

Appendix 9.3 - Model Inputs and Outputs

Model Input Data

Traffic Flow Data

Traffic data used in the assessment have been provided by the project's transport consultants, Transport Planning Associates. The tables below shows the traffic data used for this assessment. Figures 9.6 to 9.14 show the modelled road links.

Traffic Data Used Within the Assessment - 2021

Road Link ID	Daily Two Way Vehicle Flow - 2021						
	Without Development			With Development			Difference
	Total	% HDV	Speed	Total	% HDV	Speed	
24766-70874	4005	9	45	3513	20	47	-492
70874-25210	4676	7	21	4127	17	25	-549
25210-21152	16872	16	61	13967	23	67	-2905
21152-1252	16920	17	56	13086	27	68	-3834
1252-9117	7886	18	9	4070	40	5	-3817
9221-1252	9034	16	98	9016	21	98	-17
9221-9117	26870	5	10	30470	5	30	3600
27015-9221	22128	8	26	25127	9	20	3000
3104-27015	33754	8	68	36633	9	78	2879
9117-9220	18344	5	11	15938	7	17	-2406
9117-9118	16424	10	53	18334	9	53	1910
2104-1104	6871	3	38	6708	6	38	-163
1141-1104	2929	1	41	2744	7	41	-185
25174-1141	2929	1	32	2744	7	32	-185
25174-2141	3398	2	44	3202	8	45	-196
81042-24766	6144	18	31	5106	26	31	-1038
81042-24767	6095	19	25	5460	27	28	-636
24768-24767	5450	14	45	4189	23	45	-1261
24768-2309	5836	13	67	4236	23	68	-1601
21211-2246	4360	5	49	3981	10	48	-379
24767-25245	3435	8	48	3668	12	48	233
25176-25210	12207	18	70	10428	24	77	-1779
81041-25176	15328	15	48	13586	17	48	-1742
81041-21313	16773	14	36	14916	16	35	-1858
21313-24622	14682	12	78	13241	13	78	-1442

Road Link ID	Daily Two Way Vehicle Flow - 2021						
75174-28002	14299	13	67	13192	14	66	-1107
28005-28008	23001	3	90	23053	4	89	51
75211-75210	6762	10	33	6768	10	33	6
21211-3141	1411	4	49	1767	16	49	356
2141-3141	4350	2	63	4972	6	62	623
24761-2141	11591	7	44	11442	2	43	-150
2141-24766	8859	10	41	8551	8	41	-308
24620-2320	38439	10	92	42301	10	89	3862
24163-24620	34118	8	97	37563	8	95	3445
24169-24163	37228	10	92	40785	9	89	3557
26027-24897	4131	0	46	4937	0	45	806
21313-24622	14682	12	68	13241	13	68	-1442
21313-90009	8915	0	58	9173	0	57	258
1331-90009	3264	0	64	3395	0	64	131
31044-24169	39075	9	88	41961	9	85	2886
31042-2323	15523	5	56	15514	5	56	-9
31040-24897	2211	0	49	2808	0	49	597
24168-31034	47480	9	96	51788	9	94	4308
31046-24167	7740	3	48	6509	4	48	-1231
24170-24164	7817	3	38	6542	4	39	-1275
24210-24164	13994	2	35	12716	2	37	-1277
24219-24210	6847	5	41	5566	4	43	-1281
24211-24210	7120	0	29	7127	0	34	7
24165-24164	6877	0	27	6796	1	27	-81
24777-24779	37046	12	94	38149	12	93	1103
27004-24777	37046	12	94	38149	12	93	1103
27004-27005	32270	11	90	33116	11	90	846
27005-1342	36313	10	92	37172	10	92	859
24781-1342	37328	10	96	38172	10	96	844
24323-25200	31940	12	93	32540	12	93	601
2253-24323	27343	14	84	27887	14	82	544
21253-2253	29363	22	87	29939	22	87	576
24188-24164	703	0	18	720	0	19	17
24188-24174	641	0	45	683	0	45	42
24168-31034	47480	9	96	51788	9	94	4308

