Annual Progress Report (APR)

2022 Air Quality Annual Progress Report (APR) for
West Dunbartonshire Council

In fulfilment of Part IV of the Environment Act 1995
Local Air Quality Management

June, 2022

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Executive Summary: Air Quality in Our Area

Air Quality in West Dunbartonshire Council

This report considers measured pollutant concentration from within West Dunbartonshire for the calendar year of 2021 and considers the potential for exceedance of the air quality objectives

In West Dunbartonshire, the main pollutants of concern are NO_2, PM_{10}, $PM_{2.5}$ and the source of pollutant is mainly due to the volume of traffic and congestion. Local air quality within the West Dunbartonshire Council area remains generally satisfactory.

During 2021 we had 33 passive diffusion tubes located throughout the Council area to monitor NO_2. Compared to five years ago, the monitored concentrations have gradually fallen across the Council area.

West Dunbartonshire Council has two continuous automatic analysers; in Dumbarton the unit only monitors Nitrogen Dioxide (NO_2,) and is part of the Automatic Urban and Rural Network (AURN) and the other unit in Clydebank is located at Briar Drive monitors Nitrogen Dioxide (NO_2,) PM_{10} and $PM_{2.5}$. Both automatic units have triplicate co-located NO_2 diffusion tubes.

This equipment downloads monitoring data automatically and pollutant levels can be viewed via the Scottish Air Quality website.

In 2021 monitoring data did not identify any exceedance of National Air Quality Objectives for PM_{10} or $PM_{2.5}$. There were no exceedance of the NO_2 objective at any of the monitoring locations.

No significant changes to emission sources within the Council area were identified with an overall downward trend in annual mean NO_2 concentrations at both automatic monitors. There have been no new relevant industrial installations and no new or substantially altered roads within the Council area.

There were no new significant commercial, domestic or fugitive sources of emissions.

Actions to Improve Air Quality

Air quality in West Dunbartonshire is considered to be generally very good and complies with all the air quality objectives listed in Table 1.1 the Council has not identified any area where air quality objectives may be under threat and where specific action is required to improve air quality. We work closely with Planners and other agencies to ensure appropriate mitigation measures are implemented for new developments and due consideration is given to Air Quality issues.

Local Priorities and Challenges

West Dunbartonshire Council has no specific priorities in respect of local air quality beyond that of statutory monitoring and idling engines enforcement. During 2021 we continued our programme of educational workshops in targeted local primary schools focussing on sustainable travel options and its impact on local air quality.

We also purchased a mobile air quality monitoring sensor (Zephyr) to reiterate the harmful emissions associate with road vehicle transportation especially outside schools. In addition to this the service is carrying our vehicle idling enforcement programme across the Council area.

How to Get Involved

The general public can find out more about air quality and related subjects by visiting West Dunbartonshire Council web site at http://www.west-dunbarton.gov.uk/business/environmental-health/pollution/airquality/

Residents can also visit the Scottish Air Quality website and view live air quality data

http://www.scottishairquality.co.uk. There is the opportunity to register for text and email alerts when air quality is forecast likely to be moderate or higher. This will enable those with breathing problems to make informed judgement about their levels of activity or exposure.

Further information can be obtained by contacting Environmental Health at: Environmental.Health@west-dunbarton.gov.uk

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1 Local Air Quality Management

This report provides an overview of air quality in West Dunbartonshire Council during 2021. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Progress Report (APR) summarises the work being undertaken by West Dunbartonshire Council to improve air quality and any progress that has been made.

Table 1.1 – Summary of Air Quality Objectives in Scotland

Pollutant	Air Quality Objective Concentration	Air Quality Objective Measured as	Date to be Achieved by
Nitrogen dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
Nitrogen dioxide (NO_2)	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
Particulate Matter (PM_{10})	18 µg/m^3	Annual mean	31.12.2010
Particulate Matter ($PM_{2.5}$)	10 µg/m^3	Annual mean	31.12.2021
Sulphur dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
Sulphur dioxide (SO_2)	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
Sulphur dioxide (SO_2)	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	3.25 µg/m^3	Running annual mean	31.12.2010
1,3 Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg/m^3	Running 8-Hour mean	31.12.2003

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12 months, setting out measures it intends to put in place in pursuit of the objectives.

West Dunbartonshire Council currently does not have any AQMAs. More so there are no recommendations in this year's report to declare any AQMAs in the Council area.

2.2 Cleaner Air for Scotland 2

Cleaner Air for Scotland 2 – Towards a Better Place for Everyone (CAFS2) is Scotland's second air quality strategy. CAFS2 sets out how the Scottish Government and its partner organisations propose to further reduce air pollution to protect human health and fulfil Scotland's legal responsibilities over the period 2021 – 2026. CAFS2 was published in July 2021 and replaces Cleaner Air for Scotland – The Road to a Healthier Future (CAFS), which was published in 2015. CAFS2 aims to achieve the ambitious vision for Scotland "to have the best air quality in Europe". A series of actions across a range of policy areas are outlined, a summary of which is available on the Scottish Government's website.

Progress by West Dunbartonshire Council against relevant actions for which local authorities are the lead delivery bodies within this strategy is demonstrated below.

2.2.1 Placemaking – Plans and Policies

Local authorities with support from the Scottish Government will assess how effectively air quality is embedded in plans, policies, City Deals and other initiatives, and more generally in cross departmental working, identifying and addressing evidence, skills, awareness and operational gaps.

West Dunbartonshire Council has the Clydeplan Strategic Development Plan (2017) which recognises the value of sustainable and active travel for maintaining and improving air quality. More generally, West Dunbartonshire Local Development Plan LDP2 seeks to

direct new development to sustainable locations that are easily accessible by public transport, thus reducing private car journeys.

2.2.2 Transport – Low Emission Zones

Local authorities working with Transport Scotland and SEPA will look at opportunities to promote zero-carbon city centres within the existing LEZs structure.

West Dunbartonshire Council has no plans to introduce low emission zones.

2.3 Progress and Impacts of Measures to address Air Quality in West Dunbartonshire Council

West Dunbartonshire Council has not undertaken any specific measures to address local air quality in 2021 beyond the statutory monitoring and reporting requirement improving local air quality.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how local concentrations of the main air pollutants compare with the objectives.

West Dunbartonshire Council undertook automatic (continuous) monitoring at two sites during 2021, one site in Dumbarton which is part of the Automatic Urban and Rural Network (AURN) and the other in Clydebank. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at http://www.scottishairquality.co.uk

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

West Dunbartonshire Council undertook non- automatic (passive) monitoring of NO_2 at 29 sites during 2021, 29 unique sites including two sets of triplicate tubes co-located with our automatic monitoring sites given a total of 33 tubes. Table A.2 in Appendix A shows the details of the sites. We plan to review our non-automatic monitoring sites during 2022 to ensure that the most appropriates sites are being considered.

