Corstorphine Connections post-6-Month Data Collection

6-Month vs Baseline Data - Summary Note

City of Edinburgh Council

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Table of Contents

Figures

Tables

1. Introduction

AECOM was commissioned by The City of Edinburgh Council to provide consultancy support to carry out associated pre and post monitoring and evaluation tasks for the Corstorphine Connections project. The most recent survey was carried out in the period November-December 2023, 6-months after the implementation of the project in May 2023. Baseline surveys were undertaken in November 2021 prior to implementation.

This document summarises the results from the following methods of baseline and 6-month-post surveys:

1. Automatic Traffic Counts (ATCs);
2. Pedestrian/Cycle surveys;
3. School surveys;
4. Acoustic surveys; and
5. Air Quality.

Table 1 and Figure 1 below show the names and locations of the survey sites.

Table 1. Survey Site Names

Site Letter	Site Name
A	Meadow Place Road
B	St John's Road
C	Station Road
D	Pinkhill
E	Balgreen Road
F	Ladywell Avenue
G	Dovecot Road
H	Broomhall Crescent
I	Saughton Road North
J	Broomhouse Drive
K	Ladywell Road
L	Featherhall Avenue
M	Manse Street
N	Manse Road
O	Corstorphine High Street
P	Kirk Loan

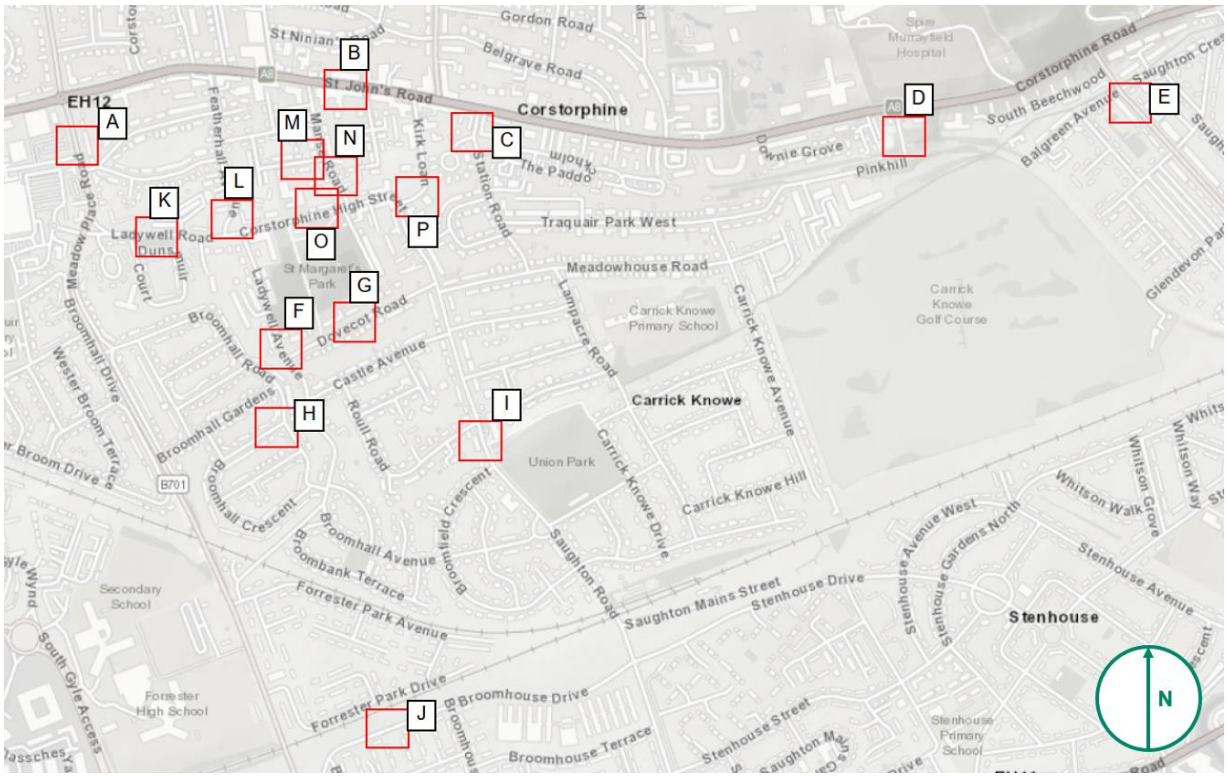


Figure 1: Corstorphine Survey Sites

2. Automatic Traffic Counts

Context

Since 2021 and the recovery from the pandemic, traffic levels have risen both in the city as a whole and particularly in west Edinburgh (where the study area is situated). Department for Transport report 10.6% more miles driven in Edinburgh in 2022 than in 2021[1] and the Council's counter network similarly indicates an increase of around 5% in traffic in the city and an increase of 6% in west Edinburgh from 2021 to 2023, as shown in Appendix B, table 22. Whilst this data can only be considered as setting a general traffic context, it suggests that the moderate overall decreases in traffic achieved by the project (shown in the following section) may be somewhat more significant. It may also indicate that the small (2.5%) increase in traffic within the project area during peak hours (see Table 3) represents a positive impact arising from the project when compared to the larger increase in traffic across west Edinburgh as a whole.

The background level of increasing traffic in the city is also a relevant factor to consider in relation to the traffic increases recorded on the boundary roads around the project area. These have seen traffic increases beyond what could be reasonably attributed to potential traffic displacement from within the project area.

Results

Automatic Traffic Counts have been carried out at 16 sites in and around the Corstorphine Connections area to assess changes in vehicle volumes and speeds. Baseline data shown below refers to the time-period Monday 8th November – Friday 12th November 2021, prior to the implementation of the Corstorphine Connections scheme. The follow-up surveys were carried out 6-months after the scheme implementation; the 6-month data shown below refers to the time-period Monday 27th November – Friday 1st December 2023.

A summary and comparison of the ATC results from the baseline and post-6-months surveys are given in Table 2, Table 3, Table 4, and Table 5, all showing weekday average values. In the tables, cells shaded grey relate to Corstorphine Primary School surrounding street sites. Two-way flow values are not necessarily the sum of the two directional flows due to rounding. The following results are given for each of the 16 sites, labelled A-P:

- For the full 24 hours:
  - Baseline and 6-month flows for both directions and the two-way flow
  - The difference between the baseline and 6-month flows for both directions and the two-way.
  - Baseline and 6-month speeds for both directions
  - The difference between the baseline and 6-month speeds for each direction
  - Baseline and 6-month 85th percentile speeds for both directions
  - The difference between the baseline and 6-month 85th percentile speeds for each direction
  - Totals relating to two-way flows for all sites, sites within the project area, sites on boundary roads around the project area, and sites on streets surrounding Corstorphine Primary School.

- During bus gate hours (08:00-10:00 & 14:45-18:30):
  - Baseline and 6-month flows for both directions and the two-way flow
  - The difference between the baseline and 6-month flows for both directions and the two-way.
  - Totals relating to two-way flows for all sites, sites within the project area, sites on boundary roads around the project area, and sites on streets surrounding Corstorphine Primary School.

