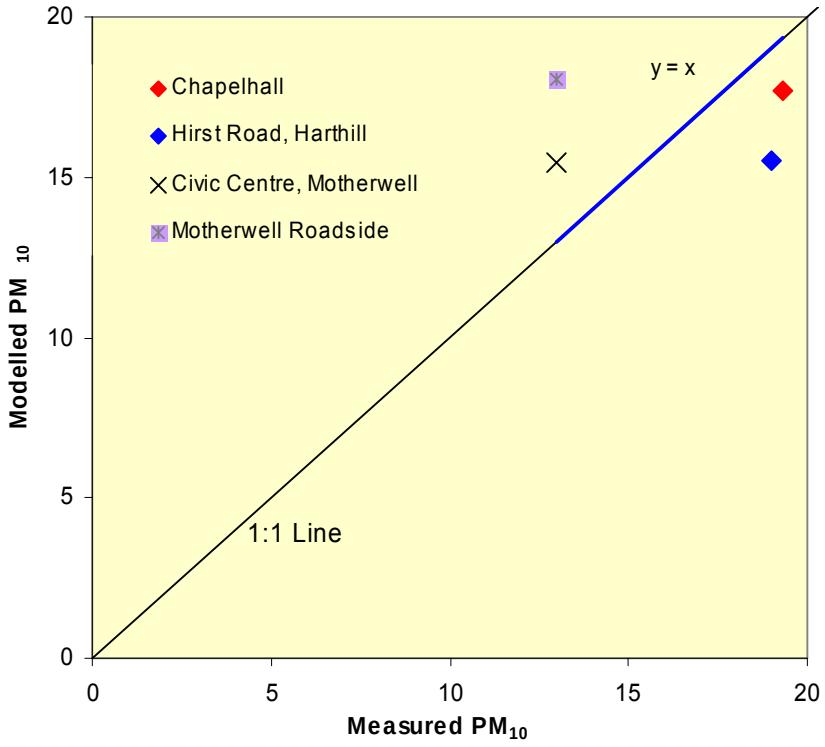

Figure AQ1.3 Measured vs Modelled PM_{10} (adjusted)

Model Results

Table AQ1.3 Modelled Annual Mean Nitrogen Dioxide Concentrations ($\mu g/m^3$) with and Without the Proposed Scheme. Receptors that are also presented in the main report are shaded.

R	M8[a]	Description	2004	2010 RMN[b]	2010 DS[c]	% Change	Impact Magnitude	Impact Significance
1	**93**	Manse Road, Motherwell (AQMA)	33.5	27.5	27.8	0.9%	Extremely Small	Negligible
2	4	Motherwell Cross AQMA (Monitor) [d]	37.9	30.8	30.4	-1.2%	Very Small	Slight Beneficial
3	6	2 Manse Road, Newmains, Wishaw	30.5	23.2	22.7	-2.0%	Very Small	Negligible
4	7	135 Main Street, Newmains, Wishaw	19.3	14.0	13.6	-3.1%	Very Small	Negligible
5	8	91 Wildman Road, Law, Carluke	13.0	9.6	9.5	-1.6%	Very Small	Negligible
6	**9**	3 Brownlee Road, Law, Carluke	14.0	10.9	10.6	-2.7%	Very Small	Negligible
7	10	126 Main Street, Overtown, Wishaw	16.3	12.8	12.4	-2.7%	Very Small	Negligible
8	11	173a Wishaw Road, , Wishaw	21.2	17.0	16.0	-6.0%	Small	Slight Beneficial
9	12	2 Stewarton Street, , Wishaw	33.3	25.5	25.4	-0.5%	Extremely Small	Negligible
10	16	Motherwell Road, Motherwell	31.4	24.3	24.5	0.8%	Extremely Small	Negligible
11	22	Merry Street, Motherwell	30.1	25.3	23.9	-5.6%	Small	Slight Beneficial
12	23	Jerviston Street, New Stevenston, Motherwell	24.4	18.8	19.2	2.1%	Very Small	Negligible
13	28	56 Calder Road, Bellshill	27.1	21.4	21.6	1.1%	Very Small	Negligible
14	29	174 Motherwell Road, Bellshill	29.9	24.8	25.5	2.7%	Very Small	Negligible
15	30	62 Hamilton Road, Bellshill	31.7	25.5	27.3	6.8%	Small	Slight Adverse
16	31	47 South View, Bellshill	33.1	27.8	30.3	9.3%	Small	Slight Adverse
17	32	6 Lysa Vale Place, Bellshill	39.5	33.1	34.5	4.2%	Very Small	Slight Adverse
18	**33**	26 Caldwell Grove, Bellshill	32.0	26.4	27.1	2.6%	Very Small	Negligible
19	34	2 Rowanden Avenue, Bellshill	31.1	25.6	26.0	1.6%	Very Small	Negligible
20	35	5 Huntly Avenue, Bellshill	36.4	30.1	30.2	0.4%	Extremely Small	Negligible
21	36	Bellshill Road, Motherwell	27.9	23.0	23.5	2.1%	Very Small	Negligible
22	38	7 Clydeview, Bothwell, Glasgow	28.7	23.7	24.9	4.7%	Very Small	Negligible
23	39	Strathclyde Park Inn, Hamilton Road, Motherwell	37.6	31.5	32.8	4.2%	Very Small	Slight Adverse
24	40	72 Wordsworth Way, Bothwell, Glasgow	30.2	25.6	25.9	1.2%	Very Small	Negligible
25	41	38 Sheepburn Road, Uddingston, Glasgow	39.7	33.5	33.5	0.1%	Extremely Small	Negligible
26	42	17 Kilpatrick Way, Uddingston, Glasgow	33.1	27.8	27.0	-3.0%	Very Small	Negligible
27	43	285 New Edinburgh Road, Uddingston, Glasgow	36.3	30.7	30.3	-1.4%	Very Small	Slight Beneficial
28	44	21 Maryville View, Uddingston, Glasgow	38.3	32.4	32.1	-0.9%	Extremely Small	Negligible