Diffusion tubes on the A82, Glasgow road and the majority of those on Kilbowie road are at roadside locations with the façade of the nearest relevant property 5-20m from the roadside.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

3.1.3 Other Monitoring Activities

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for annualisation and bias. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.

Monitored NO_2 levels at all automatic monitoring sites continue to be below the annual mean air quality objective of 40 µg/m^3. The trend in NO_2 levels over the last 5 years is shown in Figure 1. NO_2 levels have been decreasing since 2019 in Dumbarton. NO_2 levels at all automatic monitoring sites have been below the objective level since monitoring began. The graph in Figure 1, shows the annual average at each automatic monitoring location since 2017.

The 2021 annual mean concentrations of NO_2 at all diffusion tube monitoring locations are shown to be well within the air quality objective, with the highest concentration recorded being 37.6µg/m^3 at location DT34 followed closely by DT33 at 35.6µg/m^3.

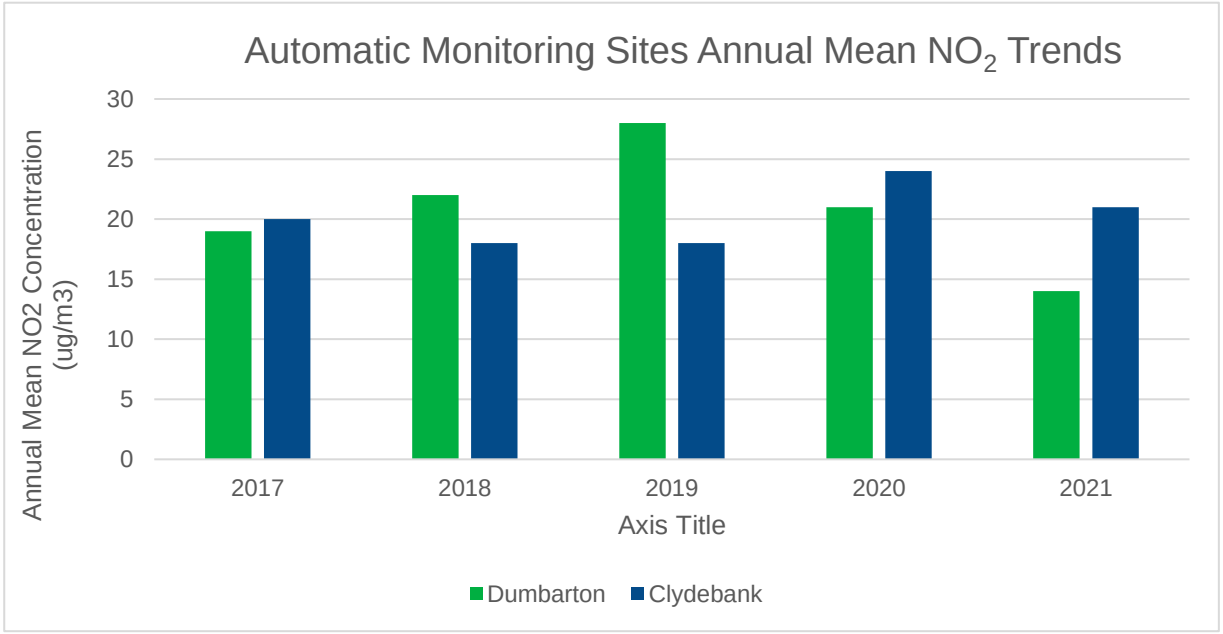


Figure 1 - Trend in automatic analyser measured annual mean 2017-2021

All automatic monitoring sites achieved compliance for NO_2 Air Quality Objectives.This measure has consistently been met across West Dunbartonshire Council area for the past five years.

For diffusion tubes, the full 2021 dataset of monthly mean values is provided in Appendix B. Where diffusion tubes reported erroneous data in 2021, the data was removed prior to data adjustment calculations, as recommended in LAQM Technical Guidance TG(16). None of the diffusion tubes required annualisation in 2021, as data capture was above 75%.

Diffusion tube DT33 and DT34 reported concentration in exceedance of Air Quality Objective, prior to distance correction and bias adjustment. A downward trend in concentration is observed across the Council's monitoring data with 100% of the existing tubes reporting no exceedance.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. There were no exceedances of the hourly mean objective at any automatic or diffusion tube sites in 2021. The hourly mean has not been exceeded at any automatic sites in the last 6 years.

Briar drive automatic monitoring site did not achieve the minimum 85% annual data capture required hence data annulisation of NO_2 data was undertaken.

3.2.2 Particulate Matter (PM_{10})

Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 18µg/m^3.

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than seven times per year.

No exceedance of the annual mean Air Quality Objective occurred at the Briar Drive monitoring site during 2021 which was the only site in West Dunbartonshire Council area where particulate matter was monitored.

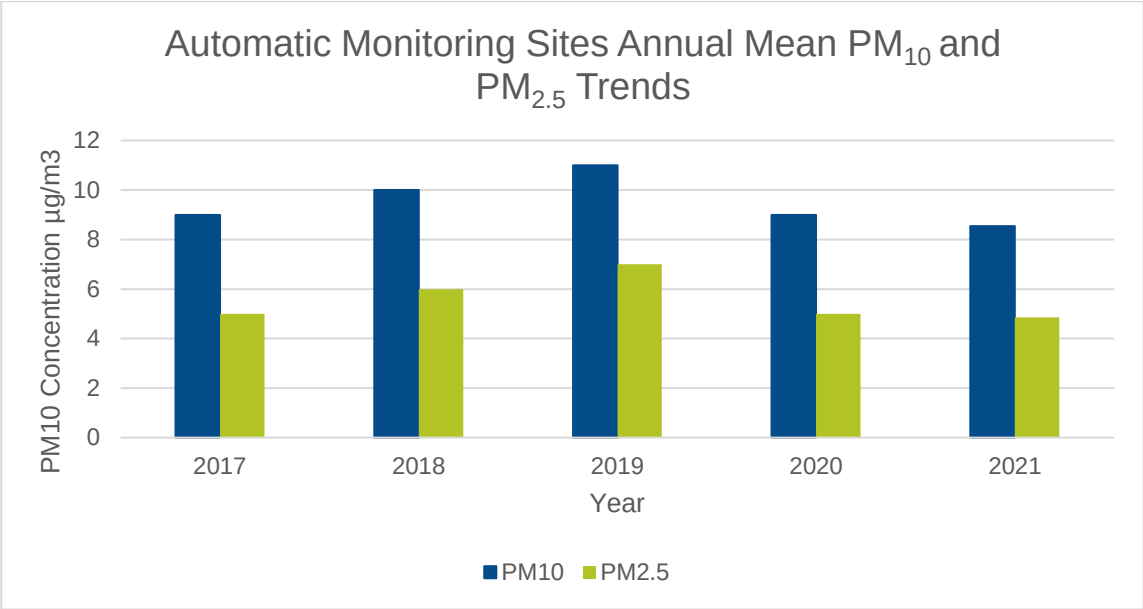


Figure 2 - Trend in automatic analyser measured PM_{10} and $PM_{2.5}$ annual mean 2017-2021

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.7 in Appendix A compares the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years with the air quality objective of 10µg/m^3. There were no exceedences of the objectives in 2020.

