London Borough of Havering
Air Quality Annual Status Report 2020 for 2019
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This report provides a detailed overview of air quality in the London Borough of Havering during 2019. It has been produced to meet the requirements of the London Local Air Quality Management statutory process[1].

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1 LLAQM Policy and Technical Guidance 2019 (LLAQM.TG (19)). https://www.london.gov.uk

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Abbreviations

AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
BEB	Buildings Emission Benchmark
CAB	Cleaner Air Borough
CAZ	Central Activity Zone
EV	Electric Vehicle
GLA	Greater London Authority
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LLAQM	London Local Air Quality Management
NRMM	Non-Road Mobile Machinery
PM_{10}	Particulate matter less than 10 micron in diameter
$PM_{2.5}$	Particulate matter less than 2.5 micron in diameter
TEB	Transport Emissions Benchmark
TfL	Transport for London

Table A. Summary of National Air Quality Standards and Objectives

Pollutant	Objective (UK)	Averaging Period	Date[1]
Nitrogen dioxide - NO_2	200 μg m^{-3} not to be exceeded more than 18 times a year	1-hour mean	31 Dec 2005
	40 μg m^{-3}	Annual mean	31 Dec 2005
Particles - PM_{10}	50 μg m^{-3} not to be exceeded more than 35 times a year	24-hour mean	31 Dec 2004
	40 μg m^{-3}	Annual mean	31 Dec 2004
Particles - $PM_{2.5}$	25 μg m^{-3}	Annual mean	2020
	Target of 15% reduction in concentration at urban background locations	3 year mean	Between 2010 and 2020
Sulphur Dioxide (SO_2)	266 μg m^{-3} not to be exceeded more than 35 times a year	15 minute mean	31 Dec 2005
	350 μg m^{-3} not to be exceeded more than 24 times a year	1 hour mean	31 Dec 2004
	125 μg m^{-3} mot to be exceeded more than 3 times a year	24 hour mean	31 Dec 2004

Note: [1] by which to be achieved and maintained thereafter

1. Air Quality Monitoring

1.1 Locations

Table B. Details of Automatic Monitoring Sites for 2019

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance from monitoring site to relevant exposure (m)	Distance to kerb of nearest road (N/A if not applicable) (m)	Inlet height (m)	Pollutants monitored	Monitoring technique
HV1	Rainham	553127	182506	Roadside	Y	3	10	3	NO_2, PM_{10}, $PM_{2.5}$	Chemiluminescent; TEOM, FDMS
HV3	Romford	551108	188257	Roadside	Y	3	8	3	NO_2, PM_{10}	Chemiluminescent;FDMS

Table C. Details of Non-Automatic Monitoring Sites for 2019

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance from monitoring site to relevant exposure (m)	Distance to kerb of nearest road (N/A if not applicable) (m)	Inlet height (m)	Pollutants monitored	Tube co-located with an automatic monitor?(Y/N)
HAV2, HAV5, HAV6	Mercury Gardens	551488	188993	Urban Centre	Y	1	3	2	NO_2	N
HAV1,	Waterloo Road	551108	188257	Urban Centre	Y	3	8	2	NO_2	Y

HAV7, HAV8										
HAV3	Nelson Road	551726	183462	Urban Background	Y	3	1	2	NO_2	N
HAV4	Langtons	553724	187560	Urban Background	Y	N/A	N/A	2	NO_2	N
HAV9, HAV10, HAV11	Alexandra Road	551629	188296	Urban Centre	Y	3	1	2	NO_2	N
HAV12	Main Road GPPS	552096	189619	Roadside	Y	4	1	2	NO_2	N
HAV13, HAV14, HAV15	A12 Junction with North Street	550607	189685	Roadside	Y	5	5	2	NO_2	N
HAV16, HAV17, HAV18	Rom Valley Way	551414	187802	Roadside	Y	N/A	1	2	NO_2	N
HAV19, HAV20, HAV21	Collier Row	549837	191109	Kerbside	Y	3	0.5	2	NO_2	N
HAV22, HAV23, HAV24	Ravensbourne School	553707	190817	Urban Background	Y	N	1	2	NO_2	N
HAV25	Wincanton Road	553727	193161	Urban Background	Y	N	3	2	NO_2	N
HAV26	Adj. 109 Cross Road	549532	189777	Urban Background	Y	3	1	2	NO_2	N
HAV27, HAV28, HAV29	Rush Green Road	550942	187420	Kerbside	Y	5	0.5	2	NO_2	N
HAV30	Marlborough Road	549318	189384	Urban Background	Y	3	1	2	NO_2	N
HAV31	Danes Road	550197	187908	Industrial	Y	4	1	2	NO_2	N
HAV32, HAV33, HAV34	Gallows Corner	553410	190558	Kerbside	Y	4	0.5	2	NO_2	N

HAV35	Church Road	554204	193795	Urban Background	Y	3	1	2	NO_2	N
HAV36	Bedford Park Entrance	551755	193022	Rural	Y	N	1	2	NO_2	N
HAV37	Colchester Road	555723	191750	Kerbside	Y	3	0.5	2	NO_2	N
HAV 38	Myrtle Road	553434	191656	Roadside	Y	N	1	2	NO_2	N
HAV39	Rise Park Boulevard	551616	190622	Roadside	Y	3	1	2	NO_2	N
HAV40	Main Road	553174	190306	Roadside	Y	9	1	2	NO_2	N
HAV41	Main Road	552517	189826	Roadside	Y	8	1	2	NO_2	N
HAV42	Mawney School	550623	188890	Kerbside	Y	2	1	2	NO_2	N
HAV43	Upminster School	556072	186539	Roadside	Y	2	2	2	NO_2	N
HAV44	Ardleigh Green School	553952	189731	Kerbside	Y	5	1	2	NO_2	N
HAV45	St. Marys School RC	552327	187422	Kerbside	Y	10	1	2	NO_2	N
HAV46	Rainham Village School	552441	182337	Kerbside	Y	1	1	2	NO_2	N
HAV47	Campion School off A127	554730	189487	Roadside	Y	7	2	2	NO_2	N
HAV48	Parkland School	550602	189990	Urban Background	Y	N	1	2	NO_2	N
HAV49	Newton's School	550722	183294	Roadside	Y	2	1	2	NO_2	N
HAV50	Blewitts Cottages	551526	182672	Kerbside	Y	12	0.5	2	NO_2	N
HAV51	St. Edwards School	551180	189432	Urban Background	Y	N	1	2	NO_2	N
HAV52	Opp. Harold Wood Stn.	554741	190626	Roadside	Y	0	2	2	NO_2	N
HAV53	(Ringroad) Nr Jctn Mawney Rd	550938	188812	Roadside	Y	N	2	2	NO_2	N
HAV54	Mawney/Pretoria Rd	550123	189186	Kerbside	Y	12	0.1	2	NO_2	N
HAV55	59 Drummond Rd	550558	189205	Urban Background	Y	7	1	2	NO_2	N
HAV56	Rainham Tesco	552047	182357	Kerbside	Y	1	1	2	NO_2	N
HAV57	Romford Taxi Rank	551420	188526	Urban Centre	Y	1	0.1	2	NO_2	N
HAV58, HAV59, HAV60	Battis	551397	188509	Urban Centre	Y	1	0.1	2	NO_2	N
HAV61	Wennington Road	553719	180987	Urban Background	Y	N	1	2	NO_2	N