R	M8[a]	Description	2004	2010 RMN[b]	2010 DS[c]	% Change	Impact Magnitude	Impact Significance
29	56	Whifflet Street, Coatbridge AQMA.	32.5	27.0	26.7	-1.0%	Very Small	Negligible
30	57	16-17 John Smith Gardens, Coatbridge	29.0	24.1	24.7	2.5%	Very Small	Negligible
31	59	Sweethill Terrace, Coatbridge	25.5	22.5	23.0	2.3%	Very Small	Negligible
32	**77**	Ivycott, Carnbroe Road, Coatbridge	44.0	27.0	31.2	15.6%	Large	Moderate Adverse
33	85	25 Ayr Road, Shawsburn, Larkhall	24.8	18.3	17.7	-3.2%	Very Small	Negligible
34	**92**	Auld House, Whifflet Street, Coatbridge (AQMA)	34.8	28.7	29.0	1.0%	Extremely Small	Negligible
35	-	84 Carmyle Ave, Glasgow	29.7	31.0	25.1	-19.0%	Large	Moderate Beneficial
36	-	1 Inzievar Terrace, Glasgow	30.8	26.6	26.0	-2.1%	Very Small	Negligible
37	-	11 Thomson Grove, Cambuslang	26.5	22.8	22.6	-0.9%	Extremely Small	Negligible
38	-	16 Glenpark Gardens, Cambuslang	30.1	25.2	25.0	-0.9%	Extremely Small	Negligible
39	-	73 Underwood Road, Rutherglen	28.2	23.5	23.4	-0.5%	Extremely Small	Negligible
40	-	37 Warriston Way, Rutherglen	23.9	20.5	20.3	-1.1%	Very Small	Negligible
41	-	141 Glasgow Road, East Kilbride	26.0	22.2	22.5	1.0%	Very Small	Negligible
42	-	PM_{10} monitor on Whirlies Roundabout [d]	33.8	27.7	28.7	3.6%	Very Small	Negligible
43	-	203 Maxwellton Avenue, East Kilbride	29.2	25.4	25.9	1.9%	Very Small	Negligible
44	-	24 Sandalwood Avenue, East Kilbride	24.8	22.3	23.2	3.9%	Very Small	Negligible
45	-	25 Macbeth, East Kilbride	33.2	28.2	29.0	2.9%	Very Small	Negligible
46	-	Flats at 1 Hunthill Road, Blantyre	28.0	21.2	20.6	-2.7%	Very Small	Negligible
47	-	51 Kirkton Avenue, Blantyre	32.2	26.7	28.6	7.1%	Small	Slight Adverse
48	-	1 Catherines Walk, Blantyre	26.9	22.7	22.9	0.9%	Extremely Small	Negligible
49	-	142 Parkville Drive, Blantyre	30.5	25.7	27.5	7.3%	Small	Slight Adverse
50	-	121 High Blantyre Road, Hamilton	30.7	25.8	25.1	-2.8%	Very Small	Negligible
51	-	6 Wellhall Road, Hamilton	40.3	30.6	30.3	-1.0%	Very Small	Slight Beneficial
52	-	77 Neilsland Road, Hamilton	22.8	19.6	19.6	-0.2%	Extremely Small	Negligible
53	-	1 Hillhouse Road, Hamilton	23.5	20.1	20.1	0.0%	Extremely Small	Negligible
54	-	43 Bothwell Road, Hamilton	27.8	23.4	23.9	2.2%	Very Small	Negligible
55	-	91 Mote Hill, Hamilton	33.9	28.4	25.6	-9.9%	Small	Slight Beneficial
56	-	14 Hamilton Road, Bothwell	32.0	26.9	25.7	-4.6%	Very Small	Negligible
57	-	28 Fallside Road, Bothwell	28.6	24.1	23.1	-4.1%	Very Small	Negligible
58	-	8 Main Street, Uddingston	33.2	27.3	26.9	-1.2%	Very Small	Negligible
59	-	1 Rosefield Gardens, Uddingston	33.0	27.4	26.5	-2.9%	Very Small	Negligible
60	-	18 Avonbridge Drive, Hamilton	26.7	22.2	22.3	0.4%	Extremely Small	Negligible
61	-	71 Olifard Avenue, Bothwell	29.3	24.4	25.0	2.4%	Very Small	Negligible
62	-	2 Northway, Blantyre	26.7	19.7	19.5	-1.3%	Very Small	Negligible
63	-	103 Overton Road,	24.1	18.2	17.6	-3.3%	Very Small	Negligible

R	M8[a]	Description	2004	2010 RMN[b]	2010 DS[c]	% Change	Impact Magnitude	Impact Significance
		Cambuslang						
64	-	23 Dalton Cottages, Hamilton Road, Cambuslang	26.2	20.1	20.2	0.4%	Extremely Small	Negligible
65	-	34 Waterside Street,	25.2	13.4	12.9	-3.5%	Very Small	Negligible
66	-	125 Strathaven Road, Stonehouse	10.7	7.8	7.5	-3.7%	Very Small	Negligible
67	-	9 Strutherhill, Larkhall	21.2	15.0	15.2	1.2%	Very Small	Negligible
68	-	1 Main Street, Stewarton	11.2	8.5	9.0	6.1%	Small	Slight Adverse
69	-	48 Harris Close, Newton Mearns	18.6	12.9	12.7	-1.7%	Very Small	Negligible
70	-	Bogside Bungalow , Eaglesham	12.8	9.9	10.1	1.4%	Very Small	Negligible
71	-	Halifax Plc. Merry Street, Motherwell AQMA[d]	40.0	32.4	32.0	-1.4%	Very Small	Slight Beneficial
72	-	33 Laighlands Road, Bothwell	26.5	22.2	22.6	2.0%	Very Small	Negligible

[a] Number used to describe the same receptor in the M8 Baillieston to Newhouse Stage 3 Assessment. Those that were included in the main report of the M8 Baillieston to Newhouse Stage 3 Assessment are shown in bold.
[b] Raith Reference Case
[c] Do Something (With Scheme)
[d] These locations are non-residential and so the objectives do not apply here.

Table AQ1.4 Modelled Annual Mean PM_{10} Concentrations ($\mu g/m^3$) with and Without the Proposed Scheme. Receptors that are also presented in the main report are shaded. Objective exceedences are shown in bold.

R	M8[a]	Description	2004	2010 RMN[b]	2010 DS[c]	% Change	Impact Magnitude	Impact Significance
1	**93**	Manse Road, Motherwell (AQMA)	17.9	16.2	16.3	0.5%	Extremely Small	Negligible
2	4	Motherwell Cross AQMA (Monitor) [d]	18.6	17.0	16.8	-0.9%	Extremely Small	Negligible
3	6	2 Manse Road, Newmains, Wishaw	16.1	14.2	14.0	-1.3%	Very Small	Slight Beneficial
4	7	135 Main Street, Newmains, Wishaw	12.7	11.5	11.3	-1.4%	Very Small	Negligible
5	8	91 Wildman Road, Law, Carluke	11.0	10.3	10.2	-1.1%	Very Small	Negligible
6	**9**	3 Brownlee Road, Law, Carluke	11.4	11.0	10.8	-1.4%	Very Small	Negligible
7	10	126 Main Street, Overtown, Wishaw	11.8	11.4	11.2	-1.3%	Very Small	Negligible
8	11	173a Wishaw Road, , Wishaw	13.3	12.8	12.4	-3.2%	Very Small	Negligible
9	12	2 Stewarton Street, , Wishaw	16.9	15.4	15.3	-0.7%	Extremely Small	Negligible
10	16	Motherwell Road, Motherwell	16.3	15.2	15.5	1.8%	Very Small	Slight Adverse
11	22	Merry Street, Motherwell	16.2	15.5	14.7	-5.1%	Small	Slight Beneficial
12	23	Jerviston Street, New Stevenston, Motherwell	13.9	13.3	13.6	2.2%	Very Small	Slight Adverse
13	28	56 Calder Road, Bellshill	14.5	13.4	13.8	3.6%	Very Small	Slight Adverse
14	29	174 Motherwell Road, Bellshill	15.8	14.6	15.1	3.4%	Very Small	Slight Adverse
15	30	62 Hamilton Road, Bellshill	16.3	14.7	15.8	7.9%	Small	Slight Adverse
16	31	47 South View, Bellshill	16.6	15.7	17.6	12.2%	Medium	Moderate Adverse
17	32	6 Lysa Vale Place, Bellshill	19.7	**18.5**	**19.6**	5.9%	Small	Substantial Adverse
18	**33**	26 Caldwell Grove, Bellshill	16.0	15.1	15.6	3.3%	Very Small	Slight Adverse
19	34	2 Rowanden Avenue, Bellshill	16.5	15.2	15.5	1.5%	Very Small	Slight Adverse
20	35	5 Huntly Avenue, Bellshill	18.3	16.5	16.6	0.9%	Extremely Small	Negligible
21	36	Bellshill Road, Motherwell	15.2	14.0	14.3	2.3%	Very Small	Slight Adverse
22	38	7 Clydeview, Bothwell, Glasgow	15.1	14.2	15.0	5.7%	Small	Slight Adverse
23	39	Strathclyde Park Inn, Hamilton Road, Motherwell	18.8	17.8	**19.3**	8.7%	Small	Substantial Adverse
24	40	72 Wordsworth Way, Bothwell, Glasgow	15.7	14.9	15.1	1.2%	Very Small	Slight Adverse
25	41	38 Sheepburn Road, Uddingston, Glasgow	20.0	**19.0**	**19.2**	0.8%	Extremely Small	Slight Adverse
26	42	17 Kilpatrick Way, Uddingston, Glasgow	16.6	15.4	15.1	-2.0%	Very Small	Slight Beneficial
27	43	285 New Edinburgh Road, Uddingston, Glasgow	17.9	16.7	16.6	-1.1%	Very Small	Slight Beneficial
28	44	21 Maryville View, Uddingston, Glasgow	18.6	**18.1**	18.0	-0.8%	Extremely Small	Slight Beneficial
29	56	Whifflet Street, Coatbridge AQMA	15.9	15.1	14.8	-1.5%	Very Small	Slight Beneficial
30	57	16-17 John Smith Gardens, Coatbridge	15.2	13.8	14.3	3.2%	Very Small	Slight Adverse