[1] DfT, https://roadtraffic.dft.gov.uk/local-authorities/29, accessed 28/02/24

Table 2: Full 24 Hours - Weekday Average Flows (vehs)

			Baseline Surveys (Nov. '21)			6 Month Surveys (Nov. '23)			Difference			
Site	Location	Road Type	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	Two-Way (%)
A	Meadow Place Road	Boundary	10087	10028	20114	11432	9616	21048	1345	-411	934	
B	St John's Road	Boundary	11479	9553	21032	11356	10133	21489	-123	580	457	
C*	Station Road	Street	1406	821	2227	1947	857	2804	541	36	577	
D	Pinkhill	Street	689	1067	1757	691	951	1642	2	-116	-115	
E	Balgreen Road	Boundary	3253	3111	6364	3822	3731	7553	569	620	1189	
F	Ladywell Avenue	Street	1130	677	1807	826	581	1407	-304	-96	-400	
G	Dovecot Road	Street	213	256	469	271	356	628	58	100	159	
H	Broomhall Crescent	Street	103	91	193	85	96	181	-18	5	-12	
I	Saughton Road North	Street	4304	4585	8889	4052	4591	8644	-252	6	-245	
J	Broomhouse Drive	Boundary	3658	3282	6940	6140	5211	11351	2482	1929	4411	
K	Ladywell Road	Street	3981	3115	7096	3615	4047	7662	-366	932	566	
L	Featherhall Avenue	Street	523	520	1043	619	1082	1700	96	562	657	
M	Manse Street	Street	62	102	165	40	111	151	-22	9	-14	
N	Manse Road	Street	3026	3	3028	1534	4	1539	-1492	1	-1489	
O	Corstorphine High Street	Street	3809	2597	6406	3604	2850	6454	-205	253	48	
P	Kirk Loan	Street	17	2624	2641	21	2424	2445	4	-200	-196	
		Total			90171			96698			6527	7.2%
		Streets (in project area) Total			35721			35256			-465	-1.3%
		Boundary Streets Total			54450			61441			6991	12.8%
		Corstorphine Primary School Surrounding Streets Total			10642			9844			-798	-7.5%

Table 3: During Bus Gate Hours (08:00-10:00 & 14:45-18:30) - Weekday Average Flows (vehs)

			Baseline Surveys (Nov. '21)			6 Month Surveys (Nov. '23)			Difference			
Site	Location	Road Type	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	Two-Way (%)
A	Meadow Place Road	Boundary	3761	3748	7509	4458	3390	7849	697	-357	340	
B	St John's Road	Boundary	4412	3604	8016	4132	3947	8079	-280	344	64	
C	Station Road	Street	574	308	882	973	351	1325	400	43	443	
D	Pinkhill	Street	281	509	790	319	488	808	39	-21	18	
E	Balgreen Road	Boundary	1271	1288	2559	1583	1408	2991	312	120	432	
F	Ladywell Avenue	Street	557	326	883	397	295	692	-160	-32	-192	
G	Dovecot Road	Street	107	115	222	154	180	334	47	65	112	
H	Broomhall Crescent	Street	42	37	78	34	40	74	-7	3	-4	
I	Saughton Road North	Street	1793	1844	3638	1685	1903	3588	-109	59	-50	
J	Broomhouse Drive	Boundary	1679	1451	3130	2493	2346	4839	814	895	1709	
K	Ladywell Road	Street	1579	1273	2853	1446	1895	3341	-134	622	488	
L	Featherhall Avenue	Street	273	256	529	304	610	913	31	354	384	
M	Manse Street	Street	29	48	76	13	47	60	-16	0	-16	
N	Manse Road	Street	1311	1	1312	416	2	418	-895	1	-894	
O	Corstorphine High Street	Street	1510	1073	2583	1478	1265	2743	-32	192	160	
P	Kirk Loan	Street	6	1134	1141	12	1057	1069	5	-77	-72	
				Total	36199			39122			2923	8.1%
				Streets (in project area) Total	14986			15364			378	2.5%
				Boundary Streets Total	21214			23758			2545	12.0%
				Corstorphine Primary School Surrounding Streets Total	4500			4135			-366	-8.1%

Table 4: Full 24 Hours - Weekday Average Speeds (mph)

Site	Location	Road Type	Baseline Surveys (Nov. '21)		6 Month Surveys (Nov. '23)		Difference	
			NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB
A	Meadow Place Road	Boundary	17.4	22.1	15.4	21.0	-2.1	-1.1
B	St John's Road	Boundary	15.5	17.3	15.9	17.4	0.4	0.1
C	Station Road	Street	13.4	13.2	13.7	14.1	0.3	0.9
D	Pinkhill	Street	17.1	17.4	16.0	16.2	-1.1	-1.2
E	Balgreen Road	Boundary	25.4	25.0	23.9	22.4	-1.5	-2.6
F	Ladywell Avenue	Street	17.7	19.1	18.1	19.1	0.4	0.0
G	Dovecot Road	Street	19.5	19.0	14.4	14.3	-5.1	-4.7
H	Broomhall Crescent	Street	16.6	15.7	18.0	17.9	1.4	2.2
I	Saughton Road North	Street	22.2	23.5	20.8	21.4	-1.4	-2.1
J	Broomhouse Drive	Boundary	29.7	30.0	27.6	27.7	-2.1	-2.3
K	Ladywell Road	Street	24.2	23.0	22.3	20.2	-1.9	-2.8
L	Featherhall Avenue	Street	17.1	15.0	12.9	12.4	-4.2	-2.6
M	Manse Street	Street	11.2	11.8	9.8	7.8	-1.4	-4.0
N	Manse Road	Street	16.8	-	16.4	-	-0.4	-
O	Corstorphine High Street	Street	22.3	22.6	21.7	20.9	-0.6	-1.7
P	Kirk Loan	Street	10.1	15.6	9.7	15.0	-0.4	-0.6

Table 5: Full 24 Hours - Weekday Average 85th Percentile Speeds (mph)

Site	Location	Road Type	Baseline Surveys (Nov. '21)		6 Month Surveys (Nov. '23)		Difference	
			NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB
A	Meadow Place Road	Boundary	23.4	26.6	21.6	25.4	-1.8	-1.2
B	St John's Road	Boundary	22.4	22.8	22.4	22.0	0.0	-0.8
C	Station Road	Street	16.4	16.3	17.1	17.5	0.7	1.2
D	Pinkhill	Street	20.2	20.1	19.7	19.6	-0.6	-0.5
E	Balgreen Road	Boundary	28.7	29.0	27.7	26.2	-1.0	-2.8
F	Ladywell Avenue	Street	21.1	22.7	21.3	22.9	0.2	0.2
G	Dovecot Road	Street	24.4	24.6	18.1	17.9	-6.3	-6.7
H	Broomhall Crescent	Street	20.4	19.8	22.0	22.3	1.6	2.4
I	Saughton Road North	Street	25.9	27.1	24.5	24.8	-1.4	-2.4
J	Broomhouse Drive	Boundary	33.8	34.0	31.5	31.4	-2.3	-2.6
K	Ladywell Road	Street	27.7	27.0	25.8	24.9	-1.9	-2.1
L	Featherhall Avenue	Street	20.3	17.5	15.6	14.9	-4.7	-2.7
M	Manse Street	Street	14.5	15.5	11.9	9.9	-2.5	-5.6
N	Manse Road	Street	20.0	-	19.7	-	-0.3	-
O	Corstorphine High Street	Street	26.1	26.6	25.6	24.7	-0.5	-1.8
P	Kirk Loan	Street	13.4	18.7	12.4	17.9	-1.0	-0.7