3.2.4 Sulphur Dioxide (SO_2)

West Dunbartonshire council does not monitor for Sulphur Dioxide.

3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

West Dunbartonshire council does not monitor for Carbon Monoxide, Lead or 1,3-Butadiene.

4 New Local Developments

No new developments in the area that may affect air quality have been identified.

4.1 Road Traffic Sources

There were no new road traffic sources identified within West Dunbartonshire Council Area in 2021.

4.2 Other Transport Sources

There were no new transport sources identified within West Dunbartonshire Council Area in 2021.

4.3 Industrial Sources

There were no new industrial sources identified within West Dunbartonshire Council Area in 2021.

4.4 Commercial and Domestic Sources

During 2021 there were a number of planning applications in respect of new biomass boilers and stoves. These are routinely screened using the approved Screening Tool and no installations have been identified as impacting adversely on local air quality. There are no new commercial or domestic sources identified in the West Dunbartonshire Council area.

4.5 New Developments with Fugitive or Uncontrolled Sources

There are no new developments with fugitive or uncontrolled sources identified in the West Dunbartonshire Council area.

5 Planning Applications

Environmental Health is consulted on many planning applications and this section summaries the planning applications for which air quality assessments were provided and accepted.

DC21/217/FUL - Vacant Land at Rothesay Dock Cart Street Clydebank-Development of a Plastics to Hydrogen Facility, Hydrogen Vehicle Refuelling Station and Associated Infrastructure and Landscaping

The conclusion of the air quality assessment was accepted. Planning permission has been granted along with a planning condition for a site specific dust mitigation measure to be implemented.

DC21/138/FUL - Development Site at Glasgow Road and Mill Road Clydebank - Residential development of 88 dwellings comprising of cottage flats, bungalows and flats with vehicular access, associated car parking and landscape works is presently under consideration.

Air quality assessment has been requested and the planning application is under consideration.

6 Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

The air quality monitoring undertaken in West Dunbartonshire Council has not identified any actual exceedance of the Air Quality Objectives at any relevant locations in 2021. When comparing the historic data against the current monitoring data, it clearly shows that pollutant levels have remained low and there is no significant risk of exceeding the air quality objectives.

The continuous monitors in Dumbarton and Clydebank have recorded consistently low levels of NO_2 annual mean since its installation in 2007.

There were no exceedances of either the PM_{10} or $PM_{2.5}$ Air Quality Objectives at the monitoring location during 2021. It is concluded that no AQMAs are required to be declared.

6.2 Conclusions relating to New Local Developments

None of the new developments identified in 2021 in West Dunbartonshire Council are likely to introduce new exceedances nor impact on the local air quality.

6.3 Proposed Actions

West Dunbartonshire Council will continue to monitor the concentration of NO_2 and particulate matter throughout the council area and take measures to improve Air Quality. It is our intention to review the NO_2 tube network and remove all NO_2 tubes which confirm there is no longer any need for concern in terms of air quality objective levels, this should be completed by the next APR.
All air quality assessments that are submitted as part of planning applications in relation to possible impacts upon local air quality will continue to be reviewed.

The next Annual Progress Report will be submitted in June 2023.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	Clydebank	Roadside	249723	672044	NO_2; $PM_{10;}$ $PM_{2.5}$	NO	Chemiluminescent; FDMS	18	4.5	1.5
CM2	Dumbarton	Roadside	240238	675193	NO_2	NO	Chemiluminescent	2.5	5	1.5

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube co-located with a Continuous Analyser?	Tube Height (m)
DT1	Clydebank 1	Kerbside	248479	671115	NO_2	No	2.0	1.0	N	2.5
DT2	Clydebank 6	Kerbside	249725	672069	NO_2	No	40.0	1.0	N	2.5
DT3	Clydebank 7	Kerbside	249918	669868	NO_2	No	4.0	1.0	N	2.5
DT4	Clydebank 9	Kerbside	249761	669990	NO_2	No	3.0	1.0	N	2.5
DT5	Clydebank 10	Kerbside	249759	671845	NO_2	No	8.5	1.0	N	2.5
DT6	Clydebank 11	Kerbside	249801	672288	NO_2	No	22.0	1.0	N	2.5
DT7	Clydebank 12	Kerbside	249747	671665	NO_2	No	10.0	1.0	N	2.5
DT8	Clydebank 13	Kerbside	249762	671760	NO_2	No	3.5	1.0	N	2.5
DT9	Clydebank 14	Kerbside	249872	671854	NO_2	No	>25	10.0	N	2.5
DT10	Clydebank 15	Kerbside	249746	671966	NO_2	No	8.5	1.0	N	2.5
DT11	Clydebank 16	Kerbside	249967	672548	NO_2	No	10.0	1.0	N	2.5
DT12	Clydebank 17	Kerbside	249987	672440	NO_2	No	11.0	1.0	N	2.5
DT29	Clydebank 19	Kerbside	249752	669981	NO_2	No	2.5	2.5	N	2.5
DT31	Clydebank 21	Kerbside	250531	669269	NO_2	No	4.0	1.0	N	2.5
DT32	Clydebank 22	Kerbside	250199	669551	NO_2	No	7.0	1.0	N	2.5
DT18	Milton 1	Kerbside	242266	674235	NO_2	No	12.0	1.0	N	2.5
DT19	Milton 2	Kerbside	242160	674299	NO_2	No	2.0	12.0	N	2.5
DT33	Milton 3	Kerbside	242378	674258	NO_2	No	21.0	1.0	N	2.5
DT34	Milton 4	Kerbside	242421	674270	NO_2	No	12.0	1.0	N	2.5
DT35	Milton 5	Kerbside	242413	674288	NO_2	No	2.0	14.0	N	2.5
DT13	Dumbarton 1	Kerbside	240322	675177	NO_2	No	2.5	2.5	N	2.5
DT14	Dumbarton 11	Kerbside	240515	675078	NO_2	No	4.0	1.0	N	2.5
DT15	Dumbarton 12	Kerbside	239410	675330	NO_2	No	7.0	1.0	N	2.5
DT16	Dumbarton 2	Kerbside	240178	675228	NO_2	No	8.0	1.0	N	2.5
DT17	Dumbarton 3	Kerbside	240279	675196	NO_2	No	4.5	1.0	N	2.5
DT20	Alexandria 1	Kerbside	239024	680206	NO_2	No	5.0	1.0	N	2.5
DT21	Balloch 1	Kerbside	238584	681562	NO_2	No	12.0	1.0	N	2.5
DT22	Briar Drive 1	Kerbside	249723	672044	NO_2	No	2.5	5.0	Y	2.5
DT23	Briar Drive 2	Kerbside	240238	675193	NO_2	No	2.5	4.5	Y	2.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube co-located with a Continuous Analyser?	Tube Height (m)
DT24	Briar Drive 3	Kerbside	248479	671115	NO_2	No	2.5	1.0	Y	2.5
DT25	Dumbarton Triplicate 1	Kerbside	240238	675193	NO_2	No	18.0	4.5	Y	2.5
DT26	Dumbarton Triplicate 2	Kerbside	240238	675193	NO_2	No	18.0	4.5	Y	2.5
DT27	Dumbarton Triplicate 3	Kerbside	240238	675193	NO_2	No	18.0	4.5	Y	2.5