R	M8[a]	Description	2004	2010 RMN[b]	2010 DS[c]	% Change	Impact Magnitude	Impact Significance
31	59	Sweethill Terrace, Coatbridge	14.4	14.1	14.5	2.7%	Very Small	Slight Adverse
32	**77**	Ivycott, Carnbroe Road, Coatbridge	22.2	15.6	**18.4**	17.5%	Large	Very Substantial Adverse
33	85	25 Ayr Road, Shawsburn, Larkhall	13.4	12.7	12.4	-2.6%	Very Small	Negligible
34	**92**	Auld House, Whifflet Street, Coatbridge (AQMA)	16.5	15.0	15.3	1.5%	Very Small	Slight Adverse
35	-	84 Carmyle Ave, Glasgow	14.9	16.6	13.9	-16.1%	Large	Moderate Beneficial
36	-	1 Inzievar Terrace, Glasgow	15.4	14.8	14.5	-2.1%	Very Small	Slight Beneficial
37	-	11 Thomson Grove, Cambuslang	14.1	13.4	13.3	-1.1%	Very Small	Negligible
38	-	16 Glenpark Gardens, Cambuslang	15.6	14.7	14.4	-1.8%	Very Small	Slight Beneficial
39	-	73 Underwood Road, Rutherglen	15.2	14.1	13.9	-1.4%	Very Small	Slight Beneficial
40	-	37 Warriston Way, Rutherglen	13.5	12.9	12.8	-1.1%	Very Small	Negligible
41	-	141 Glasgow Road, East Kilbride	14.5	14.0	14.3	1.8%	Very Small	Slight Adverse
42	-	PM_{10} monitor on Whirlies Roundabout [d]	17.7	16.3	16.8	3.1%	Very Small	Slight Adverse
43	-	203 Maxwellton Avenue, East Kilbride	16.7	16.1	16.5	3.0%	Very Small	Slight Adverse
44	-	24 Sandalwood Avenue, East Kilbride	14.4	13.9	14.3	2.7%	Very Small	Slight Adverse
45	-	25 Macbeth, East Kilbride	17.8	17.5	**18.1**	3.3%	Very Small	Moderate Adverse
46	-	Flats at 1 Hunthill Road, Blantyre	15.0	14.0	14.0	0.1%	Extremely Small	Negligible
47	-	51 Kirkton Avenue, Blantyre	17.3	16.5	17.9	8.4%	Small	Slight Adverse
48	-	1 Catherines Walk, Blantyre	14.5	13.8	13.9	1.1%	Very Small	Slight Adverse
49	-	142 Parkville Drive, Blantyre	18.1	17.6	**18.8**	6.7%	Small	Substantial Adverse
50	-	121 High Blantyre Road, Hamilton	18.0	17.4	17.1	-1.9%	Very Small	Slight Beneficial
51	-	6 Wellhall Road, Hamilton	20.6	17.9	**18.1**	0.9%	Extremely Small	Slight Adverse
52	-	77 Neilsland Road, Hamilton	13.8	13.1	13.0	-0.2%	Extremely Small	Negligible
53	-	1 Hillhouse Road, Hamilton	14.3	13.5	13.6	0.4%	Extremely Small	Negligible
54	-	43 Bothwell Road, Hamilton	15.3	14.4	14.7	2.3%	Very Small	Slight Adverse
55	-	91 Mote Hill, Hamilton	17.6	16.6	14.7	-11.1%	Medium	Moderate Beneficial
56	-	14 Hamilton Road, Bothwell	16.6	15.8	15.3	-3.2%	Very Small	Slight Beneficial
57	-	28 Fallside Road, Bothwell	15.3	14.5	13.9	-4.2%	Very Small	Slight Beneficial
58	-	8 Main Street, Uddingston	17.3	15.8	15.6	-1.1%	Very Small	Slight Beneficial
59	-	1 Rosefield Gardens, Uddingston	17.0	15.8	15.4	-3.1%	Very Small	Slight Beneficial
60	-	18 Avonbridge Drive, Hamilton	14.3	13.3	13.2	-0.1%	Extremely Small	Negligible
61	-	71 Olifard Avenue, Bothwell	15.2	14.4	14.7	1.9%	Very Small	Slight Adverse
62	-	2 Northway, Blantyre	14.1	13.2	13.0	-1.3%	Very Small	Negligible
63	-	103 Overton Road, Cambuslang	12.9	12.3	12.0	-2.4%	Very Small	Negligible
64	-	23 Dalton Cottages, Hamilton Road, Cambuslang	13.9	13.5	13.3	-1.1%	Very Small	Negligible

R	M8[a]	Description	2004	2010 RMN[b]	2010 DS[c]	% Change	Impact Magnitude	Impact Significance
65	-	34 Waterside Street,	14.1	12.1	11.5	-4.4%	Very Small	Negligible
66	-	125 Strathaven Road, Stonehouse	10.1	9.7	9.5	-1.9%	Very Small	Negligible
67	-	9 Strutherhill, Larkhall	12.5	11.9	12.0	1.2%	Very Small	Negligible
68	-	1 Main Street, Stewarton	9.8	9.1	9.2	0.9%	Extremely Small	Negligible
69	-	48 Harris Close, Newton Mearns	11.0	10.1	10.1	-0.4%	Extremely Small	Negligible
70	-	Bogside Bungalow , Eaglesham	10.1	9.5	9.6	0.3%	Extremely Small	Negligible
71	-	Halifax Plc. Merry Street, Motherwell AQMA[d]	19.5	17.8	17.5	-1.2%	Very Small	Slight Beneficial
72	-	33 Laighlands Road, Bothwell	14.3	13.5	13.8	2.3%	Very Small	Slight Adverse

[a] Number used to describe the same receptor in the M8 Baillieston to Newhouse Stage 3 Assessment. Those that were included in the main report of the M8 Baillieston to Newhouse Stage 3 Assessment are shown in bold.
[b] Raith Reference Case
[c] Do Something (With Scheme)
[d] These locations are non-residential and so the objectives do not apply here.

Table AQ1.5 Modelled Number of 24-hour PM_{10} Exceedences ($\mu g/m^3$) with and Without the Proposed Scheme. Receptors that are also presented in the main report are shaded.

R	M8[a]	Description	2004	2010 RMN[b]	2010 DS[c]	Change (days)	Impact Magnitude	Impact Significance
1	**93**	Manse Road, Motherwell (AQMA)	1	0	0	0	Extremely Small	Negligible
2	4	Motherwell Cross AQMA (Monitor) [d]	2	1	1	0	Extremely Small	Negligible
3	6	2 Manse Road, Newmains, Wishaw	0	0	0	0	Extremely Small	Negligible
4	7	135 Main Street, Newmains, Wishaw	0	0	0	0	Extremely Small	Negligible
5	8	91 Wildman Road, Law, Carluke	0	0	0	0	Extremely Small	Negligible
6	**9**	3 Brownlee Road, Law, Carluke	0	0	0	0	Extremely Small	Negligible
7	10	126 Main Street, Overtown, Wishaw	0	0	0	0	Extremely Small	Negligible
8	11	173a Wishaw Road, , Wishaw	0	0	0	0	Extremely Small	Negligible
9	12	2 Stewarton Street, , Wishaw	1	0	0	0	Extremely Small	Negligible
10	16	Motherwell Road, Motherwell	0	0	0	0	Extremely Small	Negligible
11	22	Merry Street, Motherwell	0	0	0	0	Extremely Small	Negligible
12	23	Jerviston Street, New Stevenston, Motherwell	0	0	0	0	Extremely Small	Negligible
13	28	56 Calder Road, Bellshill	0	0	0	0	Extremely Small	Negligible
14	29	174 Motherwell Road, Bellshill	0	0	0	0	Extremely Small	Negligible
15	30	62 Hamilton Road, Bellshill	0	0	0	0	Extremely Small	Negligible
16	31	47 South View, Bellshill	1	0	1	1	Extremely Small	Negligible
17	32	6 Lysa Vale Place, Bellshill	3	2	3	1	Very Small	Negligible
18	**33**	26 Caldwell Grove, Bellshill	0	0	0	0	Extremely Small	Negligible
19	34	2 Rowanden Avenue, Bellshill	0	0	0	0	Extremely Small	Negligible