3. Pedestrian / Cycle Surveys

Context

Citywide data suggests that cycling levels in some parts of Edinburgh reduced between 2021 and 2023, possibly due to an increase in cycling during the pandemic (Appendix B Table 23). It is considered plausible that the cycling reductions in Corstorphine recorded as part of this study (Table 8 & 9) may be more related to this factor than to specific impacts of Corstorphine Connections.

Time of year and weather may also have had an influence on active travel levels. The baseline data was collected in early/mid-November, but, due to very poor weather earlier in the month, the six-month data was collected in late November. At this time the weather was somewhat colder, windier and with less daylight than during the baseline period. Further details are provided in Appendix B, table 24.

Results

Pedestrian and cycle surveys were carried out at 8 sites. The baseline surveys were carried out in November 2021, prior to the implementation of the scheme. The follow-up surveys were carried out 6-months after the scheme implementation, in November 2023.

For each survey, data from a Tuesday and a Thursday was averaged to calculate weekday average flows for pedestrians and cyclists. See below for more precise details of the days each site was surveyed. Cells shaded grey in the tables below relate to sites surrounding Corstorphine Primary School. The following results are given for both pedestrians and cyclists for each of the 8 sites I, K, L, M, N, O, P, Q:

- For the period 07:00-19:00 and during bus gate hours (08:00-10:00 & 14:45-18:30):
  - Baseline and 6-month flows for both directions and the two-way flow
  - The difference between the baseline and 6-month flows for both directions and the two-way.
  - Totals relating to two-way flows for all 8 sites.

NB:

- Raw data for each site was categorized by kerbside and by ‘pavement’ versus ‘on-road’, but these variables have been consolidated.
- For Site O, data for the park entrance has not been included for consistency between surveys.
- Baseline survey data has been taken from surveys conducted on the 9th & 11th November, apart from Site O which used 16th & 18th November.
- For all sites, 6-month survey data has been taken from surveys conducted on the 21st & 23rd November.

A summary and comparison of the pedestrian and cycle count results are given in Table 6, Table 7, Table 8, and Table 9.

Table 6: 0700-1900 - Weekday Average Pedestrian Flows

Site	Location	Road Type	Baseline Surveys			6-Month Surveys			Difference			
			NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	Two-way (%)
I	Saughton Road North	Street	689	741	1430	728	773	1500	39	32	71	
K	Ladywell Road	Street	413	378	791	474	403	876	61	25	85	
L	Featherhall Avenue	Street	471	470	940	365	364	729	-106	-106	-211	
M	Manse Street	Street	358	358	716	320	332	652	-38	-27	-65	
N	Manse Road	Street	496	420	916	451	343	794	-46	-77	-123	
O	Corstorphine High Street	Street	538	457	995	620	514	1134	82	57	139	
P	Kirk Loan	Street	234	266	500	300	334	633	66	68	134	
Q	Lampacre Road	Street	215	753	968	321	334	655	106	-420	-314	
				Total	7,255			6,971			-284	-3.9%

Table 7: During Bus Gate Hours (08:00-10:00 & 14:45-18:30) - Weekday Average Pedestrian Flows

Site	Location	Road Type	Baseline Surveys			6-Month Surveys			Difference			
			NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	Two-way (%)
I	Saughton Road North	Street	354	388	742	364	390	754	10	3	12	
K	Ladywell Road	Street	215	197	411	275	239	514	61	42	103	
L	Featherhall Avenue	Street	300	317	617	215	223	438	-85	-94	-179	
M	Manse Street	Street	304	297	601	259	276	535	-45	-21	-66	
N	Manse Road	Street	328	273	601	280	212	492	-48	-62	-110	
O	Corstorphine High Street	Street	391	338	729	410	311	720	19	-28	-9	
P	Kirk Loan	Street	108	135	242	149	180	329	41	46	87	
Q	Lampacre Road	Street	140	671	811	262	269	531	122	-403	-281	
				Total	4,753			4,310			-443	-9.3%

Table 8: 0700-1900 - Weekday Average Cycle Flows

			Baseline Surveys			6-Month Surveys			Difference			
Site	Location	Road Type	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	Two-way (%)
I	Saughton Road North	Street	27	35	61	17	22	38	-10	-13	-23	
K	Ladywell Road	Street	18	22	40	15	13	28	-4	-9	-12	
L	Featherhall Avenue	Street	29	28	56	12	23	34	-17	-5	-22	
M	Manse Street	Street	8	8	16	4	5	9	-4	-3	-7	
N	Manse Road	Street	32	8	40	22	4	26	-10	-5	-14	
O	Corstorphine High Street	Street	28	21	48	25	17	42	-3	-4	-7	
P	Kirk Loan	Street	4	19	22	1	15	16	-3	-4	-7	
Q	Lampacre Road	Street	11	28	39	16	20	36	5	-8	-3	
				Total	321			227			-94	-29.3%

Table 9: During Bus Gate Hours (08:00-10:00 & 14:45-18:30) - Weekday Average Cycle Flows

			Baseline Surveys			6-Month Surveys			Difference			
Site	Location	Road Type	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	Two-way (%)
I	Saughton Road North	Street	15	22	37	10	12	22	-5	-11	-15	
K	Ladywell Road	Street	14	14	28	10	8	18	-5	-6	-10	
L	Featherhall Avenue	Street	19	15	34	6	10	16	-14	-5	-19	
M	Manse Street	Street	6	5	10	4	4	8	-2	-1	-3	
N	Manse Road	Street	22	5	27	14	1	15	-8	-5	-13	
O	Corstorphine High Street	Street	19	12	31	16	12	28	-4	0	-4	
P	Kirk Loan	Street	2	11	13	1	8	8	-2	-3	-5	
Q	Lampacre Road	Street	6	22	28	12	16	28	6	-6	0	
				Total	206			140			-67	-32.3%

4. School Hands-up Surveys

Surveys were conducted at Corstorphine Primary School and Carrick Knowe Primary School before and after the scheme implementation to assess the impacts on how the pupils travelled to school. Since implementation of the trial scheme, the proportion of children using active travel to get to Corstorphine Primary School has risen by 4%. The percentage travelling by car has also fallen by 2%. Levels of active travel to Carrick Knowe Primary School have remained the same and there has been a reduction in the number of children driven to school by 5%.