HAV62	St Edwards Way (Musicland)	551079	189055	Roadside	Y	N	1	2	NO_2	N
HAV63	North Street, Star Taxis	551011	189131	Urban Centre	Y	N	0.2	2	NO_2	N
HAV64	St Edwards Way/Como Street	550955	189176	Urban Centre	Y	N	0.5	2	NO_2	N
HAV65	Front Lane/Jnct Brunswick Ave LP40	557323	187932	Urban Centre	Y	N	0.2	2	NO_2	N
HAV66	Station Lane LP6	554013	187001	Urban Centre	Y	N	0.5	2	NO_2	N

1.2 Comparison of Monitoring Results with AQOs

The results presented are after adjustments for "annualisation" and for distance to a location of relevant public exposure, the details of which are described in Appendix A.

Table D. Annual Mean NO_2 Ratified and Bias-adjusted Monitoring Results (μg m^{-3})

Site ID	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2019 % [b]	Annual Mean Concentration (μg m^{-3})						
				2013 [c]	2014 [c]	2015 [c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]
HV1	Automatic	-	99	30.2	35.3	32	34	34.3	30	29.1
HV3	Automatic	-	100	34	**57.5**	35	38	**40**	38	35.8

Site ID	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2019 % [b]	Annual Mean Concentration (µg m^{-3})						
				2013[c]	2014[c]	2015[c]	2016[c]	2017[c]	2018[c]	2019[c]
HAV 1, 7, 8	Diffusion Tubes	-	100	**44**	**40.6**	39.0	**40.7**	**40.3**	39.6	**42**
HAV 3	Diffusion Tubes	-	100	28.6	32.9	28.3	29	31.7	26.5	36.7
HAV 4	Diffusion Tubes	-	92	19.5	24.5	20.1	26	20.1	17.3	19.7
HAV 9, 10, 11	Diffusion Tubes	-	75	-	33.3	30.7	33.1	29.6	29	26.1
HAV 12	Diffusion Tubes	-	100	-	36.8	37.4	**43**	**41.6**	36.6	32.4
HAV 13, 14, 15	Diffusion Tubes	-	100	-	39.1	39.4	**41.7**	**40.5**	38.7	35.4
HAV 16, 17, 18	Diffusion Tubes	-	100	-	34.2	34.7	36.5	39.8	34.8	33.6
HAV 19, 20, 21	Diffusion Tubes	-	100	-	**45.6**	**44.8**	**44.8**	**49.2**	**40.4**	37.2
HAV 22, 23, 24	Diffusion Tubes	-	100	-	25.8	26.6	28.3	30.4	25.3	24.5

Site ID	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2019 % [b]	Annual Mean Concentration (µg m^{-3})						
				2013[c]	2014 [c]	2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]
HAV 25	Diffusion Tubes	-	100	-	23.3	22.9	24.7	26.6	22.1	20.8
HAV 26	Diffusion Tubes	-	100	-	21.1	22.7	23.8	27.3	21.4	21.3
HAV 27, 28, 29	Diffusion Tubes	-	97	-	**47.8**	**47.6**	**52.3**	**54.1**	**51.4**	**47.3**
HAV 30	Diffusion Tubes	-	100	-	21.8	24.8	24	29.1	21.6	21.9
HAV 31	Diffusion Tubes	-	100	-	26.1	27.1	29.1	30.6	26.4	25.2
HAV 32, 33, 34	Diffusion Tubes	-	94	-	**51.6**	**55.0**	**53.2**	**52.9**	**50.3**	**49.4**
HAV 35	Diffusion Tubes	-	100	-	23.4	24.2	27.7	27.2	26.2	23
HAV 36	Diffusion Tubes	-	92	-	15.7	21.1	21.8	23.9	18.3	18.9
HAV 37	Diffusion Tubes	-	92	-	**49.8**	**48.2**	**55.3**	**55.3**	**48.0**	**41.6**

Site ID	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2019 % [b]	Annual Mean Concentration (µg m^{-3})						
				2013[c]	2014 [c]	2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]
HAV 38	Diffusion Tubes	-	100	-	22.2	21.5	24.8	25.3	22.2	21
HAV 39	Diffusion Tubes	-	100	-	31.1	33.3	31.3	38.8	29.0	28.9
HAV 40	Diffusion Tubes	-	100	-	**48.1**	**49.5**	**45.1**	**52.1**	**49.2**	**44.4**
HAV 41	Diffusion Tubes	-	92	-	**43.0**	**45.0**	**46.2**	**49.6**	**40.9**	39.3
HAV 42	Diffusion Tubes	-	100	-	32.3	31.4	31.7	31.6	30.8	29.7
HAV 43	Diffusion Tubes	-	83	-	35.0	38.2	35.9	35.6	32.2	34.3
HAV 44	Diffusion Tubes	-	100	-	37.7	37.1	37.9	36.7	34.4	31.6
HAV 45	Diffusion Tubes	-	100	-	37.2	35.7	**40.7**	37.7	35.6	31.8
HAV 46	Diffusion Tubes	-	100	-	32.9	31.3	34.5	33	32.2	30

Site ID	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2019 % [b]	Annual Mean Concentration (µg m^{-3})						
				2013[c]	2014[c]	2015[c]	2016[c]	2017[c]	2018[c]	2019[c]
HAV 47	Diffusion Tubes	-	100	-	**48.5**	**42.0**	**46.5**	**42.3**	36.8	**41**
HAV 48	Diffusion Tubes	-	92	-	27.3	28.4	30.7	37.8	25	26.4
HAV 49	Diffusion Tubes	-	58	-	29.1	26.8	27.9	28	34.3	26.6
HAV 50	Diffusion Tubes	-	100	-	38.3	**41.1**	**42.2**	**46.1**	39.8	36.6
HAV 51	Diffusion Tubes	-	92	-	26.5	24.3	24.1	24.9	23.4	21.6
HAV 52	Diffusion Tubes	-	92	-	37.5	34.3	37.3	**47.8**	**41.1**	32.2
HAV 53	Diffusion Tubes	-	92	-	25.3	22.9	23.6	*[d]	*[d]	35.2
HAV 54	Diffusion Tubes	-	-	-	-	-	-	-	-	**42.3**
HAV 55	Diffusion Tubes	-	-	-	-	-	-	-	-	27.1

Site ID	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2019 % [b]	Annual Mean Concentration (µg m^{-3})						
				2013[c]	2014 [c]	2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]
HAV 56	Diffusion Tubes	-	92	-	**49.9**	**40.4**	**48.1**	**44.1**	**45.7**	37.8
HAV 57	Diffusion Tubes	-	100	-	**63.1**	**59.0**	**62.9**	**61**	**64.7**	**53.1**
HAV 58, 59, 60	Diffusion Tubes	-	100	-	**84.7**	**75.2**	**69.1**	**71.7**	**71.4**	39.3
HAV 61	Diffusion Tubes	-	100	-	-	-	-	-	27.5	26.2
HAV62	Diffusion Tubes	-	92							38.8
HAV63	Diffusion Tubes	-	92							**41.2**
HAV64	Diffusion Tubes	-	83							**41.3**

Notes: Exceedance of the NO_2 annual mean AQO of 40 µg m^{-3} are shown in **bold**.