Road Link ID	Daily Two Way Vehicle Flow - 2021						
31036-24174	3533	0	37	3516	0	37	-17
24188-24174	641	0	45	683	0	45	42
25130-24324	2453	26	35	2336	27	35	-117
24815-24324	382	3	9	282	3	9	-100
25135-24324	2120	30	25	2080	30	25	-40
31018-31019	10673	1	96	12094	1	96	1421
31002-31018	10638	1	79	12038	1	79	1401
31018-31019	10673	1	86	12094	1	86	1421
31002-31018	10638	1	89	12038	1	89	1401
31001-31016	10593	1	96	12072	1	96	1479
2154-31011	42127	11	94	43852	11	94	1725
31030-31017	49479	9	94	52606	9	93	3127
24625-24780	4673	0	62	5200	0	62	527
75213-24625	7798	0	43	8327	0	43	529
2309-4246	34420	9	63	0	0	0	-34420
21308-24743	6284	1	72	7086	1	70	802
21308-81062	765	13	49	1155	21	50	389
3319-9104	39794	22	101	40382	21	101	588
9121-9122	36816	17	105	36613	18	105	-203
9105-6246	47006	19	97	48717	19	96	1710
24119-9119	46233	15	100	45450	16	100	-783
5246-9106	48011	16	98	48752	15	98	741
9118-1246	44852	15	100	47325	14	99	2472
9107-2331	45165	17	100	45537	17	100	373
9115-9116	42187	14	102	43310	14	102	1123
40004-24979	8666	6	69	8548	6	69	-117
24979-24551	4037	15	69	3813	16	69	-224
30002-23214	21067	4	43	20374	3	44	-693
23214-2142	25738	3	87	23547	3	87	-2191
2142-1113	3288	8	45	3692	7	45	404
2141-3141				4972	6	62	4972
24761-2141				11442	2	43	11442
81019-84001				42996	8	92	42996
81019-81018				40813	7	85	40813
2309-81018				41126	7	92	41126

Road Link ID	Daily Two Way Vehicle Flow - 2021						
81018-86000				124	44	76	124
86001-81018				187	57	68	187
86000-86003				1208	43	62	1208
86003-81019				1083	50	68	1083
81019-86002				1098	31	76	1098
86002-86004				1224	32	60	1224
86003-86002				126	44	60	126
86001-86000				1084	50	59	1084
86004-86001				1271	51	58	1271

Traffic Data Used Within the Assessment - 2031

Road Link ID	Daily Two Way Vehicle Flow - 2021						
	Without Development			With Development			Difference
	Total	% HDV	Speed	Total	% HDV	Speed	
24766-70874	4752	0.22	44	3513	20	47	-1239
70874-25210	4680	0.11	20	4127	17	25	-553
25210-21152	19288	14.17	55	13967	23	67	-5321
21152-1252	18633	15.40	51	13086	27	68	-5547
1252-9117	9112	15.40	8	4070	40	5	-5042
9221-1252	9521	12.40	98	9016	21	98	-505
9221-9117	28002	4.40	9	30470	5	30	2467
27015-9221	23648	6.34	19	25127	9	20	1479
3104-27015	33661	6.79	68	36633	9	78	2971
9117-9220	19065	4.79	11	15938	7	17	-3127
9117-9118	18079	9.15	53	18334	9	53	254
2104-1104	9343	0.07	32	6708	6	38	-2634
1141-1104	5176	7.30	38	2744	7	41	-2432
25174-1141	5178	7.30	29	2744	7	32	-2434
25174-2141	5691	0.30	35	3202	8	45	-2489
81042-24766	9473	12.44	27	5106	26	31	-4367
81042-24767	7187	14.35	16	5460	27	28	-1727
24768-24767	5968	16.15	45	4189	23	45	-1779
24768-2309	8076	9.37	60	4236	23	68	-3840
21211-2246	5854	10.40	46	3981	10	48	-1873