Corstorphine Primary School

Table 10, Table 11, and Table 12 give a summary of the totals for each of the specified modes of transport for March 2022 (pre-implementation) and September 2023 (post-implementation):

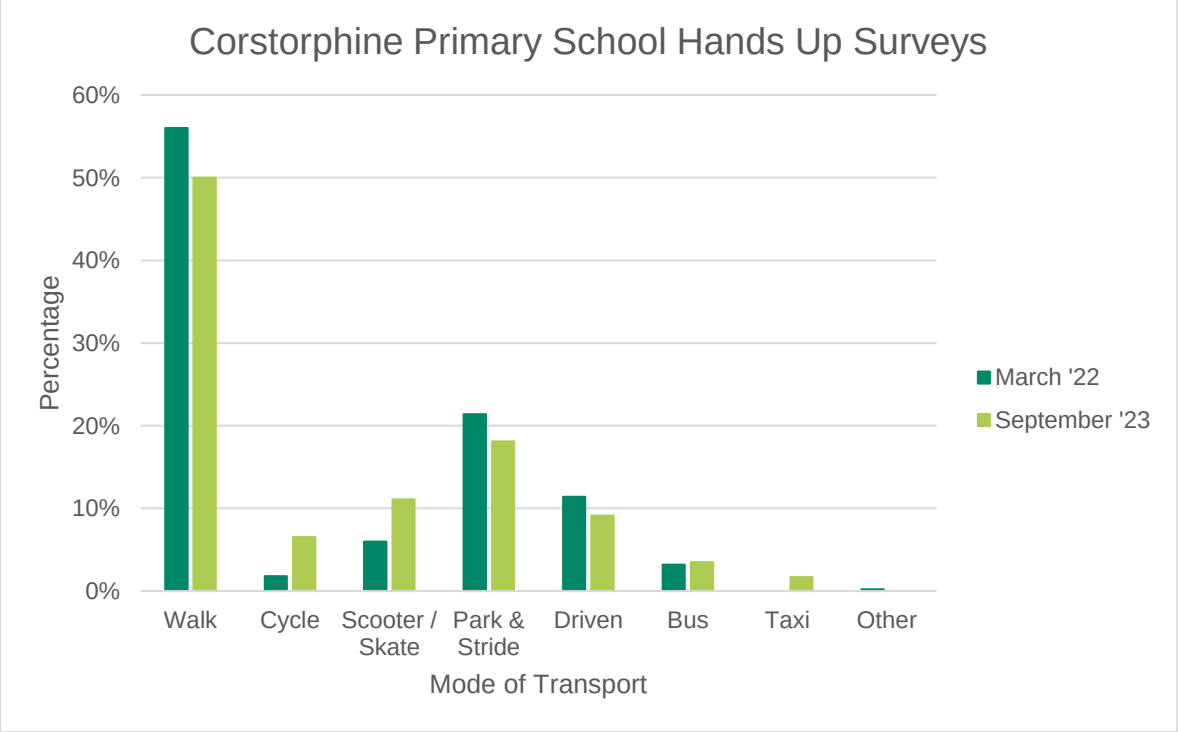
Table 10: March 2022 Hands Up Survey (Corstorphine)

	Walk	Cycle	Scooter/Skate	Park and Stride	Driven	Bus	Taxi	Other
Total	280	9	30	107	57	16	0	1
Percentage of total	56.0%	1.8%	6.0%	21.4%	11.4%	3.2%	0.0%	0.2%

Table 11: September 2023 Hands Up Survey (Corstorphine)

	Walk	Cycle	Scooter/Skate	Park and Stride	Driven	Bus	Taxi	Other
Total	329	43	73	119	60	23	11	0
Percentage of total	50.0%	6.5%	11.1%	18.1%	9.1%	3.5%	1.7%	0.0%

Table 12: Transport mode percentages pre- and post-implementation (Corstorphine)



Carrick Knowe Primary School

Table 13, Table 14, and Table 15 show a summary of the totals for each of the specified modes of transport for March 2022 (pre-implementation) and November 2023 (post-implementation):

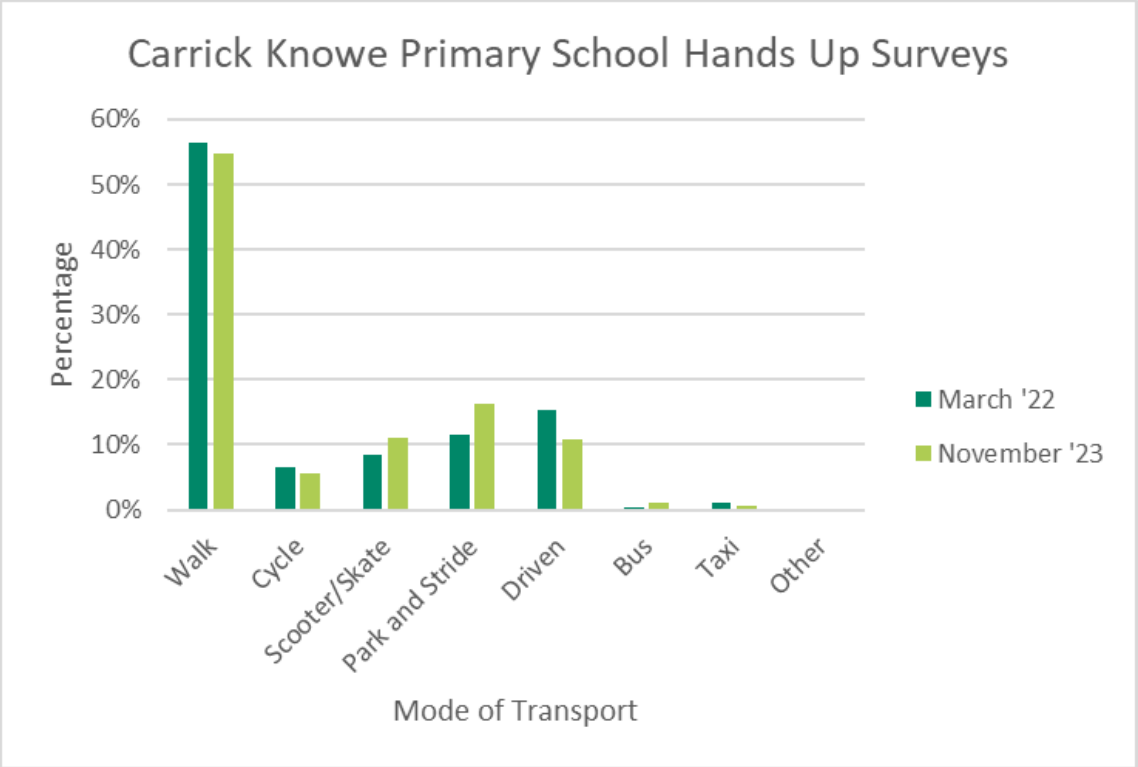
Table 13: March 2022 Hands Up Survey (Carrick Knowe)