NO_2 annual means in excess of 60 µg m^{-3}, indicating a potential exceedance of the NO_2 hourly mean AQS objective are shown in bold and underlined.

[a] data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] Means should be "annualised" in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%

[d] AQMS not in operation (Air quality monitoring was carried out at this site in order to investigate an air quality complaint. Following monitoring for 3 years it was decided to decommission this monitoring site). New locations will be decided following consultation with the GLA.

Table E. NO_2 Automatic Monitor Results: Comparison with 1-hour Mean Objective

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2019 % [b]	Number of Hourly Means > 200 µg m^{-3}						
			2013[c]	2014 [c]	2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]
HV1	-	95	0	0	0	0	0	0	0
HV3			0	0	0	0	1	0	0

Notes: Exceedance of the NO_2 short term AQO of 200 µg m^{-3} over the permitted 18 days per year are shown in **bold**.
[a] data capture for the monitoring period, in cases where monitoring was only carried out for part of the year
[b] data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)
[c] Means should be "annualised" in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%

Table F. Annual Mean PM_{10} Automatic Monitoring Results (µg m^{-3})

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2019 % [b]	Annual Mean Concentration (µg m^{-3})						
			2013[c]	2014[c]	2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]
HV1	-	95	Not in Operation	19	18	19	18	17	17.4
HV3	-	99	24	25	24	15	19	20	20.5

Notes: Exceedance of the PM_{10} annual mean AQO of 40 µg m^{-3} are shown in **bold**.
[a] data capture for the monitoring period, in cases where monitoring was only carried out for part of the year
[b] data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)
[c] Means should be "annualised" in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%

Table G. PM_{10} Automatic Monitor Results: Comparison with 24-Hour Mean Objective

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2019 % [b]	Number of Daily Means > 50 µg m^{-3}						
			2013[c]	2014 [c]	2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]
HV1	-	95	Not in Operation	3	3	6	4	1	4
HV3	-	95	6 (37)	11	9	5	N/A[d]	2	9

Notes: Exceedance of the PM_{10} short term AQO of 50 µg m^{-3} over the permitted 35 days per year or where the 90.4th percentile exceeds 50 µg m^{-3} are shown in **bold**.
Where the period of valid data is less than 85% of a full year, the 90.4th percentile is shown in brackets after the number of exceedances.
[a] data capture for the monitoring period, in cases where monitoring was only carried out for part of the year
[b] data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)
[c] Means should be "annualised" in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%

Table H. Annual Mean $PM_{2.5}$ Automatic Monitoring Results (µg m^{-3})

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2019 % [b]	Annual Mean Concentration (µg m^{-3})						
			2013[c]	2014 [c]	2015[c]	2016 [c]	2017[c]	2018[c]	2019 [c]
HV1	-	95	Not in Operation	12	11	12	12	11	11.1

Notes: Exceedance of the $PM_{2.5}$ annual mean AQO of 25 µg m^{-3} are shown in **bold**.

[a] data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] Means should be "annualised" in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%

2. Action to Improve Air Quality

2.1 Air Quality Action Plan Progress

Table J provides a brief summary of the London Borough of Havering's progress against their Air Quality Action Plan, showing progress made this year.

Table J. Delivery of Air Quality Action Plan Measures

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
Action Policy One: Air Quality Monitoring and Modelling		
1.1	Undertake detailed computer modelling of air quality in Havering.	We have introduced an interactive air quality predictive modelling tool created for us by King's College London. The interactive maps provide further evidence in addition to the Council's air quality monitoring network for planning decisions and support major strategic transport and infrastructure projects for the Council.
1.2	Use AQ Mesh Pods to provide real time air quality measurements for schools to use as part of air quality publicity campaigns and to encourage walking to school.	The pods have been installed outside schools to collect baseline data to support local projects to improve air quality within the vicinity of these, and other, schools. Although it is recognised that the accuracy of the AQMesh pods readings is not as high as other monitoring equipment, which has been officially approved by DEFRA, the use of the AQMesh pods gives a picture of air quality and has been found useful for dealing with requests / complaints and keep the public up to date on and local air quality and raise awareness and knowledge. Also getting continuous readings allows us to correlate NO_2 levels with potential causes (e.g. higher NO_2 levels at pick up/drop of times on the school run) and identify areas of poor air quality outside of schools that were previously unknown.
1.3	Undertake feasibility study into the location and start-up of a new permanent continuous monitoring location.	Action ongoing: Section 106 funding of £20,000 has been sourced for this. The location of the monitoring station will be on A1306 in Rainham expanding on the boroughs continuous monitoring programme. Efforts to attain further funding to continue the monitoring once the £20,000 has been spent are being made.

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
1.4	Expand the current Diffusion Tube Network. Install further diffusion tubes for monitoring of NO_2	Action completed in 2019: 6 additional sites were installed around the Romford ring road Hotspot locations.
1.5	Model likely air quality impact of planned major strategic schemes.	Action ongoing: All major strategic developments are required to carry out air quality modelling, as part of a detailed Air Quality Assessment at the planning application stage. Infrastructure is being progressed e.g. station at Beam Park, redevelopment of Beam Park industrial estate
Action Policy Two: Public Health and Awareness Raising to encourage Smarter Travel		
2.1	Promote walking and cycling Engage with over 50's forum to form a walking club and organised led rides	Action ongoing: The over 50's programme is run by trained volunteers with support from the Council's Sports Development department.
2.2	Continue to use Miles the Mole as an air quality champion and educational prop.	Action ongoing: Miles the Mole continues visiting schools as part of the Council's successful air quality campaign which was launched in 2017. In 2018 Miles visited 40 primary schools via Theatre in Education. • Air Quality and Miles the Mole were featured in the School Travel Plan Conference on 1 March 2019. • Presentation slides for school assemblies have been created. • Theatre in Education has been secured for June 2019. • Schools are currently booking their slots. Miles is expected to visit all 40 Primary schools. • Secondary schools are being encouraged to feature Air Quality in their next YTA programme. • The spring 2020 edition of Taking Steps Magazine will be on Air Quality.