R	M8[a]	Description	2004	2010 RMN[b]	2010 DS[c]	Change (days)	Impact Magnitude	Impact Significance
20	35	5 Huntly Avenue, Bellshill	2	0	1	0	Extremely Small	Negligible
21	36	Bellshill Road, Motherwell	0	0	0	0	Extremely Small	Negligible
22	38	7 Clydeview, Bothwell, Glasgow	0	0	0	0	Extremely Small	Negligible
23	39	Strathclyde Park Inn, Hamilton Road, Motherwell	2	1	3	1	Very Small	Negligible
24	40	72 Wordsworth Way, Bothwell, Glasgow	0	0	0	0	Extremely Small	Negligible
25	41	38 Sheepburn Road, Uddingston, Glasgow	3	2	2	0	Extremely Small	Negligible
26	42	17 Kilpatrick Way, Uddingston, Glasgow	1	0	0	0	Extremely Small	Negligible
27	43	285 New Edinburgh Road, Uddingston, Glasgow	1	1	1	0	Extremely Small	Negligible
28	44	21 Maryville View, Uddingston, Glasgow	2	1	1	0	Extremely Small	Negligible
29	56	Whifflet Street, Coatbridge AQMA	0	0	0	0	Extremely Small	Negligible
30	57	16-17 John Smith Gardens, Coatbridge	0	0	0	0	Extremely Small	Negligible
31	59	Sweethill Terrace, Coatbridge	0	0	0	0	Extremely Small	Negligible
32	**77**	Ivycott, Carnbroe Road, Coatbridge	7	0	2	1	Very Small	Negligible
33	85	25 Ayr Road, Shawsburn, Larkhall	0	0	0	0	Extremely Small	Negligible
34	**92**	Auld House, Whifflet Street, Coatbridge (AQMA)	1	0	0	0	Extremely Small	Negligible
35	-	84 Carmyle Ave, Glasgow	0	1	0	-1	Extremely Small	Negligible
36	-	1 Inzievar Terrace, Glasgow	0	0	0	0	Extremely Small	Negligible
37	-	11 Thomson Grove, Cambuslang	0	0	0	0	Extremely Small	Negligible
38	-	16 Glenpark Gardens, Cambuslang	0	0	0	0	Extremely Small	Negligible
39	-	73 Underwood Road, Rutherglen	0	0	0	0	Extremely Small	Negligible
40	-	37 Warriston Way, Rutherglen	0	0	0	0	Extremely Small	Negligible
41	-	141 Glasgow Road, East Kilbride	0	0	0	0	Extremely Small	Negligible
42	-	PM_{10} monitor on Whirlies Roundabout [d]	1	0	1	0	Extremely Small	Negligible
43	-	203 Maxwellton Avenue, East Kilbride	1	0	1	0	Extremely Small	Negligible
44	-	24 Sandalwood Avenue, East Kilbride	0	0	0	0	Extremely Small	Negligible
45	-	25 Macbeth, East Kilbride	1	1	1	0	Extremely Small	Negligible
46	-	Flats at 1 Hunthill Road, Blantyre	0	0	0	0	Extremely Small	Negligible
47	-	51 Kirkton Avenue, Blantyre	1	0	1	1	Extremely Small	Negligible
48	-	1 Catherines Walk, Blantyre	0	0	0	0	Extremely Small	Negligible
49	-	142 Parkville Drive, Blantyre	2	1	2	1	Extremely Small	Negligible
50	-	121 High Blantyre Road, Hamilton	1	1	1	0	Extremely Small	Negligible
51	-	6 Wellhall Road, Hamilton	4	1	1	0	Extremely Small	Negligible
52	-	77 Neilsland Road, Hamilton	0	0	0	0	Extremely Small	Negligible

R	M8[a]	Description	2004	2010 RMN[b]	2010 DS[c]	Change (days)	Impact Magnitude	Impact Significance
53	-	1 Hillhouse Road, Hamilton	0	0	0	0	Extremely Small	Negligible
54	-	43 Bothwell Road, Hamilton	0	0	0	0	Extremely Small	Negligible
55	-	91 Mote Hill, Hamilton	1	1	0	-1	Extremely Small	Negligible
56	-	14 Hamilton Road, Bothwell	1	0	0	0	Extremely Small	Negligible
57	-	28 Fallside Road, Bothwell	0	0	0	0	Extremely Small	Negligible
58	-	8 Main Street, Uddingston	1	0	0	0	Extremely Small	Negligible
59	-	1 Rosefield Gardens, Uddingston	1	0	0	0	Extremely Small	Negligible
60	-	18 Avonbridge Drive, Hamilton	0	0	0	0	Extremely Small	Negligible
61	-	71 Olifard Avenue, Bothwell	0	0	0	0	Extremely Small	Negligible
62	-	2 Northway, Blantyre	0	0	0	0	Extremely Small	Negligible
63	-	103 Overton Road, Cambuslang	0	0	0	0	Extremely Small	Negligible
64	-	23 Dalton Cottages, Hamilton Road, Cambuslang	0	0	0	0	Extremely Small	Negligible
65	-	34 Waterside Street,	0	0	0	0	Extremely Small	Negligible
66	-	125 Strathaven Road, Stonehouse	0	0	0	0	Extremely Small	Negligible
67	-	9 Strutherhill, Larkhall	0	0	0	0	Extremely Small	Negligible
68	-	1 Main Street, Stewarton	0	0	0	0	Extremely Small	Negligible
69	-	48 Harris Close, Newton Mearns	0	0	0	0	Extremely Small	Negligible
70	-	Bogside Bungalow , Eaglesham	0	0	0	0	Extremely Small	Negligible
71	-	Halifax Plc. Merry Street, Motherwell AQMA[d]	3	1	1	0	Extremely Small	Negligible
72	-	33 Laighlands Road, Bothwell	0	0	0	0	Extremely Small	Negligible

[a] Number used to describe the same receptor in the M8 Baillieston to Newhouse Stage 3 Assessment. Those that were included in the main report of the M8 Baillieston to Newhouse Stage 3 Assessment are shown in bold.
[b] Raith Reference Case
[c] Do Something (With Scheme)
[d] These locations are non-residential and so the objectives do not apply here.

Cumulative Model Impact Results

Table AQ1.6 Modelled Annual Mean Nitrogen Dioxide Concentrations ($\mu g/m^3$) in 2010 Under Various Scenarios.