	Walk	Cycle	Scooter/Skate	Park and Stride	Driven	Bus	Taxi	Other
Total	146	17	22	30	40	1	3	0
Percentage of total	56.37%	6.56%	8.49%	11.58%	15.44%	0.39%	1.16%	0.00%

Table 14: November 2023 Hands Up Survey (Carrick Knowe)

	Walk	Cycle	Scooter/Skate	Park and Stride	Driven	Bus	Taxi	Other
Total	158	16	32	47	31	3	2	0
Percentage of total	54.67%	5.54%	11.07%	16.26%	10.73%	1.04%	0.69%	0.00%

Table 15: Transport mode percentages pre- and post-implementation (Carrick Knowe)



5. Acoustic Surveys

Noise monitoring was undertaken to coincide with selected automatic traffic counts (ATCs) during the baseline (2021) and post 6-month (2023) ATC periods. Measurement locations were agreed with The City of Edinburgh Council and the wider project team in 2021 to correspond with five of the automated traffic count (ATC) locations – B, I, L, N, and O, shown in Figure 2. The same locations were used to conduct the 2023 noise surveys, and the results show that across the five measurement locations road traffic noise levels were similar to or slightly lower than those measured in 2021.

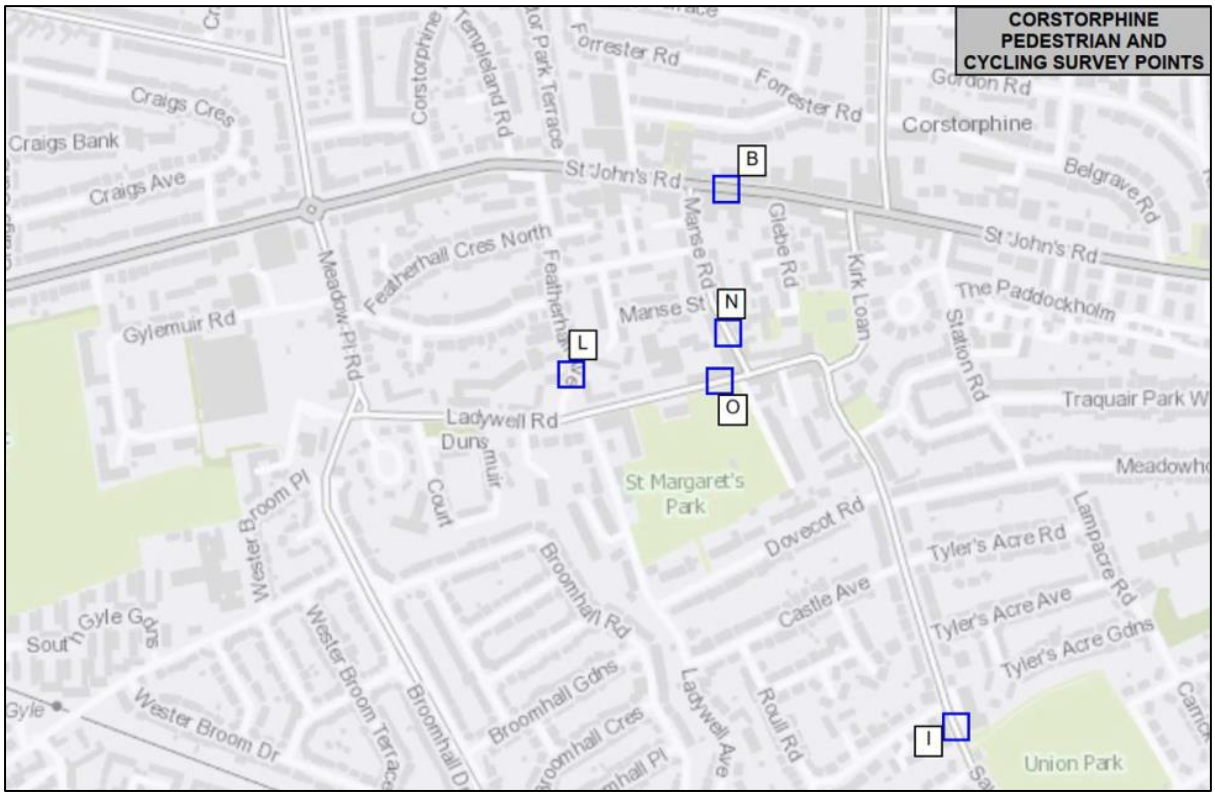


Figure 2: ATC noise survey locations

Measurements were conducted using the shortened Calculation of Road Traffic Noise (CRTN[2]) method, and included $L_{Aeq,T}$, $L_{A10,T}$, $L_{A90,T}$, & L_{AFmax}. See Appendix A for further details on the measures used.

The post 6-month surveys were planned to commence on Tuesday 21st November and Thursday 23rd November 2023 following the same rotation that was used for the baseline surveys. Due to an equipment fault on the 21st of November and unsuitable weather that followed, some of the surveys were postponed. The rotation and dates were amended to allow robust comparison to be made with the results of the 2021 surveys, and monitoring completed within the ATC period. Table 16 shows the 2021 and 2023 monitoring rotations.

Table 16: Monitoring rotations

Location and period	B (AM)	B (PM)	I (AM)	I (PM)	L (AM)	L (PM)	N (AM)	N (PM)	O (AM)	O (PM)
09/11/2021		X		X	X		X		X	
11/11/2021	X		X			X		X		X
21/11/2023		X		X	X		X			
28/11/2023								X	X	
29/11/2023	X		X			X				X

[2] Department of Transport, Welsh Office (1988) Calculation of Road Traffic Noise (CRTN)

Baseline Survey

In the baseline survey, monitoring was conducted at different times on two separate days at the same locations to consider variations that may occur on specific days or at specific times. The results of the noise monitoring are given in Table 17.

The $L_{Aeq,T}$ results are provided for the three- hour period, the $L_{A10,T}$ and $L_{A90,T}$ are provided as the arithmetic average of the three individual one-hour periods. The L_{AFmax} is the maximum level monitored during the three-hour period. The results show a range of L_{Aeq} values between 56 dB and 69 dB, L_{A10} values ranged from 58 dB to 72 dB, L_{A90} values were range between 45 dB and 62 dB, and L_{Afmax} values ranged from 79 dB to 98 dB.