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
		The campaign increases awareness and knowledge of children/staff/parents around air quality and promotes small changes people can make to reduce their contribution to air pollution and reduce their exposure to poor air quality.
2.3	Support Transport for London led initiative to commission a cross borough bus rapid transit study which would include looking at options for improving access to the London Riverside BID.	Action ongoing: The Council's Transport Planning team will be reviewing this in March 2020.
2.4	Public Health Input into delivery of AQAP. Director of Public Health to have responsibility for ensuring their Joint Strategic Needs Assessment (JSNA) includes information on Air Quality impacts on the population.	Action ongoing: The Public Health team in London Borough of Havering is fully committed to supporting the air quality agenda. • The Director of Public Health chaired the Air Quality Board • Public Health has been an active member of the Air Quality Working Group • Public Health and Planning jointly conducted a Health Impact Assessment of the Local Plan, which resulted in the creation of a new Healthy Communities Policy for the Local Plan; air quality is integral to this policy https://www.havering.gov.uk/localplandocuments • Public Health has initiated a Health in All Policies Approach to all Council services, strategies and policies. This means that all Key Decisions being approved by Cabinet must consider the health and wellbeing implications and risks of these activities. • Public Health has air quality pages on the Council website https://www.havering.gov.uk/airquality and regularly contributes to articles promoting the importance of good air quality, including e.g. Living in Havering; Taking Steps magazine featuring an article which discussed the health impacts of air quality – this magazine is distributed to all schools in the borough

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
		• Public Health contributes to promoting active travel and physical activity schemes to increase walking and cycling, all of which contribute to improving air quality; this is supported by the RSPH Accredited Health Champions programme, which is delivered by trained volunteers
2.5	Continue to promote the TfL STARS (Sustainable Travel: Active, Responsible, Safe) accredited travel planning programme with schools to reduce car use on school run	Action ongoing: All schools in Havering are encouraged to maintain active School Travel Plans (STP) and report their activities annually via the Transport for London STARS Accreditation Programme website. A STP package is designed with measures aimed at reducing car use and improving safety on the journey to/from school and schools engaged in promoting safe, active, and sustainable travel, and delivering positive changes in behaviour. Despite the programme being voluntary, we work with over 60 schools. For the academic year 2018 to 2019, 47 schools went through the programme, over 50% of Havering schools. Thirty seven of these are at Gold, one Silver and nine at Bronze level. Our schools hold sixteen School of Excellence Awards. The use of single occupancy car use has gone down from circa 39% before School Travel Plans to around 17% amongst accredited schools. Walking is still the most popular means of getting to school (43% journeys), followed by bus (12%), park and stride (8%), scooting (6%), cycling (5%), car share (3%), school bus (1%), and rail (1%). The

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
		We offer support in the form of funding, guidance together with suggested activities and initiatives including cycle training, theatre in education and curriculum materials to promote active, healthy, safe and sustainable travel to/from school as an alternative to using the car. This accreditation scheme and content within the school travel plan enables the borough to prioritise funding for engineering works around schools. The challenges of impending wider catchment areas and expanding schools can lead to higher car usage, it is very important to provide our school community with safer routes to school that provide a choice to use more active and sustainable modes of travel.
2.6	Promote Smarter Travel initiatives with businesses and encourage local business to adopt workplace travel plans.	Action ongoing: Because Havering is a large borough where workers not only travel here within the borough they also come from boroughs and Essex districts we have been proactive in promoting sustainable travel and workplace travel plans to large employers. Havering is actively engaging with businesses to create sustainable travel plans. We have business packs that were first produced in 2016 and updated in 2019 (paid for using the Mayors AQ Fund), which were sent to 500 firms and contain information on EVs to cycling. Details about our grant scheme around active travel for business is included in the pack. We attend local business forum and networking events to engage with the wider business community too. Queens Hospital is one of the largest employers in the borough and have received £3K in grants from LIP funding to help them encourage active travel.

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
		This is an on-going action, with a target of 3 businesses per year adopting. Other businesses we are working with include CEME, Sapphire Leisure Centre, and Hills Prospect drinks distributor. CEME is an innovative East London-based regeneration charity which operates a sustainably designed business development campus with EV charging and access to hydrogen fuel charging centre. Havering's Transport planners look to engage with developments over 2500 square metres through the planning process and work with the bigger employers to require that they create travel plans. We offer assistance by using a software package called Modeshift for Business. Havering offers businesses that employ more than 5 people free cycle stands and support and training to get their workforce cycling.
2.7	Continue to promote airTEXT to make sure vulnerable residents are aware of the tool and how to use it.	Action ongoing: Havering signs up to airTEXT project. As well as the Pollution webpages our Public Health team also promotes it https://www.havering.gov.uk/livingwelllaterlife Havering has done a lot of work engaging with schools on air quality and sustainable transport projects. AirTEXT is promoted at all of these events and an information leaflet is provided to pupils, teachers and parents. We ensure that airTEXT is promoted through Havering's social media platforms a few times per year particularly in winter. The Pollution and Communications teams receive daily emails from Kings College and on high pollution days the Communications team put out alerts on social media.

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
		Last year leaflets were sent out again to doctor's surgeries to remind them about airTEXT.
2.8	Investigate the feasibility of introducing Car Clubs and associated facilities in Havering.	Action ongoing: Cycle Confident who manage this scheme stopped working when the lockdown was announced so we won't be able the get the statistics until they return to work.
2.9	Support the LIP cycle training budget to promote "bike ability" in schools and also to adults and families.	Action ongoing: children were trained to ride their bikes safely and responsibly. Cycle training helps children and adults become more active and enables them to use more sustainable modes of transport.
2.10	Encourage greater use of the Council's staff travelling to work sustainably through adequate provision of cycle infrastructure at Council buildings.	Action complete: cycle storage facilities have been installed at all Council offices and staff buildings
2.11	Successful delivery of annual Local Implementation Plan programme to deliver schemes that support the Healthy Streets agenda and provide options for people to travel sustainably.	The Council's Local Implementation Plan (LIP3) has been formally approved by the TfL and will be implemented over the next three years.
2.12	Offer workplace grants to businesses for infrastructure (e.g. cycle parking, lockers and showering facilities)	Ongoing action: Queens Hospital trust have received a grant of £3,000 from LIP funding. This is an ongoing action with 3 businesses per year as target. These grants are expected to encourage staff to walk, cycle, and use public transport, supporting the Mayor's Transport Strategy targets on the number of people travelling sustainably to work.
Action Policy Three: Reducing Emissions from Buildings and Developments		
3.1	Creation of Air Quality Supplementary Planning Guidance (SPG).	Ongoing action: A Draft SPG has been created, currently awaiting approval from the Council's Planning Service. The process for formal approval and adoption will then be followed.