R	CDM[a]	RMN[b]	DS[c]	Scheme % Change[d]	Cumulative % Change[e]	Scheme Impact Significance[d]	Cumulative Impact Significance[e]	Change in Significance[f]
1	27.7	27.5	27.8	0.9%	0.1%	Negligible	Negligible	
2	30.9	30.8	30.4	-1.2%	-1.6%	Slight Beneficial	Slight Beneficial	
3	22.8	23.2	22.7	-2.0%	-0.6%	Negligible	Negligible	
4	14.3	14.0	13.6	-3.1%	-5.4%	Negligible	Slight Beneficial	X
5	9.8	9.6	9.5	-1.6%	-3.3%	Negligible	Negligible	
6	11.2	10.9	10.6	-2.7%	-5.0%	Negligible	Slight Beneficial	X
7	13.0	12.8	12.4	-2.7%	-4.0%	Negligible	Negligible	
8	17.1	17.0	16.0	-6.0%	-6.7%	Slight Beneficial	Slight Beneficial	
9	25.4	25.5	25.4	-0.5%	-0.2%	Negligible	Negligible	
10	24.2	24.3	24.5	0.8%	1.0%	Negligible	Negligible	
11	25.2	25.3	23.9	-5.6%	-5.5%	Slight Beneficial	Slight Beneficial	
12	18.9	18.8	19.2	2.1%	1.8%	Negligible	Negligible	
13	21.8	21.4	21.6	1.1%	-0.5%	Negligible	Negligible	
14	25.2	24.8	25.5	2.7%	1.2%	Negligible	Negligible	
15	26.7	25.5	27.3	6.8%	2.0%	Slight Adverse	Negligible	X
16	27.4	27.8	30.3	9.3%	10.5%	Slight Adverse	Moderate Adverse	X
17	32.7	33.1	34.5	4.2%	5.6%	Slight Adverse	Slight Adverse	
18	26.3	26.4	27.1	2.6%	3.0%	Negligible	Negligible	
19	26.1	25.6	26.0	1.6%	-0.5%	Negligible	Negligible	
20	31.0	30.1	30.2	0.4%	-2.5%	Negligible	Slight Beneficial	X
21	23.3	23.0	23.5	2.1%	0.7%	Negligible	Negligible	
22	23.7	23.7	24.9	4.7%	4.7%	Negligible	Negligible	
23	31.4	31.5	32.8	4.2%	4.4%	Slight Adverse	Slight Adverse	
24	25.6	25.6	25.9	1.2%	1.1%	Negligible	Negligible	
25	33.4	33.5	33.5	0.1%	0.4%	Negligible	Negligible	
26	28.1	27.8	27.0	-3.0%	-4.0%	Negligible	Negligible	
27	30.6	30.7	30.3	-1.4%	-1.1%	Slight Beneficial	Slight Beneficial	
28	32.6	32.4	32.1	-0.9%	-1.5%	Negligible	Slight Beneficial	X
29	26.6	27.0	26.7	-1.0%	0.7%	Negligible	Negligible	
30	24.6	24.1	24.7	2.5%	0.6%	Negligible	Negligible	
31	21.7	22.5	23.0	2.3%	6.2%	Negligible	Slight Adverse	X
32	36.7	27.0	31.2	15.6%	-15.0%	Moderate Adverse	Moderate Beneficial	X
33	18.5	18.3	17.7	-3.2%	-4.3%	Negligible	Negligible	
34	28.5	28.7	29.0	1.0%	1.6%	Negligible	Negligible	
35	25.2	31.0	25.1	-19.0%	-0.3%	Moderate Beneficial	Negligible	X
36	26.0	26.6	26.0	-2.1%	0.2%	Negligible	Negligible	
37	22.5	22.8	22.6	-0.9%	0.3%	Negligible	Negligible	
38	25.0	25.2	25.0	-0.9%	0.0%	Negligible	Negligible	
39	23.4	23.5	23.4	-0.5%	-0.1%	Negligible	Negligible	
40	20.4	20.5	20.3	-1.1%	-0.5%	Negligible	Negligible	
41	22.1	22.2	22.5	1.0%	1.5%	Negligible	Negligible	
42	27.7	27.7	28.7	3.6%	3.5%	Negligible	Negligible	

R	CDM[a]	RMN[b]	DS[c]	Scheme % Change[d]	Cumulative % Change[e]	Scheme Impact Significance[d]	Cumulative Impact Significance[e]	Change in Significance[f]
43	25.2	25.4	25.9	1.9%	2.5%	Negligible	Negligible	
44	22.3	22.3	23.2	3.9%	4.1%	Negligible	Negligible	
45	27.4	28.2	29.0	2.9%	5.7%	Negligible	Slight Adverse	X
46	21.6	21.2	20.6	-2.7%	-4.4%	Negligible	Negligible	
47	26.7	26.7	28.6	7.1%	7.2%	Slight Adverse	Slight Adverse	
48	22.8	22.7	22.9	0.9%	0.6%	Negligible	Negligible	
49	25.6	25.7	27.5	7.3%	7.5%	Slight Adverse	Slight Adverse	
50	25.6	25.8	25.1	-2.8%	-1.9%	Negligible	Negligible	
51	33.1	30.6	30.3	-1.0%	-8.5%	Slight Beneficial	Slight Beneficial	
52	19.6	19.6	19.6	-0.2%	-0.1%	Negligible	Negligible	
53	20.0	20.1	20.1	0.0%	0.5%	Negligible	Negligible	
54	23.3	23.4	23.9	2.2%	2.7%	Negligible	Negligible	
55	28.3	28.4	25.6	-9.9%	-9.4%	Slight Beneficial	Slight Beneficial	
56	26.7	26.9	25.7	-4.6%	-3.7%	Negligible	Negligible	
57	23.7	24.1	23.1	-4.1%	-2.7%	Negligible	Negligible	
58	27.5	27.3	26.9	-1.2%	-2.1%	Negligible	Negligible	
59	27.4	27.4	26.5	-2.9%	-3.3%	Negligible	Negligible	
60	22.3	22.2	22.3	0.4%	0.2%	Negligible	Negligible	
61	24.4	24.4	25.0	2.4%	2.1%	Negligible	Negligible	
62	20.7	19.7	19.5	-1.3%	-5.7%	Negligible	Slight Beneficial	X
63	18.2	18.2	17.6	-3.3%	-3.1%	Negligible	Negligible	
64	20.1	20.1	20.2	0.4%	0.6%	Negligible	Negligible	
65	13.3	13.4	12.9	-3.5%	-3.0%	Negligible	Negligible	
66	7.9	7.8	7.5	-3.7%	-5.0%	Negligible	Negligible	
67	15.1	15.0	15.2	1.2%	0.6%	Negligible	Negligible	
68	8.5	8.5	9.0	6.1%	6.4%	Slight Adverse	Slight Adverse	
69	12.9	12.9	12.7	-1.7%	-1.7%	Negligible	Negligible	
70	10.0	9.9	10.1	1.4%	1.2%	Negligible	Negligible	
71	32.5	32.4	32.0	-1.4%	-1.6%	Slight Beneficial	Slight Beneficial	
72	22.1	22.2	22.6	2.0%	2.3%	Negligible	Negligible	

[a] Committed Do-Minimum
[b] Raith Reference Case
[c] Do Something (With Scheme)
[d] The change between the Enhanced Do Minimum and the With Scheme
[e] The change between the Committed Do-Minimum and the With Scheme
[f] Flagged if the Cumulative Impact Significance is different from the Scheme Impact Significance

Table AQ1.7 Modelled Annual Mean PM_{10} Concentrations ($\mu g/m^3$) in 2010 Under Various Scenarios.

R	CDM[a]	RMN[b]	DS[c]	Scheme % Change[d]	Cumulative % Change[e]	Scheme Impact Significance[d]	Cumulative Impact Significance[e]	Change in Significance[f]
1	16.5	16.2	16.3	0.5%	-1.5%	Negligible	Slight Beneficial	X
2	17.0	17.0	16.8	-0.9%	-1.1%	Negligible	Slight Beneficial	X
3	14.1	14.2	14.0	-1.3%	-0.2%	Slight Beneficial	Negligible	X
4	11.7	11.5	11.3	-1.4%	-2.8%	Negligible	Negligible	
5	10.5	10.3	10.2	-1.1%	-2.3%	Negligible	Negligible	
6	11.2	11.0	10.8	-1.4%	-3.7%	Negligible	Negligible	