Table 17: Baseline noise monitoring results

Measurement Location	Free-field/ Façade	Measurement Period	$L_{Aeq, 3hr}$ (dB)	$L_{A10, T}$ (dB)	$L_{A90, T}$ (dB)	L_{AFmax} (dB)
B- St John's Road	Façade	09/11/21 14:00 - 17:00	69	72	62	98
		11/11/21 10:00 - 13:00	69	72	62	94
I - Saughton Road North	Façade	09/11/21 15:15 - 17:13*	67	71	54	84
		11/11/21 10:00 - 13:00	65	69	49	85
L - Featherhall Avenue	Free-field	09/11/21 10:00 - 14:00	56	58	48	79
		11/11/21 14:00 - 17:00	56	59	45	86
N - Manse Road	Façade	09/11/21 10:00 - 13:00	61	65	47	92
		11/11/21 14:00 - 17:00	62	66	46	88
O - Corstorphine High Street	Façade	09/11/21 10:00 - 13:00	68	72	52	90
		11/11/21 14:00 - 17:00	67	71	50	95

* Equipment error - only 2 hours of measurements were done at this location on the first day

The main sound source at all locations was road traffic, although there were multiple contributors to the sound levels at all locations. This mainly included sounds from pedestrians passing by and sounds from children attending the nearby primary school at locations L and O, as well as bird song, dogs, and vehicles loading. A nearby substation was heard at Site I.

The sound levels at B, I and O are typical for roadside locations along a road in urban areas. The sound levels are L and N are typical for roadside locations along a road in residential areas.

6-Month Surveys

The post 6-Month surveys follow the methodology used in the baseline surveys. As before, monitoring was conducted at different times on two separate days at each location. A summary of the measured levels is presented in Table 18.

The results show a range of L_{Aeq} values between 54 dB and 70 dB, L_{A10} values ranged from 57 dB to 73 dB, L_{A90} values were range between 43 dB and 61 dB, and L_{Afmax} values ranged from 80 dB to 97 dB.

Table 18: Post 6-Month noise monitoring results

Measurement Location	Free-field/ Façade	Measurement Period	$L_{Aeq, 3hr}$ (dB)	$L_{A10, T}$ (dB)	$L_{A90, T}$ (dB)	L_{AFmax} (dB)
B- St John's Road	Façade	21/11/2023 14:09 – 17:09*	70	73	61	97
		29/11/2023 10:00 – 13:00	69	72	61	96
I - Saughton Road North	Façade	21/11/2023 14:00 – 17:00	65	69	52	84
		29/11/2023 10:00 – 13:00	65	69	51	93
L - Featherhall Avenue	Free-field	21/11/2023 10:00 – 13:00	54	57	44	80
		29/11/2023 14:00 – 17:00	58	58	46	89
N - Manse Road	Façade	21/11/2023 10:00 – 13:00	60	63	43	96
		28/11/2023 14:00 – 17:00	60	63	46	93
O - Corstorphine High Street	Façade	28/11/2023 10:00 – 13:00	67	72	52	85
		29/11/2023 14:00 – 17:00	67	72	52	94

* Late starting period due to equipment errors

The dominant sound source at all locations was road traffic, although several other extraneous sources also contributed to the sound levels. These mainly included sounds from pedestrians passing by and sounds from children playing at the nearby primary school (locations L and O).

At location I, it was noted that a substation was heard in the 2021 report. However, this was not the case during the 2023 survey. Distant construction noise was also audible on the 29th November 2023 at this location, although no adverse contribution was observed to the dominant sound source of road traffic.

At location N road traffic from Manse Road was the dominant sound source when present, although there were lulls in traffic between peak periods where there is no through route to St. John's Road. Road traffic from Corstorphine High Street was the dominant sound source when there was no traffic on Manse Road.

Comparison

In the post 6-month survey, the sound climate at each monitoring location was similar to that during the baseline survey. The subjective observations made from the 2023 survey were in line with the 2021 survey, except for no audible noise from the substation at location I in 2023 (although this was heard in 2021).

Table 19 shows the difference in $L_{A10,T}$ levels (which best represents road traffic noise) between the 2021 and 2023 survey, where negative values show a reduction compared with the 2021 survey.

Table 19: Difference between 2023 and 2021 sound levels

Measurement Location	Free/field/ Façade	Measurement Period	Difference in $L_{A10, T}$ (dB)
B- St John's Road	Façade	AM	0
		PM	1
I - Saughton Road North	Façade	AM	0
		PM	-2
L - Featherhall Avenue	Free-field	AM	-1
		PM	-1
N - Manse Road	Façade	AM	-2
		PM	-3
O - Corstorphine High Street	Façade	AM	0
		PM	1

The results show that:

- At locations B, L and O road traffic noise levels are similar to those measured in 2021
- At location I road traffic noise levels are similar to or slightly lower than those measured in 2021
- At location N road traffic noise levels are slightly lower than those measured in 2021

6. Air Quality Surveys

Air quality monitoring surveys have been conducted to establish nitrogen dioxide (NO_2) concentrations around the study area before and after the scheme implementation.

The six months pre-scheme implementation air quality survey results cover a monitoring period between November 2021 and May 2022. The post-scheme survey duration is twelve months. This section summarises the first six-months of the post-scheme implementation survey, undertaken between June 2023 and December 2023. The air quality survey is currently ongoing to obtain the full 12-months data.

Part IV of the Environment Act (2021) requires UK governments to produce a national Air Quality Strategy which contains standards, objectives, and measures for improving ambient air quality. The Air Quality Strategy sets out Air Quality Objectives (AQO) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale. The post-scheme survey results have been assessed against these criteria as well as the pre-scheme results.

Methodology

For the post-scheme survey, NO_2 diffusion tubes were deployed at 25 sites around Corstorphine on 5th June 2023 and decommissioned on 6th December 2023. Tubes were monitored in duplicates at each location. Site information is detailed in Table 20 and Figure 3.

There is an existing air quality monitoring network (AQMA) within Edinburgh, managed by City of Edinburgh Council (CoEC). CoEC has six active AQMAs, the closest to the study area is at St John's Road. Site Cor_17 was co-located with the CoEC continuous monitoring station at St John's Road and two other sites (Cor_18 and Cor_19) were co-located with CoEC diffusion tubes.

The remaining diffusion tubes were placed in roadside locations around Corstorphine, at the same locations as for the pre-scheme survey, except for Cor_2, Cor_5, Cor_6, and Cor_12 where street furniture upon which the monitoring equipment was previously installed were no longer available. These sites therefore could not be used in the pre- and post-scheme comparison.

Diffusion tubes were attached to existing street furniture at a height of 1.8 – 2.8 m (representing ground floor exposure). All sites were routinely checked for precision, and there were no significant issues.

As only six months of monitoring was carried out, annualization was required at all sites to account for seasonal variation. Diffusion tube bias was adjusted to improve the accuracy, quality and reliability of the monitoring results in line with Defra TG.22 guidance[3] using Defra's local bias adjustment sheet[4].