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
		Havering's local SPG aims to inform developers and consultants regarding the Council's requirements for new developments in relation to air quality and encourage engagement at an early stage. It has been decided to include carbon guidance into this document.
3.2	Review current planning conditions, in relation to air quality, to ensure they are fit for purpose.	Action completed: Planning conditions have been reviewed and are in line with the requirements set out in the London Plan and the relevant SPGs.
3.3	Adopt and implement planning controls on combined heat and power (CHP) or biomass systems	Action ongoing: The Council uses a condition requiring the emissions limits for CHP and Biomass set out in Appendix 7 of the GLA Sustainable Design and Construction SPG.
3.4	Adopt and implement planning controls on air quality neutral development. New major developments will be required to be air quality neutral as a minimum.	Action ongoing: Havering requires an AQ Neutral assessment for all major developments. As this is not currently included in the planning validation checklist, we do not always receive the report at the planning application stage. If the report is not included, a condition requiring an AQ Neutral is attached to the planning permission.
3.5	To ensure that new Housing Estate Regeneration Programme for LBH housing developments obtain the commitment from developers to a strategy of future reduction of reduced carbon foot print and minimal impact on air quality.	Action ongoing: The Council's regeneration team is committed to reduced carbon foot print and air quality neutral development. Public Protection, Regeneration Services and the appointed consultants and contractors collaborate and are aware that an air quality assessment is required on validation of any regeneration planning applications.
3.6	Adopt and implement planning controls for innovative and recognised green space and planting in new developments. Planning to work with grounds maintenance and parks	Action ongoing: Inter departmental work with the Council's Planning and Grounds Maintenance Services is being progressed. Mawney Foundation School was identified in our schools survey for boundary fence planting because it is adjacent to a busy road during peak hours which runs along Como Street and Mawney Road. The planting

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
	at design stage for advice on greening and planting	comprised of ferns and hostas which now offers a welcoming and attractive barrier. Plans progressed in 2019 to decommission the Romford town centre subways in response to the Healthy Streets initiative which is being embraced by Havering. The subways were infilled, trees and shrubs planted and "toucan" crossings were installed. Another major aim of this is to improve the attractiveness of the town centre to encourage walking to Romford. Tree Planting occurred in along main roads of 2019 low maintenance, attractive and with unobtrusive roots. The planting locations were at air quality focus areas Romford Ring Road, Rush Green Road, Roneo Corner, and Rainham Village. The species were predominantly silver birch but were also a mix of other species for resilience in case of R&D outbreaks and most importantly pollution tolerant
3.7	Promote and enforce the Smoke Control Areas to reduce the amount of unlicensed burning.	Action ongoing: Havering provides information to residents about SCZs on our website https://www.havering.gov.uk/airquality At the beginning of autumn 2019 information was sent out on Havering's social media pages linking to our website. Should Havering receive chimney smoke complaints they are investigated to determine if authorized fuels are being used by the resident. If non authorized fuels are being used our enforcement officers educate the residents on SCZs and for a first complaint provide details from the DEFRA website. If further complaints are made and substantiated then enforcement action is taken. Havering doesn't have any wood fired oven pizza premises in the borough. However, our

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
		Food inspectors had a campaign last year visiting all food premises with coal tandoor ovens and oversaw their conversion to gas which consequently contributed to reducing smoke emissions. This project was partnered with health and safety inspectors who also had concerns due to carbon monoxide emissions from coal tandoor ovens.
3.8	Monitoring and implementation of Non Road Mobile Machinery (NRMM)	Action ongoing: Havering has always been proactive in ensuring dust management plans are conditioned as part of the construction management plan for planning applications. This includes smaller developments. Conditions are not discharged until satisfactory plans and diagrams are submitted. In spite of this dust nuisance from construction sites does occur at a small number of medium sized sites. Nuisance enforcement officers are quick to respond to any complaints received. Havering joined the MAQF NRMM scheme being managed by the LB Merton. Only eighteen sites were inspected by Merton in 2019 due to unforeseen officer leave. All major planning applications are conditioned with the NRMM standard condition where this machinery is to be used during site works.
3.9	Promote public sector landlords (homes and public buildings) to take air quality and energy efficiency advice before refits, via the GLA RE:NEW and RE:FIT Programmes.	Action ongoing: The Council's Housing stock will be introducing a new SAP target from 2019/20. The current target is 70.32 (on SAP 2009)
3.10	Deliver infrastructure to ensure that Romford, Rainham and Beam Park Housing Zones are accessible by means other than the car and that residents are provided with	The action in being progressed. The Council is going out to tender to appoint a Contractor for the Beam Parkway scheme.

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
	options to travel sustainably (Including the Beam Parkway Major scheme and Beam Park station)	The infrastructure includes road improvements to make cycling and walking more attractive to residents. The Beam Park station will also improve accessibility to the south of the borough and is expected to reduce car use and therefore emissions from road traffic.
3.11	Identify previously unknown and new premises that require permitting under PPC. Determine these properties that require permitting for Pollution Prevention Control (PPC).	No progress has been made in 2018. Further review will be carried out in 2019. Consultant to be recruited.
3.12	Signpost business contact and residents to the appropriate boiler scrappage schemes and energy efficiency grants; Promote businesses and residents to take air quality and energy efficiency advice; embed this practice as part of business as usual activity of the department	Action ongoing: Warmer Homes Scheme for vulnerable tenants and vulnerable owner occupiers began in Autumn 2019 when funding is expected. Guidance is already provided on Havering's website, but the uptake in Havering is currently low. Mailshots have been sent out to alert vulnerable residents to the funding available, in order to upgrade their boilers or fit first time central boilers. Ash Patel at Camden is leading on the project.
Action Policy Four: Reducing Emissions from Transport		
4.1	Include requirement for suppliers of large council contracts that they have attained silver or gold FORS accreditation for their organisation and vehicles	The action is being progressed with the Council's Procurement and Waste Teams. In addition to this, the Council's Transport Team is trialling Gas to Liquid fuel as an alternative to diesel for some of its fleet.
4.2	Investigate the feasibility of introducing dedicated drop off zones outside all schools for buses & coaches.	This action has been completed. Following investigation, the Council's Highways and Parking Services have advised that this action is not feasible because of the existing keep clear zones outside all schools which must remain in place.
4.3	Renewal of Taxi Framework, with suppliers complying to the Ultra Low Emission Zone	The action is being progressed and is dependent on action by TfL.

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
	(ULEZ) & exploring ZEC (Zero Emission Capable) Standards	
4.4	Provide Smarter Driver Training for all vocational drivers of the Council's fleet vehicles. Delivered by CPC training and FTA Van excellence accreditation	The action has been completed by the Council's Transport Services and Asset Management.
4.5	Investigate the feasibility on the delivery of Electric Vehicle Charging Point infrastructure across the borough.	Action ongoing: After a feasibility study was undertaken by the Council's Transport Planning regarding building a network of EV charging points in 2019 it was decided that further options need to be evaluated. This will be continuing in 2020.
4.6	Review parking charges policy (controlled parking zones	Action completed: In 2019 we wrote a review of residential parking charges to introduce a £25 surcharge for diesel cars. This motion was put forward to councillors and the majority voted against it. Unlike central London Havering is a large borough with rural areas that have limited public transport connections. Limiting parking in Havering town centre would cause many retailers to close, residents would then need to travel to Brentwood in Essex causing far more emissions.
4.7	Engage with businesses in the borough through business forums to discuss the options for upgrading/retrofitting to accommodate ULEZ requirements.	Action ongoing: The Council attended a Business Engagement Forum in 2018 and distributed approximately 1000 Business Packs. The Business Packs provide businesses with information on sustainable travel advice, such as information on emissions zones and charges in London, electric and hybrid vehicles, benefits of cycling and walking to work, aiming to increase sustainable travel.
4.8	Plant greenery and trees (e.g. hedgerows and trees such as ash, common alder, field maple, larch, Norway maple, scots pine and silver birch) along main roads and town	Hostas and Ferns have been planted in Romford town centre, which is one of Havering's air pollution hotspots / air quality focus areas. More planting is planned in 2019 targeting other hotspots.