Road Link ID	Daily Two Way Vehicle Flow - 2021						
24767-25245	5101	0.01	48	3668	12	48	-1433
25176-25210	13296	18.55	66	10428	24	77	-2867
81041-25176	16532	15.23	48	13586	17	48	-2946
81041-21313	17992	8.72	36	14916	16	35	-3076
21313-24622	17276	6.31	59	13241	13	78	-4035
75174-28002	14856	6.81	66	13192	14	66	-1664
28005-28008	25082	3.09	87	23053	4	89	-2030
75211-75210	7189	12.89	32	6768	10	33	-422
21211-3141	1963	6.50	49	1767	16	49	-196
2141-3141	5859	9.76	62	4972	6	62	-887
24761-2141	13216	2.18	35	11442	2	43	-1774
2141-24766	11573	3.53	28	8551	8	41	-3022
24620-2320	44265	9.85	90	42301	10	89	-1964
24163-24620	39708	9.32	96	37563	8	95	-2145
24169-24163	42728	8.52	90	40785	9	89	-1943
26027-24897	4313	0.01	46	4937	0	45	624
21313-24622	17276	6.31	49	13241	13	68	-4035
21313-90009	9508	0.26	57	9173	0	57	-335
1331-90009	3969	0.02	64	3395	0	64	-574
31044-24169	43995	8.20	87	41961	9	85	-2035
31042-2323	19008	5.88	38	15514	5	56	-3494
31040-24897	1662	0.00	49	2808	0	49	1146
24168-31034	54126	8.08	91	51788	9	94	-2338
31046-24167	10204	3.20	48	6509	4	48	-3695
24170-24164	10279	3.18	37	6542	4	39	-3736
24210-24164	16209	4.23	31	12716	2	37	-3493
24219-24210	9380	11.56	40	5566	4	43	-3813
24211-24210	6829	0.00	26	7127	0	34	298
24165-24164	7718	0.08	23	6796	1	27	-923
24777-24779	39606	11.28	94	38149	12	93	-1457
27004-24777	39606	11.28	94	38149	12	93	-1457
27004-27005	31991	13.15	91	33116	11	90	1125
27005-1342	36807	10.48	92	37172	10	92	365
24781-1342	38434	8.92	95	38172	10	96	-262
24323-25200	32854	10.81	93	32540	12	93	-314

Road Link ID	Daily Two Way Vehicle Flow - 2021						
2253-24323	25035	13.85	83	27887	14	82	2852
21253-2253	25786	27.08	88	29939	22	87	4153
24188-24164	1076	0.72	19	720	0	19	-356
24188-24174	745	0.64	45	683	0	45	-62
24168-31034	54126	8.08	91	51788	9	94	-2338
31036-24174	5363	0.00	37	3516	0	37	-1847
24188-24174	745	0.64	45	683	0	45	-62
25130-24324	2657	21.55	35	2336	27	35	-321
24815-24324	435	8.99	9	282	3	9	-153
25135-24324	2278	31.74	25	2080	30	25	-197
31018-31019	11084	0.68	96	12094	1	96	1010
31002-31018	11620	0.02	76	12038	1	79	419
31018-31019	11084	0.68	86	12094	1	86	1010
31002-31018	11620	0.02	86	12038	1	89	419
31001-31016	14683	0.22	96	12072	1	96	-2610
2154-31011	44805	9.87	94	43852	11	94	-953
31030-31017	53149	8.40	92	52606	9	93	-543
24625-24780	4975	0.99	62	5200	0	62	225
75213-24625	8614	0.70	43	8327	0	43	-287
2309-4246	37737	8.81	48	0	0	0	-37737
21308-24743	7083	0.04	71	7086	1	70	3
21308-81062	1840	6.01	49	1155	21	50	-685
3319-9104	45709	19.78	98	40382	21	101	-5327
9121-9122	39752	15.82	103	36613	18	105	-3139
9105-6246	49784	18.96	95	48717	19	96	-1067
24119-9119	48496	14.43	98	45450	16	100	-3046
5246-9106	51059	15.16	96	48752	15	98	-2307
9118-1246	47750	14.05	99	47325	14	99	-425
9107-2331	45593	16.96	100	45537	17	100	-55
9115-9116	43848	13.69	101	43310	14	102	-537
40004-24979	7476	6.76	69	8548	6	69	1072
24979-24551	4963	11.36	69	3813	16	69	-1150
30002-23214	25101	1.05	38	20374	3	44	-4728
23214-2142	31518	1.22	88	23547	3	87	-7971
2142-1113	3075	0.03	45	3692	7	45	617

Road Link ID	Daily Two Way Vehicle Flow - 2021						
2141-3141				4972	6	62	4972
24761-2141				11442	2	43	11442
81019-84001				42996	8	92	42996
81019-81018				40813	7	85	40813
2309-81018				41126	7	92	41126
81018-86000				124	44	76	124
86001-81018				187	57	68	187
86000-86003				1208	43	62	1208
86003-81019				1083	50	68	1083
81019-86002				1098	31	76	1098
86002-86004				1224	32	60	1224
86003-86002				126	44	60	126
86001-86000				1084	50	59	1084
86004-86001				1271	51	58	1271

It should be noted that roads were only modelled where there are sensitive receptors within 200 m of the road.