[3] Defra (2022), Local Air Quality Management, Technical Guidance (TG22), Available at: LAQM-TG22-August-22-v1.0.pdf (defra.gov.uk) Accessed 07/02/2024
[4] Defra (2011) Diffusion Tube Precision Accuracy Bias Spreadsheet. Available at: https://laqm.defra.gov.uk/air-quality/air-quality-assessment/local-bias/ Accessed 07/02/2024

Table 20: Diffusion Tube Site Information

Site ID	Location
Cor 1	B701
Cor 2	Station Rd
Cor 3	Pinkhill
Cor 4	Balgreen Rd
Cor 5	Ladywell Av
Cor 6	Dovecote Rd
Cor 7	Broomhall Gardens
Cor 8	Saughton Rd N
Cor 9	Broomhouse Dr
Cor 10	Ladywell Rd
Cor 11	Featherhall Av
Cor 12	Manse Street
Cor 13	Manse Rd
Cor 14	Corstorphine High Street
Cor 15	Kirk Loan
Cor 16	St John's Rd
Cor 17	St John's Rd
Cor 18	St John's Rd
Cor 19	St John's Rd
Cor 20	Corstorphine Rd
Cor 21	Balgreen Rd
Cor 22	Lampacre Rd
Cor 23	Broomhouse Rd
Cor 24	Meadowhouse Rd
Cor 25	Traquair Park W

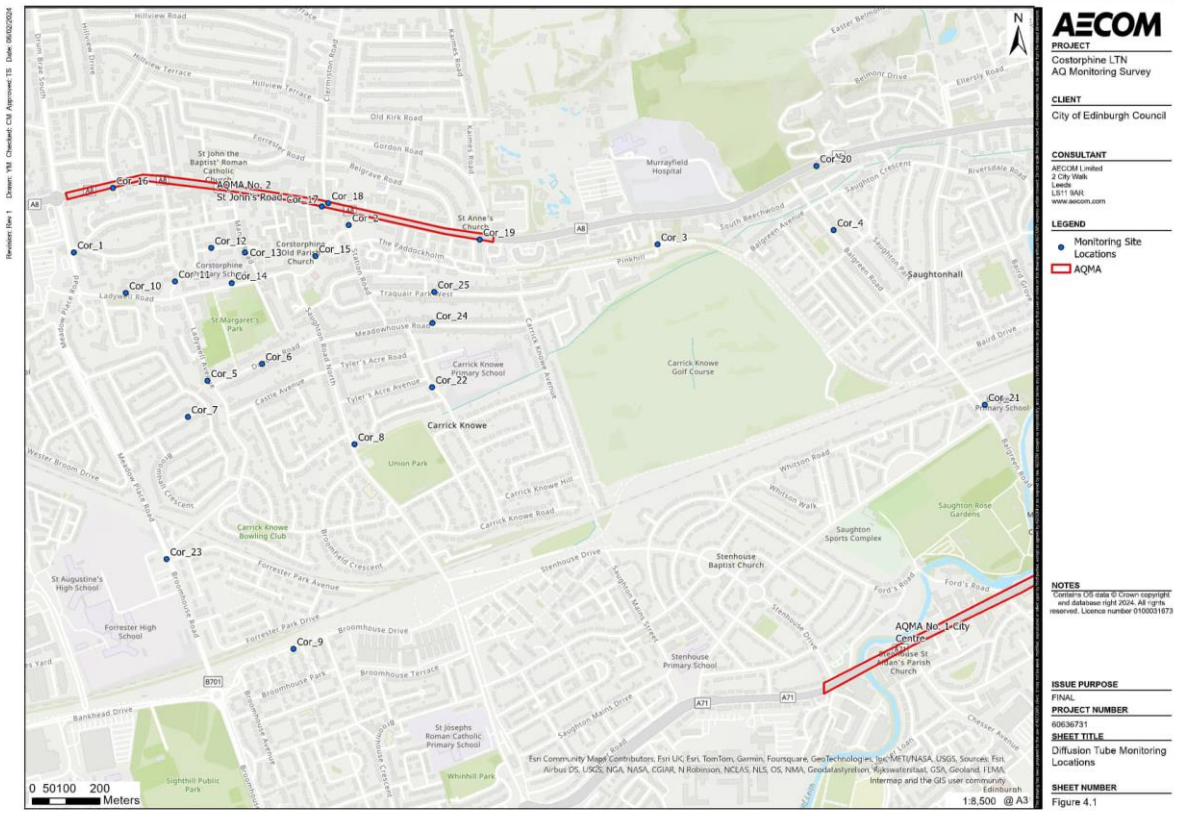


Figure 3: Location of Air Quality Monitoring Sites

Data capture of the first six months of the post-scheme survey was generally good. However, monitoring site Cor_20 had a particularly poor data capture of 16.7%. Due to the data capture being below 25%, this monitoring site was omitted from analysis.

Monitoring using diffusion tubes is considered an "indicative" monitoring technique. This is because they have a relatively high level of uncertainty, cited in guidance as ± 25%[5]. Therefore, when comparing sets of diffusion tube results, small changes in NO_2 concentrations should be interpreted with caution.

Results

The pre- and post-scheme mean NO_2 concentrations (as well as the change) for each site can be found in Table 21 and are shown in Figure 4.

[5] AEA Energy and Environment (2008), Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance. (1a), 53.

Table 21: Annualized and bias-adjusted NO_2 monitoring results of the pre-scheme survey and the first 6-months of the post-scheme survey

Site ID	Location	Pre-scheme (µg/m^3)	Post-scheme (µg/m^3)	Change in NO_2 concentrations (µg/m^3)
Cor 1	B701	23.5	20.8	-2.7
Cor 3	Pinkhill	13.5	11.8	-1.6
Cor 4	Balgreen Rd	14.1	13.7	-0.3
Cor 7	Broomhall Gardens	13.0	12.5	-0.5
Cor 8	Saughton Rd N	14.2	15.6	1.4
Cor 9	Broomhouse Dr	20.6	18.4	-2.2
Cor 10	Ladywell Rd	19.4	19.6	0.2
Cor 11	Featherhall Av	13.9	12.9	-1.0
Cor 13	Manse Rd	15.7	15.5	-0.2
Cor 14	Corstorphine High St	19.5	16.5	-3.1
Cor 15	Kirk Loan	14.5	13.9	-0.6
Cor 16	St John's Rd	28.2	27.8	-0.4
Cor 17	St John's Rd	31.2	30.7	-0.5
Cor 18	St John's Rd	22.8	24.2	1.4
Cor 19	St John's Rd	25.6	26.1	0.4
Cor 21	Balgreen Rd	24.3	25.2	0.9
Cor 22	Lampacre Rd	12.5	11.3	-1.2
Cor 23	Broomhouse Rd	13.3	13.9	0.6
Cor 24	Meadowhouse Rd	13.5	12.4	-1.1
Cor 25	Traquair Park W	13.6	12.8	-0.8