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
	centres, which can lead to an improvement in air quality based on available evidence	Plans progressed in 2019 to decommission the Romford town centre subways in response to the Healthy Streets initiative which is being embraced by Havering. The subways were infilled, trees and shrubs planted and "toucan" crossings were installed. Another major aim of this is to improve the attractiveness of the town centre to encourage walking to Romford. Tree Planting occurred in along main roads of 2019 low maintenance, attractive and with unobtrusive roots. The planting locations were at air quality focus areas Romford Ring Road, Rush Green Road, Roneo Corner and Rainham Village. The species were predominantly silver birch but were also a mix of other species for resilience in case of R&D outbreaks and most importantly pollution tolerant: Acer campestre Elegant x5 Acer campestre Lienco x2 Alnus cordata x4 Betula albosinensis Fascination x5 Betula pendula x10 Betula Jacquemontii Doorenbos x2 Liquidambar styraciflua Worplesdon x6 Liriodendron tulipifera x5 Platanus orientalis Minaret x5 Prunus avium Plena x4 Prunus Royal Burgundy x1 Prunus Sunset Boulevard x1 Tilia cordata Greenspire x5 Moving forward we have pledged to plant 100 trees in housing estates in 2020. Our residents love that we have plenty of green spaces and parks so the Comms department did lots of publicity and social medial promotion of this. Feedback is always supportive.

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaints
4.9	Develop Local Implementation Plan to support improvements in local air quality; together with working with TfL to ensure pollution sources outside of local control i.e. buses and commuter traffic are dealt with.	Action ongoing: The Council's LIP3 has been formally approved by the TfL and will be implemented over the next three years. With regard to upgrading / replacing TfL buses that are not ULEZ compliant, TfL have informed us that they are working to reduce tailpipe emissions from bus fleet across London and that all buses in Havering will be EURO VI by the end of 2020..
4.10	Undertake feasibility work to examine the air quality implications of re-routing of bus services away from Romford town centre and look options for improving sustainable travel access into Romford town centre.	Action ongoing: This action has been scheduled for 2020.
4.11	Continue to routinely check the weighbridges used commercially by (usually large) vehicles	Two of the four weighbridges tested in LBH in February 2020 were not found to be within acceptable tolerances for inspection and remediation notices were served. This action aims to reduce the number of overloaded vehicles and is expected to lead to a reduction in emissions

3. Planning Update and Other New Sources of Emissions

Table K. Planning requirements met by planning applications in London Borough of Havering in 2019

Condition	Number
Number of planning applications where an air quality impact assessment was reviewed for air quality impacts	2
Number of planning applications required to monitor for construction dust	2
Number of CHPs/Biomass boilers refused on air quality grounds	0
Number of CHPs/Biomass boilers subject to GLA emissions limits and/or other restrictions to reduce emissions	0
Number of developments required to install Ultra-Low NO_x boilers	143
Number of developments where an AQ Neutral building and/or transport assessments undertaken	143
Number of developments where the AQ Neutral building and/or transport assessments not meeting the benchmark and so required to include additional mitigation	0
Number of planning applications with S106 agreements including other requirements to improve air quality	0
Number of planning applications with CIL payments that include a contribution to improve air quality	0
NRMM: Central Activity Zone and Canary Wharf Number of conditions related to NRMM included. Number of developments registered and compliant. Please include confirmation that you have checked that the development has been registered at www.nrmm.london and that all NRMM used on-site is compliant with Stage IIIB of the Directive and/or exemptions to the policy.	N/A
NRMM: Greater London (excluding Central Activity Zone and Canary Wharf) Number of conditions related to NRMM included. Number of developments registered and compliant. Please include confirmation that you have checked that the development has been registered at www.nrmm.london and that all NRMM used on-site is compliant with Stage IIIA of the Directive and/or exemptions to the policy.	143 conditions included 18 registered and compliant 0 unregistered/uncompliant and being chased. Merton had staffing issues in 2019

Brief description of the Planning Process

The Council's Planning Service consults the Public Protection Service on all valid planning applications received, including major developments. Public Protection Officers then review and

assess these applications recommending air quality conditions where required. Once a planning consultation response has been sent the progress of the planning application is not monitored by Public Protection (e.g. whether the application has been granted planning permission or not, whether the recommended conditions have been attached or not etc.).

However the Planning Service will, usually, adopt our recommendations and the relevant conditions are attached to the planning decisions. Once an application for discharge of condition has been submitted, Public Protection is consulted again and the submitted documentation is reviewed and assessed. The condition is discharged once the documentation has been considered sufficient in line with current guidance.

3.1 New or significantly changed industrial or other sources

"No new sources identified"

Appendix A Details of Monitoring Site QA/QC

A.1 Automatic Monitoring Sites

HV1 and HV3 are representative of roadside exposure within the Borough. All the sites are part of the London Air Quality Network and therefore the standards of QA/QC are similar to those of the government's AURN sites. Regular monthly calibrations are carried out, with subsequent data ratification undertaken by ERG at King's College London. The data has been ratified for 2019 by Kings College London[2] with the exception of PM_{10} data at HV3.

Data capture from the NOx analysers at HV1 and HV3 in 2018 were 99% and 100% respectively.

PM_{10} Monitoring Adjustment

PM_{10} at HV3, and PM_{10} and $PM_{2..5}$ at HV1 are measured by FDMS, consequently correction is not necessary.

A.2 Diffusion Tube Quality Assurance / Quality Control

Diffusion Tubes are supplied and analysed by Socotec, Didcot. For 2019 tubes are prepared by spiking acetone: triethanolamine (50:50) onto grids prior to the tubes being assembled. The tubes are desorbed with distilled water and the extract analysed using a segmented flow autoanalyser with ultraviolet detection. The tubes were analysed in accordance with Socotec's standard operating procedure ANU/SOP/1015. This method meets the guidelines set out in DEFRA's 'Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance'. As set out in the practical guidance, the results were initially calculated assuming an ambient temperature of 11°C, the reported values have been adjusted to 20°C to allow for direct comparison with EU limits. As set out in the 2019 Summary of Precision Results for Nitrogen Dioxide Diffusion Tube Collocation Studies Socotec Didcot is listed in the table of laboratories with **Good** Precision. In the Summary of Laboratory Performance in AIR NO2 Proficiency Testing Scheme (April 2017 – February 2019). Socotec currently holds a rating of **Satisfactory** laboratory.