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results ($\mu g/m^3$)

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM1	Roadside	Automatic	97	97	19	22.05(3)	28.2(3)	21	14
CM2	Roadside	Automatic	50	50	20	18	18	24	21
DT1	Kerbside	Diffusion Tube	91.7	91.7	23.8	22.5	22.5	19.1	17.2
DT2	Kerbside	Diffusion Tube	100.0	100.0	28.4	28.4	30.7	21.2	19.5
DT3	Kerbside	Diffusion Tube	100.0	100.0	23.7	20.6	23.9	15.4	13.0
DT4	Kerbside	Diffusion Tube	91.7	91.7	19.7	22.0	20.7	14.0	14.9
DT5	Kerbside	Diffusion Tube	100.0	100.0	23.4	20.6	25.0	16.8	13.8
DT6	Kerbside	Diffusion Tube	100.0	100.0	18.9	17.3	19.5	12.9	13.6
DT7	Kerbside	Diffusion Tube	83.3	83.3	23.1	19.9	19.3	14.9	15.4
DT8	Kerbside	Diffusion Tube	91.7	91.7	21.4	18.7	20.9	12.7	14.9
DT9	Kerbside	Diffusion Tube	100.0	100.0	13.5	11.0	13.8	9.1	8.4
DT10	Kerbside	Diffusion Tube	100.0	100.0	22.0	21.5	21.2	15.8	15.6
DT11	Kerbside	Diffusion Tube	91.7	91.7	20.5	21.6	22.1	15.6	12.5
DT12	Kerbside	Diffusion Tube	91.7	91.7	21.0	18.0	21.9	12.9	14.1
DT29	Kerbside	Diffusion Tube	100.0	100.0	21.3	19.9	21.7	12.3	11.6
DT31	Kerbside	Diffusion Tube	100.0	100.0	21.0	20.2	20.4	11.0	12.0
DT32	Kerbside	Diffusion Tube	100.0	100.0	19.3	15.5	19.3	13.4	13.0
DT18	Kerbside	Diffusion Tube	100.0	100.0	**47.1**	38.2	**42.2**	23.0	29.5
DT19	Kerbside	Diffusion Tube	91.7	91.7	18.7	20.3	18.9	19.9	13.7
DT33	Kerbside	Diffusion Tube	83.3	83.3	**49.0**	**43.9**	**46.2**	30.9	35.6
DT34	Kerbside	Diffusion Tube	91.7	91.7	**48.5**	**42.5**	**49.3**	32.5	37.6
DT35	Kerbside	Diffusion Tube	91.7	91.7	22.4	21.2	20.2	16.4	14.1
DT13	Kerbside	Diffusion Tube	91.7	91.7	23.3	21.9	25.7	13.6	16.5
DT14	Kerbside	Diffusion Tube	100.0	100.0	22.9	18.8	18.3	13.3	15.2
DT15	Kerbside	Diffusion Tube	100.0	100.0	16.6	14.4	17.3	13.3	11.7
DT16	Kerbside	Diffusion Tube	100.0	100.0	25.7	24.9	25.9	18.5	19.0
DT17	Kerbside	Diffusion Tube	83.3	83.3	21.0	26.6	24.7	16.7	19.9
DT20	Kerbside	Diffusion Tube	100.0	100.0	23.5	21.1	22.7	13.7	14.9
DT21	Kerbside	Diffusion Tube	100.0	100.0	22.8	18.0	20.1	12.4	14.2
DT22	Kerbside	Diffusion Tube	100.0	100.0	20.5	19.31	21.6	12.3	14.2

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
DT23	Kerbside	Diffusion Tube	100.0	100.0	20.7	17.31	20.9	14.9	14.2
DT24	Kerbside	Diffusion Tube	100.0	100.0	21.6	19.27	17.0	14.1	14.2
DT25	Kerbside	Diffusion Tube	100.0	100.0	16.4	18.7	18.2	13.3	13.4
DT26	Kerbside	Diffusion Tube	100.0	100.0	20.6	16.6	17.7	11.3	13.4
DT27	Kerbside	Diffusion Tube	100.0	100.0	18.0	16.3	18.5	10.8	13.4

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in bold.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG(16) if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.4 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM1	Roadside	Automatic	97	97	0	0(92)	0(110)	0(85)	0
CM2	Roadside	Automatic	50	50	0(101)	0	0	0	0(86)

Notes:

Exceedances of the NO_2 1-hour mean objective (200 µg/m^3 not to be exceeded more than 18 times/year) are shown in bold.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.5 – Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM1	Roadside	70	70	9	10	11	9	9

Notes:

Exceedances of the PM_{10} annual mean objective of 18 $\mu g/m^3$ are shown in bold.

All means have been "annualised" as per LAQM.TG(16), valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.6 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
WD-CM1	Roadside	70	70	0	0	4	0	0(20)

Notes:

Exceedances of the PM_{10} 24-hour mean objective (50 µg/m^3 not to be exceeded more than seven times/year) are shown in bold.

If the period of valid data is less than 85%, the 98.1st percentile of 24-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.7 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM1	Roadside	70	70	5	6	7	5	5

Notes:

Exceedances of the $PM_{2.5}$ annual mean objective of 10 µg/m^3 are shown in bold.