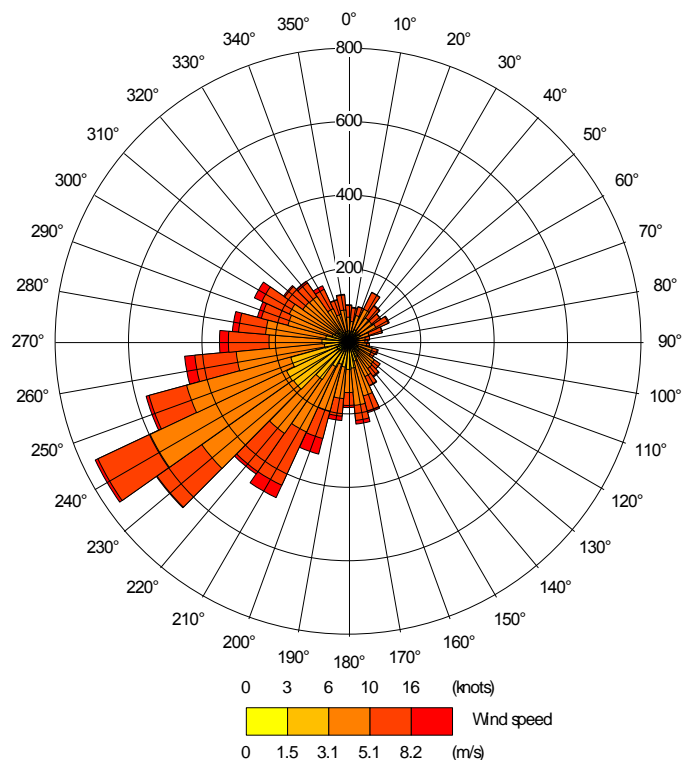
The average speed on each road has been reduced by 10 km.hr⁻¹ to take into account the possibility of slow moving traffic near junctions and at roundabouts in accordance with LAQM.TG16.

Vehicle Emission Factors

The modelling has been undertaken using Defra's 2016 emission factor toolkit (version 8.0) which draws on emissions generated by the European Environment Agency (EEA) COPERT 5 emission calculation tool.

Meteorological Data

ADMS-Roads requires detailed meteorological data as an input. The most representative observing station for the region of the study area that supplies all the data in the required format is Bedford approximately 30 km east of the Main SRFI Site. Meteorological data from that station for 2017 have been used within the dispersion model. The wind rose is presented below.



Receptors

The air quality assessment predicts the impacts at locations that could be sensitive to any changes. For assessing human-health impacts, such sensitive receptors should be selected where the public is regularly present and likely to be exposed over the averaging period of the objective. LAQM.TG16 provides examples of exposure locations and these are summarised in the table below.

Example of Where Air Quality Objectives Apply

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual-mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building's façades), or any other location where public exposure is expected to be short-term.
Daily-mean	All locations where the annual-mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building's façade), or any other location where public exposure is expect to be short-term.
Hourly-mean	All locations where the annual and daily mean would apply. Kerbside	Kerbside sites where the public would not be expected to have regular access

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
	<p>sites (e.g. pavements of busy shopping streets).</p> <p>Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more.</p> <p>Any outdoor locations to which the public might reasonably be expected to spend 1-hour or longer.</p>	

Representative sensitive receptors for this assessment have been selected at properties where pollutant concentrations and/or changes in pollutant concentrations are anticipated to be greatest, as listed in the table below. Receptors 61 and 62 are within the Towcester AQMA. There are no sensitive receptors within the M1 AQMA but receptors 31, 32 and 45 are the nearest sensitive receptors modelled. Receptors are listed in alphabetical order and Figures 9.3 – 9.5 show the locations of sensitive receptors modelled in South Northamptonshire.

Sensitive Receptors Modelled – South Northamptonshire

Receptor ID	Receptor name	X(m)	Y(m)
1	A508	476767	244989
2	Ashwood Farm	478370	251621
3	Bleak Hall Farmhouse	466506	243093
4	Blisworth Lodge Farm	473569	253433
5	Blisworth Marina 1	472014	255054
6	Blisworth Marina 2	472249	255584
7	Blisworth Park	471852	254604
8	Blisworth Primary School	472830	253596
9	Brackley Hatch	464802	241744
10	Broadwater Lane	468351	248414
11	Carrs Way	469394	260744
12	Celvert Road	467111	249989
13	Chapmans Drive	478042	241451
14	Collingtree Road	473683	255510
15	Courteenhall East Lodge	477353	252991
16	Creslow Court	479738	240342
17	Dalvina Place	481553	239646
18	Gaytonway	473085	255492
19	Grafton Regis	475475	246721
20	Green Lane	468324	248017