The bias adjustment factor for Socotec, for the 50% TEA in Acetone preparation method in 2019, taken from the National Bias Adjustment Factor Spread sheet (0919) is 0.77. The bias adjustment factor for the previous years was 0.76.

Factor from Local Co-location Studies (if available)

The London Borough of Havering has a triplicate diffusion tube co-location study at one of the roadside automatic monitoring sites, operational since 2015. The precision and accuracy of the triplicate tubes was checked via the AEA_DifTPAB_v04 sheet provided on the Defra website. Due to Waterloo Road being a high concentration site (roadside site) any bias adjustment factors derived should not be used for any low concentration monitoring sites. We do not have a Background automatic monitoring site in the borough.

[2] PM_{10} data at HV3 is awaiting ratification.

Discussion of Choice of Factor to Use

As a local bias adjustment factor was not available, the bias adjustment factor for Socotec, for the 50% TEA in Acetone preparation method, taken from the National Bias Adjustment Factor Spread sheet (September 2019) was used.

A.3 Adjustments to the Ratified Monitoring Data

Short-term to Long-term Data Adjustment

Capture rates for NO_2 at our two continuous monitoring stations were above 75% therefore annualisation was not necessary for 2019. With respect to the diffusion tube sites; only one recorded less than 75% data capture, HAV49 Newton's School. To ensure the diffusion tube site adjustment was relevant two Background continuous monitoring sites with data capture greater than 85% were used; Thurrock's Background AMS (99% data capture) and Haringey's Background AMS (98% data capture). The annualisation results are provided in Table L.

Table L. Short-Term to Long-Term Monitoring Data Adjustment

Site	Site Type	Annual Mean (µg/m³)	Period Mean (µg/m³)	Ratio
Haringey	Background	21.9	26.7	0.820
Thurrock	Background	22.9	25.9	0.884
			Average	0.852

Distance Adjustment

Site Ref	Distance from DT to Kerb (m)	Distance from Kerb to Receptor (m)	Local Annual Mean Background NO_2 Concentration ($\mu g/m^{-3}$)	Measured Annual Mean NO_2 Concentration ($\mu g/m^{-3}$)	Defra Calculator Predicted Annual Mean ($\mu g/m^{-3}$)	Comments
HAV27-29 Rush Green Road	0.5	5	21	47.3	36.6	5 m from commercial use
HAV32-34 Gallows Corner	0.5	4	20	49.4	38.6	4 m from building, 1st floor residential
HAV37 Colchester Rd	0.5	3	29	41.6	37.6	3 m from 1st floor residential
HAV40 Main Rd	1	9	20	44.4	33.6	9 m from ground floor residential
HAV47 A127	2	20	18.1	41	36.7	7 m to school field
HAV54 Mawney/Pretoria	0.1	12	5	42.3	17.7	12 m to residential building

Appendix B Full Monthly Diffusion Tube Results for 2019

Table M. NO_2 Diffusion Tube Results

Site ID	*Valid data capture for monitoring period % [a]*	*Valid data capture 2019 % [b]*	*Annual Mean NO_2*													
			Jan	*Feb*	*March*	*Apr*	*May*	*June*	*Jul*	*Aug*	*Sept*	*Oct*	*Nov*	*Dec*	*Annual mean – raw data [c]*	*Annual mean – bias adjusted [c]*
HAV1		100	64.2	69.1	55	54	46.1	49.7	51	28.5	58.9	64.4	71.2	34.3	**53.9**	**41.5**
HAV2		100	65	72.2	55.1	68.4	50.4	48.8	54.9	31	57.5	67	69	33.2	**56.0**	**43.2**
HAV3		100	64.4	69.9	55.8	53.1	46.9	52.3	53.9	30.7	58	59.4	67.5	31.9	**53.7**	**41.3**
HAV4		100	56.4	68.5	44.4	50.4	42.9	43.6	43.7	26.9	51.3	59.1	60.9	28	**48.0**	37.0

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2019 % [b]	Annual Mean NO_2													
			Jan	Feb	March	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Annual mean – raw data [c]	Annual mean – bias adjusted [c]
HAV5		100	59.9	75.3	38.6	50.9	42.4	42.3	44.5	27.9	48.3	58.3	68.4	30.7	**49.0**	37.7
HAV6		100	57.2	68.5	42.8	39.1	41.8	43	43.2	25.7	50.1	57	59	24.9	**46.0**	35.4
HAV7		92	50.8	53.5	36.1		24.5	23.5	26.8	17.2	32.5	40.5	46.1	20.5	33.8	26.0
HAV8		75	34.5			47	16.8	16.2		10.5	25.9	27.9	35.8	15.2	25.5	19.7
HAV9		100	2.6		44.2	31.3	28.8	25	28.4	17.3	34.4	39.9	49.7	22.8	27.0	20.8
HAV10		100	53.1	54.9	46.2	32.2	23.3	24.1	28.1	18	34	44.4	52.1	17.6	35.7	27.5
HAV11		100	55.5	58.1	67.2	31.7	29.2	24.2	27.4	17.5	38.2	43.5	52.6	21.1	38.9	29.9
HAV12		100	62.8	56.1	53.7	41.3	38.8	33.7	34.8	19.9	42.1	44	50.7	27.3	**42.1**	32.4
HAV13		100	63.2	58.8	52.8	44.6	43.2	39.8	42.2	21.4	46.7	48.7	66	27.3	**46.2**	35.6
HAV14		100	53.8	61.8	47.2	52.3	42	38.4	41.9	20.6	47.3	50.8	58.2	24.9	**44.9**	34.6
HAV15		100	61.4	60.3	49.5	55.2	44.6	39.9	37.1	19.6	49.6	51.6	68.8	24.7	**46.9**	36.1
HAV16		100	60.2	59.6	45	48.4	37.2	35.3	35.6	20.1	43.5	48.8	68.8	25.2	**44.0**	33.9
HAV17		100	57.7	59.7	43.8	48.7	35.1	32.4	34.1	18.8	40.7	48.8	65	26.4	**42.6**	32.8
HAV18		100	66.5	44.8	66.1	50.2	33.2	32.9	34.6	20	46.8	48.4	64.8	23.6	**44.3**	34.1
HAV19		100	61.8	66	50.1	46.5	42.2	42.8	45.7	27.6	50.9	59	58	32.2	**48.6**	37.4
HAV20		100	64.7	67.7	47.6	44	43.7	44.4	43.2	25.6	49.2	60.1	57.2	27.1	**47.9**	36.9
HAV21		100	67	72.4	44.7	45.4	44.5	45.1	45.5	27.6	50.5	52.8	56.9	30.8	**48.6**	37.4
HAV22		100	48.7	50.3	32	28.1	23.4	20.9	23.6	14.1	32.2	38.5	45.8	16.8	31.2	24.0
HAV23		100	47.3	50.4	35.6	29	22.8	21.1	23.6	15.8	31.8	39.8	45.9	19.9	31.9	24.6
HAV24		100	55.9	51.6	29	29.1	23.4	22.4	24.2	14.9	31.7	39.2	44.7	21.2	32.3	24.9
HAV25		100	38.1	43.5	27.1	27.2	20.2	19.2	19.2	13.3	26.8	32.6	37.5	18.9	27.0	20.8
HAV26		100	42	41.6	29.9	23.9	19.7	18.5	18.7	11.6	26	31.7	48.1	19.6	27.6	21.3
HAV27		92	76.6	77.3	65.6	54	60.3	48	56.4	26	63.1	68	77.1	35.8	**64.4**	**49.6**