All means have been "annualised" as per LAQM.TG(16), valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Monthly Diffusion Tube Results (µg/m^3)

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Bias Adjusted (1)
DT1	18.0	23.6	13.1		18.5	9.1	3.9[2]	17.6	13.0	34.8	25.3	23.4	19.6	17.2
DT2	30.5	30.7	9.4	16.8	7.6	21.7	9.4	34.2	23.1	27.7	28.9	26.7	22.2	19.5
DT3	21.1	20.5	6.0	10.1	7.4	10.4	5.3	22.2	12.6	19.1	20.5	22.0	14.8	13.0
DT4	30.7	22.5	10.0		23.3	12.4	8.2	16.0	11.0	12.2	17.6	22.7	17.0	14.9
DT5	14.2	23.7	7.6	17.3	2.1[2]	10.3	6.0	20.7	13.6	17.8	18.7	23.0	15.7	13.8
DT6	17.0	22.1	12.2	12.6	9.9	10.3	7.4	14.5	13.7	20.8	21.0	25.1	15.6	13.6
DT7	23.6	24.0	14.4	16.1	10.9	11.8	6.7	19.1			20.9	27.9	17.5	15.4
DT8	20.5	19.7	16.8	17.8		8.3	10.0	18.5	9.2	23.1	19.9	22.7	17.0	14.9
DT9	13.6	10.9	10.5	4.3	6.0	4.1	2.6[2]	11.3	5.5	11.7	14.6	12.9	9.6	8.4
DT10	19.7	27.4	15.2	16.9	8.9	14.6	6.6	20.9	18.0	24.6	20.5	20.0	17.8	15.6
DT11	17.1	20.4	19.6	12.6	6.7	2.8	4.4	7.7	15.0	24.2	26.6		14.3	12.5
DT12	17.4	29.5	10.3		9.4	5.4	5.9	20.1	15.8	22.2	21.8	19.2	16.1	14.1
DT29	30.8	14.4	10.0	14.9	4.5	10.5	4.7	11.9	9.6	12.2	19.3	15.3	13.2	11.6
DT31	21.5	21.6	8.1	15.3	12.7	9.5	4.0	13.2	8.7	14.2	19.0	15.9	13.6	12.0
DT32	25.8	14.6	3.2[2]	12.4	7.2	7.0	4.7	23.4	9.4	21.3	18.2	19.6	14.9	13.0
DT18	40.9	22.4	21.1	32.4	51.3	31.9	20.3	45.4	39.5	40.2	30.3	27.3	33.6	29.5
DT19	17.9	15.7	17.4	16.2	16.2	12.3	11.0	20.9	15.6		10.9	17.5	15.6	13.7
DT33	48.9	21.8	23.8	35.2		97.9[2]	48.2	52.0	53.3	44.0	37.1	41.4	**40.6**	35.6
DT34	45.8	38.3	24.1	34.9	2.1[2]	48.1	48.6	56.2	43.0	47.0		43.2	**42.9**	37.6
DT35	20.5	19.7	11.0	16.3	6.5	16.4		19.5	14.9	17.0	17.9	16.7	16.0	14.1
DT13	30.9	18.9	9.1	19.7	11.5	11.4	19.1		14.0	22.0	21.8	28.0	18.8	16.5
DT14	40.8	7.2	16.5	17.0	10.0	8.4	9.5	20.8	12.0	18.8	19.5	27.4	17.3	15.2
DT15	26.1	14.2	6.7	9.5	11.0	10.9	7.3	17.5	8.4	15.9	14.3	18.7	13.4	11.7
DT16	32.1	15.9	18.1	17.6	17.2	20.2	13.2	34.8	8.3	34.1	21.2	27.6	21.7	19.0
DT17	30.6	21.4	9.4	33.2		17.5	16.0		29.5	25.4	26.8	17.4	22.7	19.9

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Bias Adjusted (1)
DT20	25.4	16.4	15.3	17.2	12.5	8.5	8.0	20.7	19.8	24.3	19.3	16.8	17.0	14.9
DT21	24.0	18.5	13.8	14.9	19.0	10.1	11.3	22.0	11.9	15.8	13.1	19.8	16.2	14.2
DT22	20.4	22.7	11.5	19.1	11.2	11.6	8.7	17.1	2.1[2]	19.2	14.7	24.7	16.2	14.2
DT23	22.9	21.0	11.4	18.1	9.1	13.6	4.1	19.2	3.7[2]	19.5	11.4	1.7[2]	16.2	
DT24	21.8	22.0	13.2	15.6	9.9	11.3	6.6	19.0	3.9[2]	19.5	13.6	26.2	16.2	
DT25	34.1	15.0	13.9	16.4	10.5	11.1	13.8	18.8	2.1[2]	19.0	18.1	18.6	15.3	13.4
DT26	23.5	13.7	13.9	16.0	11.1	11.8	13.7	19.4	4.1	14.1	18.2	14.6	15.3	
DT27	30.5	11.1	13.2	12.8	11.6	10.7	12.0	17.1	4.1	19.2	21.6	19.3	15.3	

Notes:

(1) See Appendix C for details on bias adjustment

(2) Erroneous result has been removed to calculate annual mean of raw data.

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

New or Changed Sources Identified Within West Dunbartonshire Council During 2021

West Dunbartonshire Council has not identified any new sources relating to air quality within the reporting year of 2021.

Additional Air Quality Works Undertaken by West Dunbartonshire Council During 2021

West Dunbartonshire Council has not completed any additional works within the reporting year of 2021.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes for the year 2021 are supplied and analysed by Glasgow Scientific Services (GSS) and are prepared using the 20% TEA in water method and in accordance with the procedures set out in the practical guidance. The duration of exposure is normally the 4/5 weeks period as suggested by the calendar provided by Defra. All results have been bias adjusted and annualised where required. The full set of monthly NO_2 diffusion tube results are shown in Table B.1 above.

Glasgow Scientific Services (GSS) Laboratory is UKAS accredited laboratory and participate in the AIR NO_2 Proficiency Testing Scheme. In 2021 the results the lab submitted to the scheme were determined to be satisfactory based on a z-score of ≤±2.

The triplicate co-location studies were undertaken at Glasgow road and Briar drive to determine a local bias factor.

Diffusion Tube Annualisation

All diffusion tube monitoring locations within West Dunbartonshire Council recorded data capture of above 75% therefore it was not required to annualise any of their monitoring data.

Diffusion Tube Bias Adjustment Factors

West Dunbartonshire Council carried out two co-location studies in 2021 with the triplicate set of NO_2 tubes been located with the automatic NOx analyser. The local bias adjustment factor of 0.88 was derived from the co-location studies undertaken at Glasgow road in Dumbarton and Briar Drive in Clydebank.