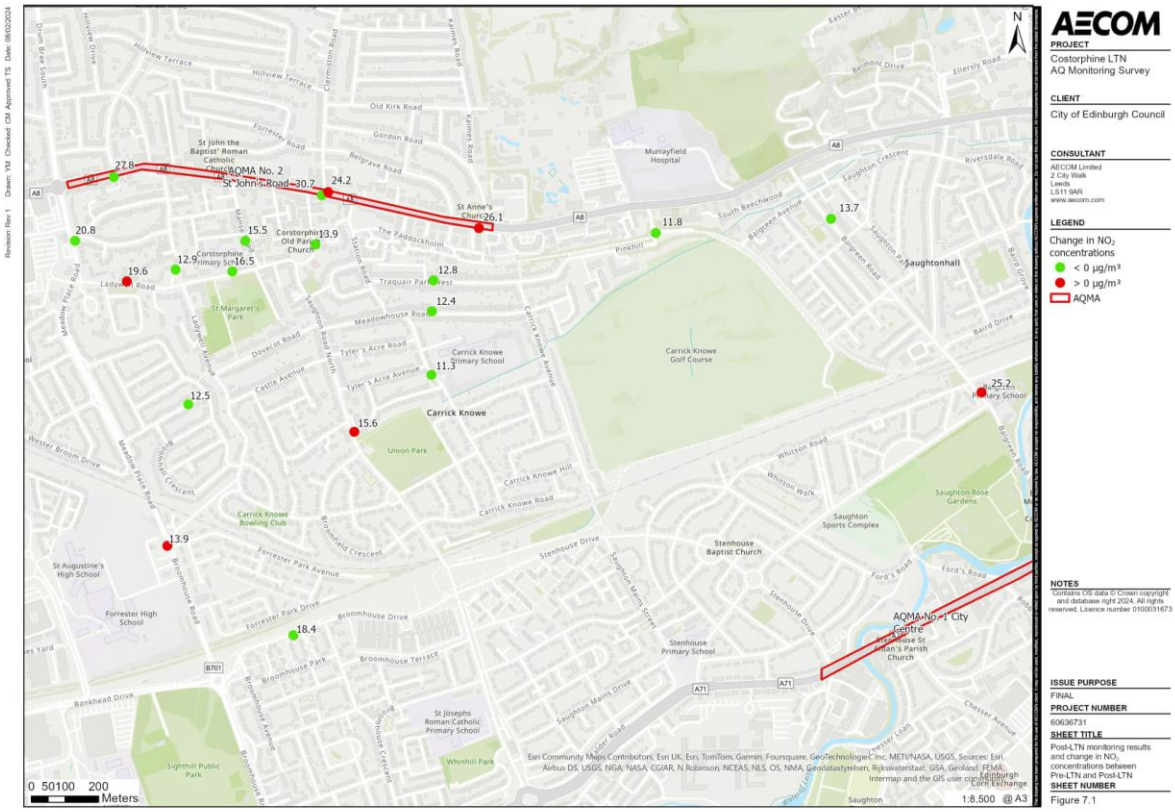


Figure 4: Post-scheme monitoring results (labels of monitoring sites) and change in Annual Mean NO_2 concentrations between pre-scheme and post-scheme surveys

Of the 25 monitoring sites installed in Corstorphine, there were no exceedances of the annual mean NO_2 AQO of 40 µg/m^3.

At most monitoring sites, a decrease in NO_2 concentrations could be determined when comparing post-scheme concentrations with pre-scheme concentrations, although these are relatively small, ranging from -3.1 to 1.4 µg/m^3. This is partially reflected in the Edinburgh wide air quality monitoring trends[6] and is therefore considered likely to be attributable to other improvements such as emissions in the fleet, rather than due to the implementation of the scheme; no clear relationship between changes in annual mean NO_2 concentrations and traffic has been identified.

[6] Edinburgh City Council (2023) 2023 Air Quality Annual Progress Report (APR) for The City of Edinburgh Council. Available at: laqm-annual-progress-report-2023 (edinburgh.gov.uk) Accessed 07/02/2024

Appendix A Acoustic Terminology

A.1 Ambient or Activity Sound Levels - L_{Aeq}

The equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$, is the single number that represents the average sound energy measured over that period. The $L_{Aeq,T}$ is the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period.

A.2 Road Traffic Sound Levels – L_{A10}

With regards to road traffic the parameter L_{A10} is prescribed by the relevant guidance and legislation. $L_{A10,T}$ is the A-weighted sound level exceeded for 10% of the measurement period T. The $L_{A10,18h}$ is defined in the Calculation of Road Traffic Noise (CRTN) as the arithmetic average of the individual 1-hour $L_{A10,1h}$ levels between 06:00 - 00:00. Using the shortened CRTN measurement procedure the $L_{A10,18h}$ can be estimated from the arithmetic average of 3 individual $L_{A10,1h}$ measurements taken between 10:00 and 17:00 by the subtraction of 1 dB.

A.3 Background Sound Levels – L_{A90}

A parameter that is widely accepted as reflecting human perception of the ambient sound is the background sound level, $L_{A90,T}$. This is the sound level exceeded for 90 % of the measurement period and generally reflects the sound level in the lulls between individual sound events. Over a one-hour period, the L_{A90} will be the sound level exceeded for 54 minutes.

A.4 Maximum Sound Levels - L_{Amax}

The L_{Amax} is the maximum A-weighted sound pressure level measured over a measurement period.

A.5 Calculation of Road Traffic Noise (CRTN) Measurement Criteria

The CRTN sets out the following guidelines for the measurement procedure:

- Other traffic or extraneous sounds do not influence the measured level;
- Dry road surface;
- Average wind speed in the direction from the road to monitoring location should be less than 2 m/s;
- Maximum wind speed should never be greater than 10 m/s
- Microphone position view should not be obstructed
- Microphone should be 4-15 m from nearside edge of carriageway
- Microphone should be 1.2 m above road surface
- Microphone diaphragm should be horizontal
- Measurements should be taken in free-field conditions (minimum distance of 15 m to nearest reflecting surface). If free-field is not possible, the measurement should be taken 1 m from façade.

Appendix B Wider Traffic Context

Table 22: Number of vehicles recorded by Edinburgh City Council automatic counters

		Year	
		2021	2023
West Edinburgh	Vehicles	16,588,997	17,586,127
	Change		997,130
	% Change		6.0%
Whole city	Vehicles	44,407,274	46,779,595
	Change		2,372,321
	% Change		5.3%

Table 23: Number of cyclists counted at automatic counters in Edinburgh

	Average number of cyclists per day			
Location	Nov-21	Nov-23	Change	% Change
Nicolson Street	581	654	73	13%
A90 Deans Bridge	484	319	-165	-34%
Whitehouse Loan	448	545	97	22%
Crewe Road South	431	386	-45	-10%
Carrington Road Eastbound	126	114	-12	-10%
Blacket Avenue	116	132	16	14%

Table 24: Comparative weather data, Edinburgh Airport weather station

Date	General conditions	Wind (mph)	Temp (°C)	Daylight hours
09/11/2021	Sunny, some clouds, one short light rain shower	11–16	10–12	9 hrs 12 mins
11/11/2021	Sunny, some clouds, two short light rain showers	6–9	8–12	9 hrs 05 mins
21/11/2023	Sunny, some cloud	3–10	2–7	8 hrs 35 mins
23/11/2023	Sunny, some clouds, two short light rain showers	12–26	8–13	8 hrs 30 mins

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