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2019 % [b]	Annual Mean NO_2													
			Jan	Feb	March	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Annual mean – raw data [c]	Annual mean – bias adjusted [c]
HAV28		100	79	71.9	66.6	63	61.5	53.9	55.9	27.8	61.4	63.6	80.1	34.7	**60.0**	**46.2**
HAV29		100	76.2	75.2	66.3	65.9	58.4	55.8	58.3	30.4	56	62	84.7	32.3	**60.1**	**46.3**
HAV30		100	45.9	42	30	23.6	21.7	18.7	18.8	12.2	25.5	34.4	48.8	19.4	28.4	21.9
HAV31		100	55.2	40.8	37.5	30.8	24.4	22.4	24	15.4	29.9	38.2	52.8	21.1	32.7	25.2
HAV32		83	81.3	88.9	71.1	51.1	51.2	51.2	57.3	36.1	58.9	56.7	71.6	43.8	**71.9**	**55.4**
HAV33		100	73.8	93.7	73.9	54.3	57.2	48.5	56.6	35.9	57.4	62.8	71.8	38.7	**60.4**	**46.5**
HAV34		100	81.4	89.1	79	52.4	58.4	49.5	58.7	34.6	57.7	62.9	56.3	41.5	**60.1**	**46.3**
HAV35		100	37	40.7	30.4	32.2	25.1	23.6	25.6	14	32.6	33.5	45.5	18.4	29.9	23.0
HAV36		92	37	45.8	26	23.2	17.9	17	16.5	10.6		26	34.7	15	24.5	18.9
HAV37		92	71.3	68.6	71.9	54.4	53.9	44.6	47.4	27.9		54.2	70.4	30.3	**54.1**	**41.6**
HAV38		100	34.9	45	28.9	25.9	21.8	19.2	18.5	12.3	26.2	31.3	43.9	19.6	27.3	21.0
HAV39		100	52.1	54.8	38.4	32.9	30.8	31.6	32.9	21.1	41	43.9	46	25.1	37.6	28.9
HAV40		100	83.5	76.1	68.5	52.9	56.7	48.5	53.4	29	56.1	57.1	73.7	36	**57.6**	**44.4**
HAV41		92	62.4	66.2	55.9	51.7	48.1	42.3	42.6		48.8	49.6	66.1	27.7	**51.0**	39.3
HAV42		100	57	56.3	47.5	33.5	32.9	28.5	29.9	17.9	36.7	43.8	55.3	23.6	38.6	29.7
HAV43		83	59		95.6	34.9	33.5	31.6	33.6		40.9	39.1	53.7	23.6	**44.6**	34.3
HAV44		100	52	59.9	44.5	44.3	32.6	33.3	35.4	19.9	40	46.5	59.6	25.2	**41.1**	31.6
HAV45		100	57.7	53.2	47.7	42.9	37.6	34.4	34.8	19.9	42.3	45.8	56.2	22.7	**41.3**	31.8
HAV46		100	55.3	57	49.5	38.9	30.4	28	33.8	19.1	39.2	42.1	49.9	24.4	39.0	30.0
HAV47		100	64	54.8	56.6	72.1	52	44.1	55.8	26.6	54.8	55.2	73	30.1	**53.3**	**41.0**
HAV48		92	43.2	47.7	32.7	27.9	23.6	22.1	22.4	13.9	35.4	38.7	46.4	22.8	34.3	26.4
HAV49	58		46.8	56.8	41.8	30.4						37.7	47.4	22.7	34.5	26.6[c]
HAV50		100	65.9	76.5	52.2	44.6	37	36.8	39.8	24.2	49.2	55.6	56.4	31.8	**47.5**	36.6

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2019 % [b]	Annual Mean NO_2													
			Jan	Feb	March	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Annual mean – raw data [c]	Annual mean – bias adjusted [c]
HAV51		92	42.1	45.2		24.1	22.7	20.6	21.6	12.8	27.8	33.7	38	20	28.1	21.6
HAV52		92	59.2	60.2		45.8	35.6	32.7	35.2	21	41.6	50.4	53.9	24.4	**41.8**	32.2
HAV53		92	68.5	67	60.2		41	41.4	37.3	20.9	47.6	41.1	52.9	24.5	**45.7**	35.2
HAV54		100	86.3	69	74.5	68.7	57.9	47.4	55.6	24.6	59.7	41.2	54.8	19.9	**55.0**	**42.3**
HAV55		100	49.6	42	36.2	23.3	23.3	21.7	22.3	13.5	31	53	76.5	30.2	35.2	27.1
HAV56		92	74.6	69.8		48.5	45.3	39.5	44.3	24.3	50.5	52.1	64.8	26.5	**49.1**	37.8
HAV57		100	65.8	90.9	78.6	67.9	61	63.2	78.2	44	73.1	82.4	76.8	45.7	**69.0**	**53.1**
HAV58		100	106.7	111.4	103.1	97.8	92.1	91.6	107	66.7	119	138	86.9	58.4	**98.2**	**75.6**
HAV59		100	103.2	103.4	91.7	89	84.2	83.7	101.5	64.1	108	102.2	108.3	58.2	**91.5**	**70.4**
HAV60		100	92.9	85.8	98.8	84.8	85.1	81.9	95.2	60.4	107	106.8	101.4	56.9	**88.1**	**67.8**
HAV61		100	48.1	49.5	29.1	36.7	25.4	23.2	25.1	15.4	49	35.6	52.5	18	34.0	26.2
HAV62		92	76.4	65.7	62.7	68.6	52.8	34.7		21.2	27.9	50.4	66.3	27.3	**50.4**	38.8
HAV63		92	80.9	75.4	61.6	48.7	52.1	46.6		23.7	50.4	52.6	67.5	29	**53.5**	**41.2**
HAV64		83	64.4	71.5	57.4	62.9	51.4	39	41.3			54.2	63.7	30.2	**53.6**	**41.3**

Exceedance of the NO_2 annual mean AQO of 40 µg m^{-3} are shown in **bold**.

[a] Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] Data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] Means should be "annualised" in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%