The national adjustment factor of 1.12 is based on six studies of which five are of poor precision and one of good precision. See https://laqm.defra.gov.uk/wp-content/uploads/2022/04/Database_Diffusion_Tube_Bias_Factors_v03_22-FINAL.xlsx).

A summary of bias adjustment factors used by West Dunbartonshire Council over the past five years is presented in Table C.1.

With regard to the application of a bias adjustment factor for diffusion tubes, Defra LAQM.TG(16) and the LAQM Helpdesk recommend the use of a local bias adjustment factor where available and relevant to the diffusion tube sites.

West Dunbartonshire Council have applied the local bias adjustment factor of 0.88 to the 2021 monitoring data instead of 1.12 for the national bias adjustment factor.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	Local	-	0.88
2020	National	03/21	0.96
2019	National	03/20	0.86
2018	National	N/K	0.86
2017	National	N/K	0.91

NO_2 Fall-off with Distance from the Road

No diffusion tube NO_2 monitoring locations within Wes Dunbartonshire Council required distance correction during 2021.

QA/QC of Automatic Monitoring

The QA/QC audits for West Dunbartonshire Council automatic monitoring sites are carried out by Ricardo Energy & Environment (E&E) twice a year at sites.

All equipment is subject to QA/QC procedures as recommended in LAQM.TG16. To ensure that the information obtained from the analysers is as accurate as possible and to quantify any instrument drifts; a stringent two point zero/span calibration check is performed at two weekly intervals in accordance with the manufacturers' instruction handbooks and from the LSO Operator manual.

Audits are carried out every 6 months by Ricardo AEA while servicing of all monitoring instruments are carried out every 6 months by an Acoem.

Ratification of the data is also carried out by Ricardo AEA, and the monitoring data presented within the APR have been ratified. The full Air Pollution Report for 2021 produced by Ricardo Energy and Environment for West Dunbartonshire Glasgow Road (site ID WDB4) and West Dunbartonshire Clydebank (site ID WDB3) can be accessed at http://www.scottishairquality.co.uk

PM_{10} and $PM_{2.5}$ Monitoring Adjustment

The type of PM_{10}/$PM_{2.5}$ monitor(s) utilised by West Dunbartonshire Council at Kilbowie roundabout site is a Palas Fidas 200 analyser which does not required the application of a correction factor.

Automatic Monitoring Annualisation

Annualisation was required for the Automatic monitoring site located on Briar Drive (CM2) close to Kilbowie roundabout in Clydebank for NO_2 and PM_{10} and $PM_{2.5}$ as the data capture was less than 75%. The results are shown in Table C.2.

NO_2 Fall-off with Distance from the Road

No automatic NO_2 monitoring locations within West Dunbartonshire Council required distance correction during 2021

Table C.2 – Annualisation Summary (concentrations presented in µg/m³)

Site ID	Annualisation Factor Dundee Mains Loan	Annualisation Factor Glasgow Townhead	Annualisation Factor Grangemouth Moray	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
CM2 (Clydebank) NO_2	1.143	1.241	1.135	1.173	17.5	20.53	
CM2 (Clydebank) PM_{10}	0.967	1.006	0.972	1.173	8.7	10.21	
CM2 (Clydebank) $PM_{2.5}$	0.988	1.005	0.977	1.173	4.9	5.75	

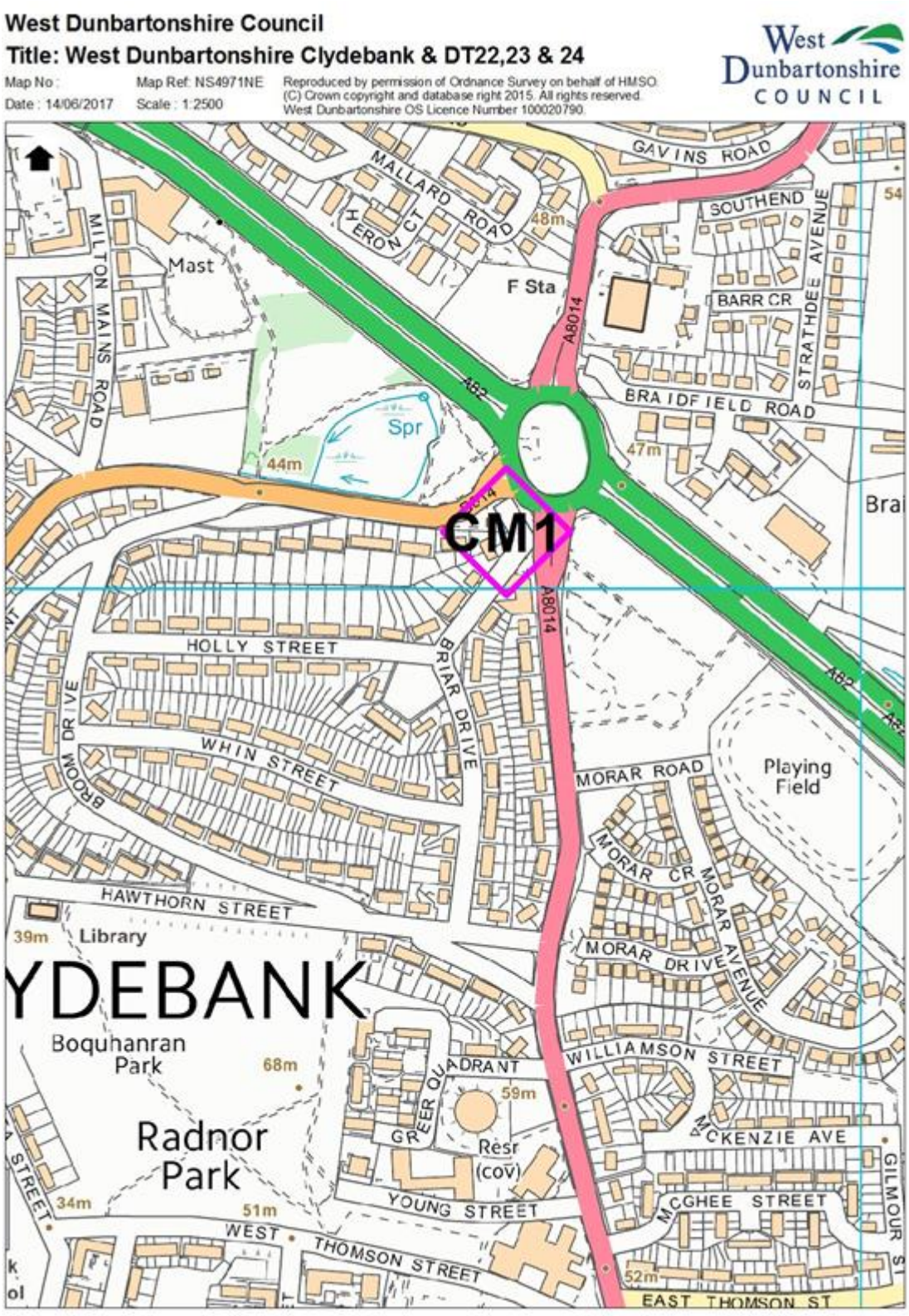
Table C.3 – Local Bias Adjustment Calculations