R	CDM[a]	RMN[b]	DS[c]	Scheme % Change[d]	Cumulative % Change[e]	Scheme Impact Significance[d]	Cumulative Impact Significance[e]	Change in Significance[f]
7	11.5	11.4	11.2	-1.3%	-2.1%	Negligible	Negligible	
8	12.9	12.8	12.4	-3.2%	-4.1%	Negligible	Negligible	
9	15.4	15.4	15.3	-0.7%	-0.8%	Negligible	Negligible	
10	15.2	15.2	15.5	1.8%	1.7%	Slight Adverse	Slight Adverse	
11	15.4	15.5	14.7	-5.1%	-4.4%	Slight Beneficial	Slight Beneficial	
12	13.3	13.3	13.6	2.2%	2.2%	Slight Adverse	Slight Adverse	
13	13.7	13.4	13.8	3.6%	1.2%	Slight Adverse	Slight Adverse	
14	14.8	14.6	15.1	3.4%	1.6%	Slight Adverse	Slight Adverse	
15	15.2	14.7	15.8	7.9%	4.0%	Slight Adverse	Slight Adverse	
16	15.6	15.7	17.6	12.2%	12.9%	Moderate Adverse	Moderate Adverse	
17	**18.2**	**18.5**	**19.6**	5.9%	7.7%	Substantial Adverse	Substantial Adverse	
18	14.9	15.1	15.6	3.3%	4.2%	Slight Adverse	Slight Adverse	
19	15.5	15.2	15.5	1.5%	-0.2%	Slight Adverse	Negligible	X
20	17.0	16.5	16.6	0.9%	-2.3%	Negligible	Slight Beneficial	X
21	14.3	14.0	14.3	2.3%	0.4%	Slight Adverse	Negligible	X
22	14.1	14.2	15.0	5.7%	5.9%	Slight Adverse	Slight Adverse	
23	17.8	17.8	**19.3**	8.7%	8.5%	Substantial Adverse	Substantial Adverse	
24	14.9	14.9	15.1	1.2%	1.1%	Slight Adverse	Slight Adverse	
25	**19.0**	**19.0**	**19.2**	0.8%	0.6%	Slight Adverse	Slight Adverse	
26	15.5	15.4	15.1	-2.0%	-2.2%	Slight Beneficial	Slight Beneficial	
27	16.6	16.7	16.6	-1.1%	-0.5%	Slight Beneficial	Negligible	X
28	**18.3**	**18.1**	18.0	-0.8%	-1.6%	Slight Beneficial	Moderate Beneficial	X
29	14.7	15.1	14.8	-1.5%	1.1%	Slight Beneficial	Slight Adverse	X
30	14.1	13.8	14.3	3.2%	1.1%	Slight Adverse	Slight Adverse	
31	13.7	14.1	14.5	2.7%	5.3%	Slight Adverse	Slight Adverse	
32	**21.7**	15.6	**18.4**	17.5%	-15.2%	Very Substantial Adverse	Very Substantial Beneficial	X
33	12.8	12.7	12.4	-2.6%	-3.5%	Negligible	Negligible	
34	14.9	15.0	15.3	1.5%	2.5%	Slight Adverse	Slight Adverse	
35	14.0	16.6	13.9	-16.1%	-0.4%	Moderate Beneficial	Negligible	X
36	14.6	14.8	14.5	-2.1%	-0.8%	Slight Beneficial	Negligible	X
37	13.4	13.4	13.3	-1.1%	-0.4%	Negligible	Negligible	
38	14.6	14.7	14.4	-1.8%	-0.9%	Slight Beneficial	Negligible	X
39	14.0	14.1	13.9	-1.4%	-0.8%	Slight Beneficial	Negligible	X
40	12.9	12.9	12.8	-1.1%	-0.7%	Negligible	Negligible	
41	14.0	14.0	14.3	1.8%	1.7%	Slight Adverse	Slight Adverse	
42	16.3	16.3	16.8	3.1%	3.3%	Slight Adverse	Slight Adverse	
43	16.1	16.1	16.5	3.0%	2.8%	Slight Adverse	Slight Adverse	
44	13.9	13.9	14.3	2.7%	2.7%	Slight Adverse	Slight Adverse	
45	17.1	17.5	**18.1**	3.3%	5.7%	Moderate Adverse	Substantial Adverse	X
46	14.1	14.0	14.0	0.1%	-0.2%	Negligible	Negligible	
47	16.5	16.5	17.9	8.4%	8.4%	Slight Adverse	Slight Adverse	
48	13.8	13.8	13.9	1.1%	0.6%	Slight Adverse	Negligible	X
49	17.6	17.6	**18.8**	6.7%	6.9%	Substantial Adverse	Substantial Adverse	
50	17.3	17.4	17.1	-1.9%	-1.5%	Slight Beneficial	Slight Beneficial	
51	**18.7**	17.9	**18.1**	0.9%	-3.3%	Slight Adverse	Slight Beneficial	X
52	13.1	13.1	13.0	-0.2%	-0.3%	Negligible	Negligible	
53	13.5	13.5	13.6	0.4%	0.3%	Negligible	Negligible	
54	14.4	14.4	14.7	2.3%	2.3%	Slight Adverse	Slight Adverse	

R	CDM[a]	RMN[b]	DS[c]	Scheme % Change[d]	Cumulative % Change[e]	Scheme Impact Significance[d]	Cumulative Impact Significance[e]	Change in Significance[f]
55	16.5	16.6	14.7	-11.1%	-10.8%	Moderate Beneficial	Moderate Beneficial	
56	15.6	15.8	15.3	-3.2%	-2.3%	Slight Beneficial	Slight Beneficial	
57	14.4	14.5	13.9	-4.2%	-3.2%	Slight Beneficial	Slight Beneficial	
58	15.9	15.8	15.6	-1.1%	-1.6%	Slight Beneficial	Slight Beneficial	
59	15.9	15.8	15.4	-3.1%	-3.2%	Slight Beneficial	Slight Beneficial	
60	13.3	13.3	13.2	-0.1%	-0.4%	Negligible	Negligible	
61	14.4	14.4	14.7	1.9%	1.9%	Slight Adverse	Slight Adverse	
62	13.5	13.2	13.0	-1.3%	-3.6%	Negligible	Slight Beneficial	X
63	12.2	12.3	12.0	-2.4%	-2.1%	Negligible	Negligible	
64	13.5	13.5	13.3	-1.1%	-1.3%	Negligible	Negligible	
65	12.1	12.1	11.5	-4.4%	-4.7%	Negligible	Negligible	
66	9.7	9.7	9.5	-1.9%	-2.2%	Negligible	Negligible	
67	11.9	11.9	12.0	1.2%	1.0%	Negligible	Negligible	
68	9.1	9.1	9.2	0.9%	1.0%	Negligible	Negligible	
69	10.1	10.1	10.1	-0.4%	-0.5%	Negligible	Negligible	
70	9.5	9.5	9.6	0.3%	0.3%	Negligible	Negligible	
71	17.8	17.8	17.5	-1.2%	-1.3%	Slight Beneficial	Slight Beneficial	
72	13.5	13.5	13.8	2.3%	2.3%	Slight Adverse	Slight Adverse	

[a] Committed Do-Minimum
[b] Raith Reference Case
[c] Do Something (With Scheme)
[d] The change between the Enhanced Do Minimum and the With Scheme
[e] The change between the Committed Do-Minimum and the With Scheme
[f] Flagged if the Cumulative Impact Significance is different from the Scheme Impact Significance

Table AQ1.8 Modelled Number of 24-hour PM_{10} Exceedences in 2010 Under Various Scenarios.

R	CDM[a]	RMN[b]	DS[c]	Scheme Impact Significance[d]	Cumulative Impact Significance[e]	Change in Significance[f]
1	1	0	0	Negligible	Negligible	
2	1	1	1	Negligible	Negligible	
3	0	0	0	Negligible	Negligible	
4	0	0	0	Negligible	Negligible	
5	0	0	0	Negligible	Negligible	
6	0	0	0	Negligible	Negligible	
7	0	0	0	Negligible	Negligible	
8	0	0	0	Negligible	Negligible	
9	0	0	0	Negligible	Negligible	
10	0	0	0	Negligible	Negligible	
11	0	0	0	Negligible	Negligible	
12	0	0	0	Negligible	Negligible	
13	0	0	0	Negligible	Negligible	
14	0	0	0	Negligible	Negligible	
15	0	0	0	Negligible	Negligible	
16	0	0	1	Negligible	Negligible	
17	2	2	3	Negligible	Negligible	
18	0	0	0	Negligible	Negligible	
19	0	0	0	Negligible	Negligible	