21	Greenleys Lane	480738	239832
22	Hazelborough House	465558	242615
23	Herbert Gardens	469712	250079
24	High Street	472391	253388
25	Hollandstone Farm	465619	259934
26	Kiln Farm	461796	240650
27	Kislingbury Grange	470667	257829
28	Lordsfields Farm	468930	245102
29	Main Road	466353	259692
30	Mansell Close	469321	249824
31	Maple Farm 1	474576	255680
32	Maple Farm 2	474631	255620
33	Mill Lane	459457	237050
34	Millers Close	469566	258875
35	North Street 1	471357	256901
36	North Street 2	471705	256802
37	Northampton Road	469342	260407
38	Northampton Road	469231	248881
39	Oxford Park Drive	478296	241385
40	Ploughmans Way	476880	255201
41	Quiton Green	478163	253068
42	Rectory Lane	473379	255361
43	Road School	475372	251144
44	Shearmans	480490	239792
45	Shepherd's Lodge	473268	256801
46	St Johns Road	470881	251722
47	Stoke Road	472719	253150
48	Stoneway	479245	250728
49	The Lodge	477429	254148
50	Third Lodge	470091	250429
51	Tithe Way	475491	251970
52	Towcester Bypass 1	468489	247571
53	Towcester Bypass 2	469342	246640
54	Towcester Bypass 3	470116	246667
55	Towcester Bypass School	470520	246863
56	Towcester Road	466884	249860

57	Towcester Road	471790	252807
58	Towcester Road	469273	244283
59	Versions Farm	459501	238629
60	Watling Street 1	469150	248908
61	Watling Street 2	469270	248759
62	Watling Street 3	469393	248550
63	Watling Street 4	469576	248383
64	Weeden Road	470111	260210
65	West Lodge Cottages	475270	253350
66	Whitfield	460635	239756
67	Windmill Farm	467500	244268
68	Woodlands	476415	254359
69	Wootton Road	477390	254463
70	Wretton House	467057	243415

Long-Term Pollutant Predictions

Annual-mean NO_x and PM₁₀ concentrations have been predicted at selected sensitive receptors using ADMS-Roads, then added to relevant background concentrations. Primary NO in the NO_x emissions is converted to NO₂ to a degree determined by the availability of atmospheric oxidants locally and the strength of sunlight. For road traffic sources, annual-mean NO₂ concentrations have been derived from the modelled road-related annual-mean NO_x concentration using the Defra's calculator [i].

Short-Term Pollutant Predictions

In order to predict the likelihood of exceedences of the hourly-mean AQS objectives for NO₂ and the daily-mean AQS objective for PM₁₀, the following relationships between the short-term and the annual-mean values at each receptor have been considered.

Hourly-Mean AQS Objective for NO₂

Research undertaken in support of LAQM.TG16 has indicated that the hourly-mean limit value and objective for NO₂ is unlikely to be exceeded at a roadside location where the annual-mean NO₂ concentration is less than 60 µg.m⁻³. In May 2008, a re-analysis of the relationship between annual and hourly-mean NO₂ concentrations was undertaken using data collated between 2003 and 2007 [ii]. The conclusions and recommendations of that report are:

“Analysis shows that statistically, on the basis of the dataset available here, the chance of measuring an hourly nitrogen dioxide objective exceedence whilst reporting an annual-mean NO₂ of less than 60 µg.m⁻³ is very low....

It is therefore recommended that local authorities continue to use the threshold of 60 µg.m⁻³ NO₂ as the guideline for considering a likely exceedence of the hourly-mean nitrogen dioxide objective.”

Daily-Mean AQS Objective for PM₁₀

The number of exceedences of the daily-mean AQS objective for PM₁₀ of 50 µg.m⁻³ may be estimated using the relationship set out in LAQM.TG16:

*Number of Exceedences of Daily Mean of $50 \mu\text{g.m}^{-3} = -18.5 + 0.00145 * (\text{Predicted Annual-mean } \text{PM}_{10})^3 + 206 / (\text{Predicted Annual-mean } \text{PM}_{10} \text{ Concentration})$*

This relationship suggests that the daily-mean AQS objective for PM_{10} is likely to be met if the predicted annual-mean PM_{10} concentration is $31.8 \mu\text{g.m}^{-3}$ or less.

The daily mean objective is not considered further within this assessment if the annual-mean PM_{10} concentration is predicted to be less than $31.5 \mu\text{g.m}^{-3}$.