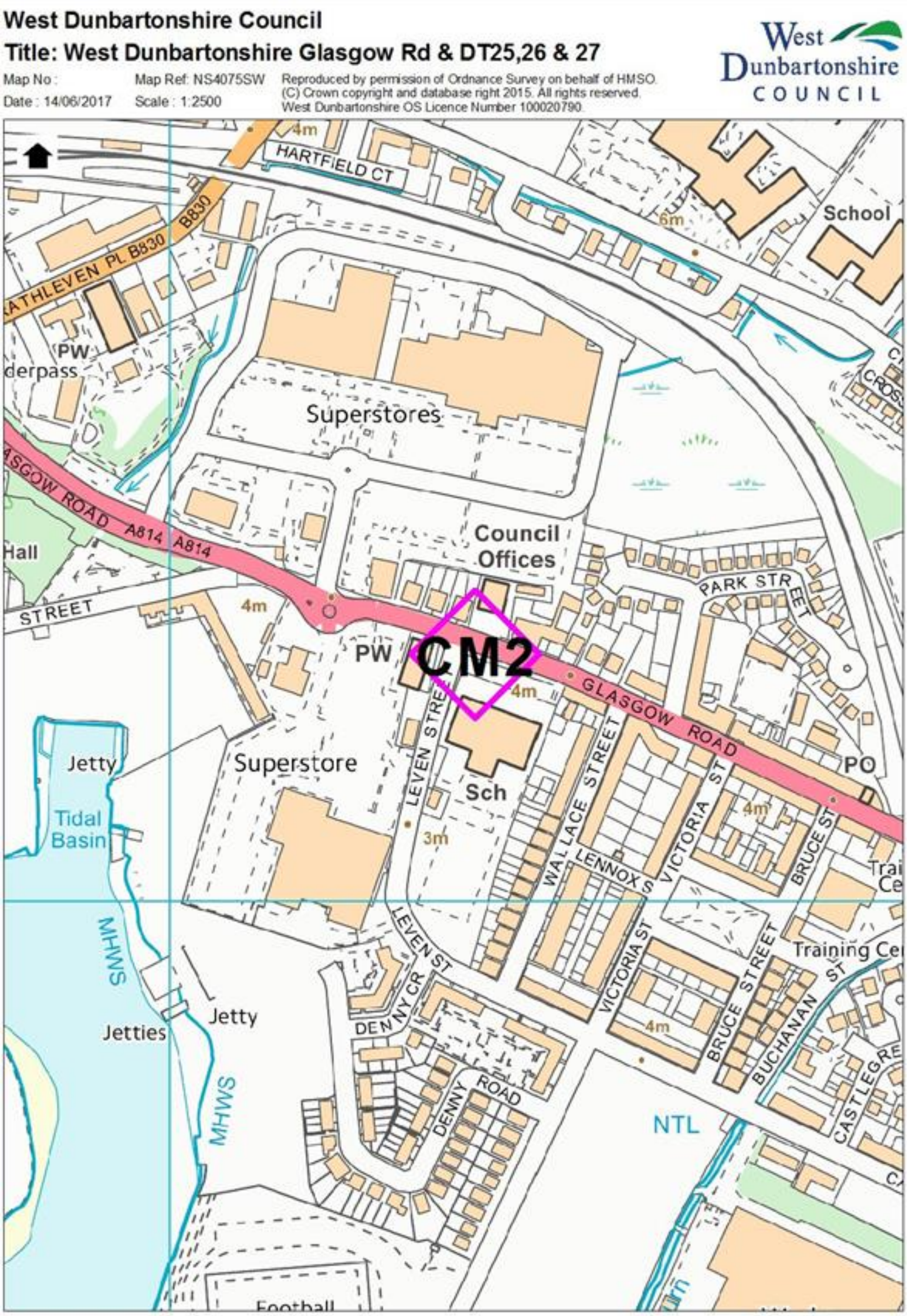
	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
Periods used to calculate bias	5	10			
Bias Factor A	1.13 (0.84 - 1.75)	0.71 (0.48 - 1.38)			
Bias Factor B	-12% (-43% - 19%)	40% (-27% - 108%)			
Diffusion Tube Mean (µg/m³)	14.8	16.2			
Mean CV (Precision)	8.7%	10.0%			
Automatic Mean (µg/m³)	16.7	11.6			
Data Capture	97%	100%			
Adjusted Tube Mean (µg/m³)	17 (12 - 26)	11 (8 - 22)			

Notes:

A combined local bias adjustment factor of 0.88 has been used to bias adjust the 2021 diffusion tube results.