R	CDM[a]	RMN[b]	DS[c]	Scheme Impact Significance[d]	Cumulative Impact Significance[e]	Change in Significance[f]
20	1	0	1	Negligible	Negligible	
21	0	0	0	Negligible	Negligible	
22	0	0	0	Negligible	Negligible	
23	1	1	3	Negligible	Negligible	
24	0	0	0	Negligible	Negligible	
25	2	2	2	Negligible	Negligible	
26	0	0	0	Negligible	Negligible	
27	1	1	1	Negligible	Negligible	
28	2	1	1	Negligible	Negligible	
29	0	0	0	Negligible	Negligible	
30	0	0	0	Negligible	Negligible	
31	0	0	0	Negligible	Negligible	
32	6	0	2	Negligible	Slight Beneficial	X
33	0	0	0	Negligible	Negligible	
34	0	0	0	Negligible	Negligible	
35	0	1	0	Negligible	Negligible	
36	0	0	0	Negligible	Negligible	
37	0	0	0	Negligible	Negligible	
38	0	0	0	Negligible	Negligible	
39	0	0	0	Negligible	Negligible	
40	0	0	0	Negligible	Negligible	
41	0	0	0	Negligible	Negligible	
42	0	0	1	Negligible	Negligible	
43	0	0	1	Negligible	Negligible	
44	0	0	0	Negligible	Negligible	
45	1	1	1	Negligible	Negligible	
46	0	0	0	Negligible	Negligible	
47	0	0	1	Negligible	Negligible	
48	0	0	0	Negligible	Negligible	
49	1	1	2	Negligible	Negligible	
50	1	1	1	Negligible	Negligible	
51	2	1	1	Negligible	Negligible	
52	0	0	0	Negligible	Negligible	
53	0	0	0	Negligible	Negligible	
54	0	0	0	Negligible	Negligible	
55	0	1	0	Negligible	Negligible	
56	0	0	0	Negligible	Negligible	
57	0	0	0	Negligible	Negligible	
58	0	0	0	Negligible	Negligible	
59	0	0	0	Negligible	Negligible	
60	0	0	0	Negligible	Negligible	
61	0	0	0	Negligible	Negligible	
62	0	0	0	Negligible	Negligible	
63	0	0	0	Negligible	Negligible	
64	0	0	0	Negligible	Negligible	
65	0	0	0	Negligible	Negligible	
66	0	0	0	Negligible	Negligible	
67	0	0	0	Negligible	Negligible	
68	0	0	0	Negligible	Negligible	

R	CDM[a]	RMN[b]	DS[c]	Scheme Impact Significance[d]	Cumulative Impact Significance[e]	Change in Significance[f]
69	0	0	0	Negligible	Negligible	
70	0	0	0	Negligible	Negligible	
71	1	1	1	Negligible	Negligible	
72	0	0	0	Negligible	Negligible	

[a] Committed Do-Minimum
[b] Raith Reference Case
[c] Do Something (With Scheme)
[d] The change between the Enhanced Do Minimum and the With Scheme
[e] The change between the Committed Do-Minimum and the With Scheme
[f] Flagged if the Cumulative Impact Significance is different from the Scheme Impact Significance.

Air Quality Impacts on Vegetation

The potential for air quality impact of the proposed Scheme on sensitive ecosystems has been assessed in accordance with Interim Advice Note 61/05 which supplements DMRB 11.3.1. This note sets out a method of assessing the potential impacts of road schemes on protected habitats through influencing local air quality.

There is evidence that elevated concentrations of NOx can damage particularly sensitive vegetation. In addition, there is evidence that the deposition of nitrogen to the ground can damage certain habitats. Critical levels have been defined to prevent gaseous pollutants directly affecting plants. Defra (2001) define a Critical Level as "the concentration of a pollutant in the atmosphere, below which vegetation is unlikely to be damaged according to present knowledge". In addition to the Critical Levels, Critical Loads have been defined to prevent the long-term effects of deposition. Defra (2001) define Critical Loads as "the amount of pollutant deposited below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge".

In the UK, the statutory nature conservation agencies use a Critical Level for NOx of 30 $\mu g/m^3$ at internationally designated conservation sites and SSSIs. The same level is also set as an EU Limit Value. As a Limit Value, it only applies at distances greater than 20 km from towns with more than 250,000 inhabitants or more than 5 km from other built-up areas. The Critical Loads are specific to different types of habitat

1.1.6 Site Identification

In accordance with Interim Advice Note 61/05, all SACs, SPAs, cSPAs, Ramsar or SSSI sites within 200m of any road on which a potentially significant change traffic flows (as defined in the main text of the report) have been identified. There are no European designated sites that meet these criteria but there are five SSSIs: Hamilton Low Parks, Calder Glen, Milburn, Avondale, and Bothwell Castle Grounds. Advice has been taken from ecology specialists at Young Associates regarding the feature of interest at each site.

The direct effects which IAN 61/05 assesses relate to terrestrial vegetation. The feature of interest at Hamilton Low Parks is birds, which will not be directly influenced by nitrogen deposition. This site has thus been scoped out of the assessment. Calder Glen is a geological SSSI, and as such air quality will not affect the feature of interest (carboniferous rock sequence). This site has also been scoped out of the assessment. The assessment thus focuses on Milburn, Avondale and Bothwell Castle Grounds.

1.1.7 Background Concentrations

As noted above, the national maps of predicted background concentrations published by Defra and the DAs have recently been updated. NOx concentrations predicted using the new backgrounds are different to those predicted using the old background concentrations (as were used for the M8 Baillieston to Newhouse Stage 3 Assessment).

1.1.8 Ambient Concentrations of Nitrogen Oxides

NOx concentrations for the base year (2004) and the year of opening both with and without the Scheme were calculated at each receptor using the DMRB Screening model as recommended in IAN 61/05. The results are presented in Table AQ1.9.

Predicted NOx concentrations for 2004 exceed the Critical Level adjacent to the road within the Milburn SSSI. Anticipated improvements brought about at the national level are expected to lead to concentrations falling between 2004 and 2010 so that in the 2010 baseline, the critical level will not be exceeded within any of the SSSIs. The Scheme is expected to reduce NOx concentrations at all three SSSIs. According to the criteria set out in Tables AQ1.1 and AQ1.2, the Scheme would bring about reductions in concentrations ranging from moderate to extremely small and impacts ranging from slight beneficial to negligible.

1.1.9 Nitrogen Deposition

Nitrogen deposition flux at each of the receptors listed above has been calculated following the methodology set out in IAN 61/05 (using ambient concentrations calculated with the DMRB screening model, which is recommended in IAN 61/05). Results are presented in Table AQ1.10.

The critical loads are likely to be exceeded at all three sites in the baseline case and also in 2010 with or without the proposed Scheme. The Scheme is expected to bring about an extremely small reduction in nitrogen deposition flux at all of the locations assessed. These changes amount to slight beneficial impacts according to the criteria defined in Table AQ1.2.

1.1.10 Cumulative Impacts at SSSIs

Tables AQ1.11 and AQ1.12 set out the predicted cumulative impacts of the proposed Scheme along with the proposed M8 Baillieston to Newhouse Scheme and the Associated Network Improvements at the three SSSIs that were assessed for the Scheme-only impacts[2]. At all three sites, the cumulative impacts would bring about a greater improvement than the Scheme-only impacts, but would not change their description according to the criteria set out in Tables AQ1.1 and AQ1.2. In terms of NOx concentrations, the three Schemes would bring about reductions ranging from moderate to extremely small and impacts ranging from slight beneficial to negligible at these three SSSIs. In terms of nitrogen deposition the three Schemes would bring about extremely small reductions in total flux which would amount to slight beneficial impacts.

[2] As noted in the main report, the selection of significant links was not expanded to account for cumulative impacts.

Table AQ1.9 NOx Concentrations Near to Potentially Sensitive Ecological Sites

Site	Distance from Road Centre (m)	NOx Annual Mean (µg/m^3)			% Change	Change as % of 30 µg/m^3
		2004	2010 RMN	2010 with Scheme		
Milburn	12.5	**33.0**	23.3	21.6	-7	-5
	25	27.9	19.8	18.7	-6	-4
	50	22.2	16.0	15.3	-4	-2
	100	17.5	12.8	12.6	-1	-1
	200	15.8	11.7	11.7	<1[a]	<1[a]
Avondale	12.5	29.6	21.4	19.1	-11	-8
	25	25.2	18.3	16.6	-9	-6
	50	20.3	14.7	13.8	-6	-3
	100	16.3	11.8	11.6	-2	-1
	200	14.8	10.8	10.7	<1[a]	<1[a]
Bothwell Castle	115[b]	21.0	16.4	16.0	-2	-1
	200	20.3	15.8	15.8	<1[a]	<1[a]

[a] The precise figure, as calculated, is between zero and minus one.

[b] Bothwell Castle Grounds are approximately 115m from the centre of the nearest affected road and so the transect has stopped here.

Table AQ1.10 Nitrogen Deposition Near to Potentially Sensitive Ecological Sites

Site	Distance from Road Centre (m)	Nitrogen Deposition (kg-N/ha/yr)				% Change	Change as % of Critical Load
		2004	2010 RMN	2010 with Scheme	Critical Load		
Milburn	12.5	**28.5**	**25.1**	**25.0**		<1[a]	<1[a]
	25	**28.3**	**25.0**	**25.0**		<1[a]	<1[a]
	50	**28.2**	**24.9**	**24.9**	10 - 20	<1[a]	<1[a]
	100	**28.0**	**24.8**	**24.8**		<1[a]	<1[a]
	200	**28.0**	**24.7**	**24.7**		<1[a]	<1[a]
Avondale	12.5	**31.0**	**27.3**	**27.2**		<1[a]	-1 - <1[a]
	25	**30.8**	**27.2**	**27.2**		<1[a]	-1 - <1[a]
	50	**30.7**	**27.1**	**27.1**	10 - 20	<1[a]	<1[a]
	100	**30.6**	**27.0**	**27.0**		<1[a]	<1[a]
	200	**30.5**	**27.0**	**27.0**		<1[a]	<1[a]
Bothwell Castle	115[b]	**27.9**	**24.3**	**24.3**	10 - 20	<1[a]	<1[a]
	200	**27.9**	**24.3**	**24.3**		<1[a]	<1[a]

[a] The precise figure, as calculated, is between zero and minus one.

[b] Bothwell Castle Grounds are approximately 115m from the centre of the nearest affected road and so the transect has stopped here.

Table AQ1.11 Cumulative NOx Concentrations Near to Potentially Sensitive Ecological Sites

Site	Distance from Road Centre (m)	NOx Annual Mean (µg/m^3)			% Change	Change as % of 30 µg/m^3
		2004	2010 CDM	2010 with Scheme		
Milburn	12.5	**33.0**	24.0	21.6	-10	-8
	25	27.9	20.3	18.7	-8	-6
	50	22.2	16.2	15.3	-6	-3
	100	17.5	12.9	12.6	-2	-1
	200	15.8	11.7	11.7	<1[a]	<1[a]
Avondale	12.5	29.6	21.9	19.1	-13	-10
	25	25.2	18.6	16.6	-11	-7
	50	20.3	14.9	13.8	-7	-4
	100	16.3	11.9	11.6	-3	-1
	200	14.8	10.8	10.7	<1[a]	<1[a]
Bothwell Castle	115[b]	21.0	16.5	16.0	-3	-2
	200	20.3	15.9	15.8	-1	<1[a]

[a] The precise figure, as calculated, is between zero and minus one.

[b] Bothwell Castle Grounds are approximately 115m from the centre of the nearest affected road and so the transect has stopped here.

Table AQ1.12 Cumulative Nitrogen Deposition Near to Potentially Sensitive Ecological Sites

Site	Distance from Road Centre (m)	Nitrogen Deposition (kg-N/ha/yr)				% Change	Change as % of Critical Load
		2004	2010 CDM	2010 with Scheme	Critical Load		
Milburn	12.5	**28.5**	**25.1**	**25.0**		<1[a]	-1 - <1[a]
	25	**28.3**	**25.0**	**25.0**		<1[a]	<1[a]
	50	**28.2**	**24.9**	**24.9**	10 - 20	<1[a]	<1[a]
	100	**28.0**	**24.8**	**24.8**		<1[a]	<1[a]
	200	**28.0**	**24.7**	**24.7**		<1[a]	<1[a]
Avondale	12.5	**31.0**	**27.3**	**27.2**	10 - 20	<1[a]	-1 - <1[a]
	25	**30.8**	**27.2**	**27.2**		<1[a]	-1 - <1[a]
	50	**30.7**	**27.1**	**27.1**		<1[a]	<1[a]
	100	**30.6**	**27.0**	**27.0**		<1[a]	<1[a]
	200	**30.5**	**27.0**	**27.0**		<1[a]	<1[a]
Bothwell Castle	115[b]	**27.9**	**24.3**	**24.3**	10 - 20	<1[a]	<1[a]
	200	**27.9**	**24.3**	**24.3**		<1[a]	<1[a]

[a] The precise figure, as calculated, is between zero and minus one.

[b] Bothwell Castle Grounds are approximately 115m from the centre of the nearest affected road and so the transect has stopped here.

EFFECTS OF CONGESTION ON EMISSIONS

The average speed used in modelling can have a significant effect on the calculated emissions and does not always represent the worst case. This note sets out how congestion, which has not been taken into account explicitly in the modelling, could affect the results. It compares emissions based on assumption of a steady average speed with emissions calculated assuming periods of low speed and periods of higher speed, giving rise to the same overall average speed.

Using the Casella/AEA Emission Factor calculator version 2 (available from www.casellastanger.com/modelling_helpdesk), emissions have been calculated for a 1 km length of road with a daily flow of 100,000 vehicles, with 10% HDV, for the year 2010.

Do Minimum Scenario: Daily average speed of 84 kph
Nitrogen oxides (NOx) missions are calculated assuming:

a) a steady 84 kph for all hours of the day
b) a congestion scenario, with an average speed of 84 kph made up of 2 hours at 20 kph affecting 20% of the traffic and 22 hours at 100 kph affecting 80% of the traffic.

With Scheme Scenario: Daily average speed of 100 kph
Emissions are calculated assuming:

c) a steady 100 kph for all hours of the day

Table AQ1.13: Emissions based on average speed of 84 kph

Speed	NOx emissions (kg)	PM_{10} emissions (kg)
a) Do Minimum Steady Speeds	647	16.5
b) Do Minimum Congestion	751	22.9
Increase with Congestion	16%	39%
c) With Scheme	727	21.9

Not allowing for congestion, as has been assumed in the calculations of total emissions, will mean that do-minimum emissions may have been underestimated, particularly in 2020 when the existing road network is expected to be very congested. In this example, the emissions without allowing for congestion increase by 12% between do-minimum and with scheme scenarios, from 647 to 727 kg NOx. This becomes a 3% decrease from 751 to 727 kg NOx if congestion is allowed for. In practice it is very difficult to allow for congestion, as the necessary information is normally not available. Thus this example just illustrates the potential effects of congestion.

Updated Traffic Data Sensitivity Analysis

Traffic Data

SIAS have supplied updated traffic data for the M74 junction 5 (Raith junction) Stage 3 air quality assessment, which take account of some minor changes to road alignments and the inclusion of Strathclyde Business park in the traffic model. A sensitivity analysis is therefore required to determine the significance of changes between the original and updated traffic data. The results of this analysis are presented and discussed below.

Assessment

The criteria used to define a significant change in traffic flow are set out in the main text of the Environmental Statement. Applying these criteria to the new dataset shows that all links that are significant in the revised traffic data have already been included in the assessment. If the study area had been defined according to the revised data, it would have been marginally smaller, but it remains a relevant area to have assessed.

Within this study area, the predicted changes due to the Scheme remain relatively constant across the two sets of traffic data. On those roads where the effect of the Scheme differs between the two datasets, the difference would be less than 800 vehicles per day. In the context of the air quality assessment, such differences are judged to be negligible. .

The physical changes associated with the proposed new road alignments are very unlikely to have any impact on modelled concentrations. This is because the changes are to links which, in both cases, are further from the nearest modelled receptor than a number of other links included in the model.

Conclusions

The analysis presented above shows that if the air quality model were to be rerun using the updated traffic dataset, it is very unlikely that any of the results would be significantly different. The conclusions of the assessment would thus remain unaltered. The assessment as presented in the main text thus remains valid despite the changes to the Scheme design and to the traffic model.