Appendix D: Automatic Monitoring Site Location Maps co-located NO_2 tubes

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Map No :
Date : 14/06/2017
Map Ref: NS4075SW
Scale : 1:2500
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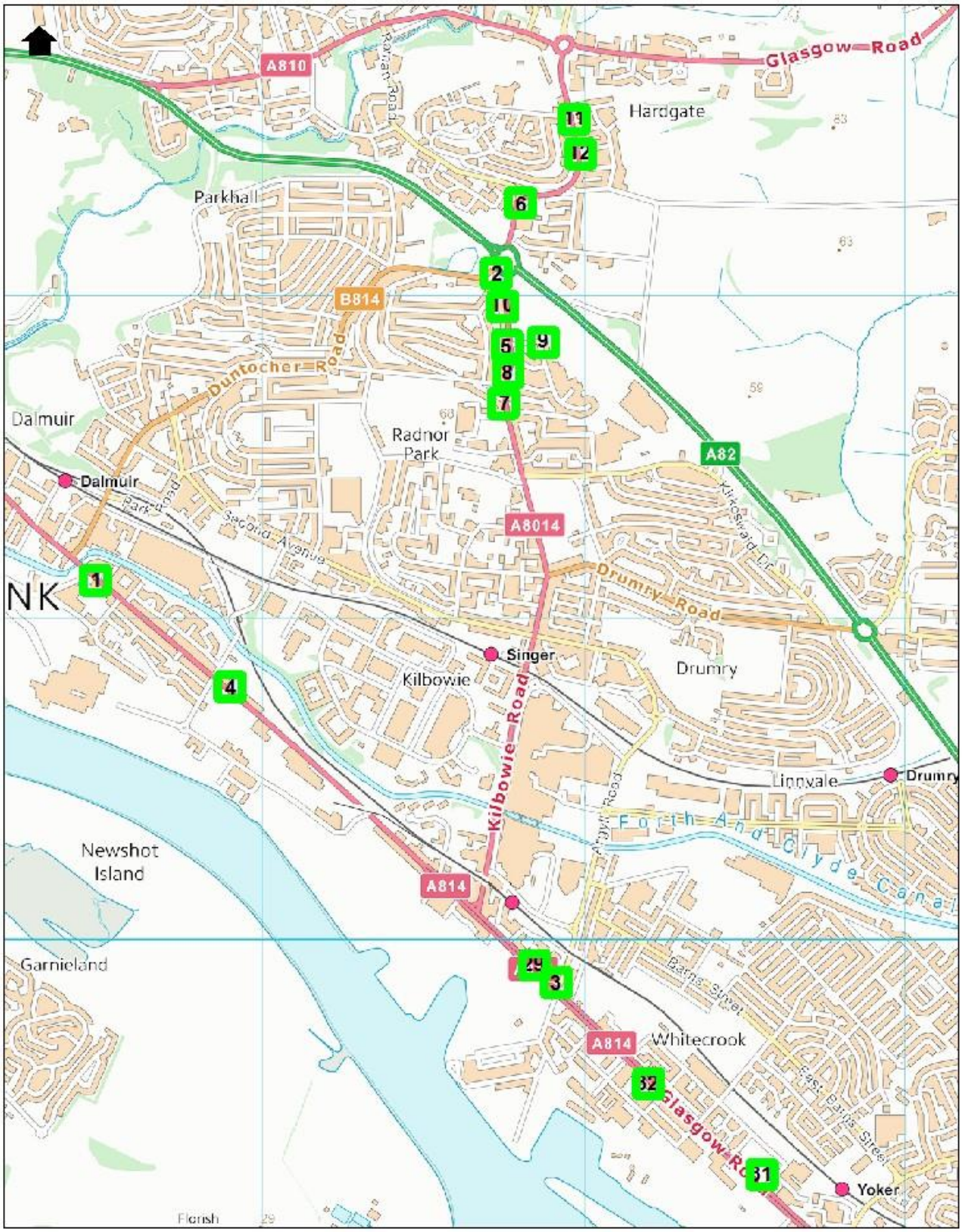
HARTFIELD CT
B830
School
PW
Superstores
Council
Offices
PARK STREET
A814
GLASGOW ROAD
CM2
PW
Hall
STREET
4m
Jetty
Tidal
Basin
Superstore
Sch
LEVEN STREET
WALLACE STREET
VICTORIA ST
LENNOX S
BRUCE ST
PO
3m
MHWS
Jetties
Jetty
LEVEN ST
DENNY CR
DENNY ROAD
VICTORIA ST
BRUCE STREET
BUCHANAN ST
CASTLEGREEN
Training Ce
NTL
Football

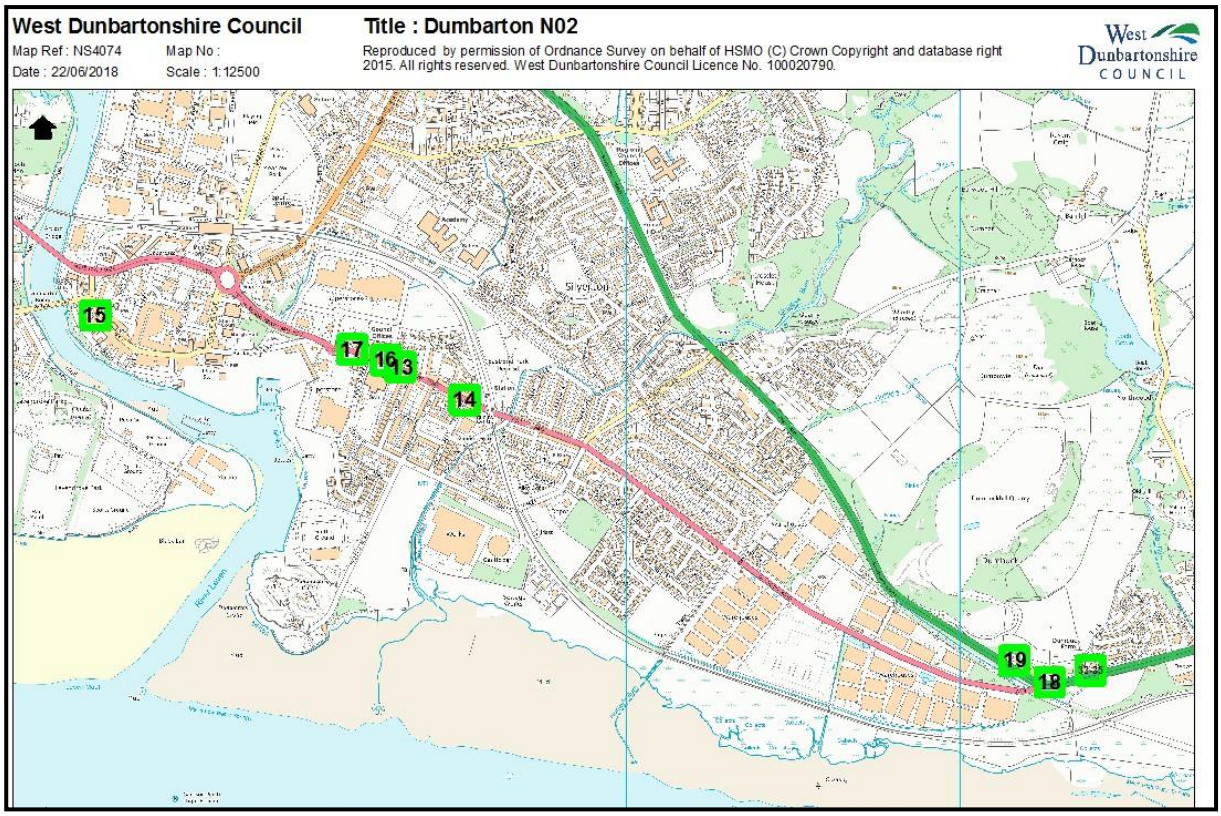
West Dunbartonshire Council

Title : Clydebank NO2

Map No :
Date : 16/06/2021

Map Ref : NS4971
Scale : 1:15000

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Date : 22/06/2018
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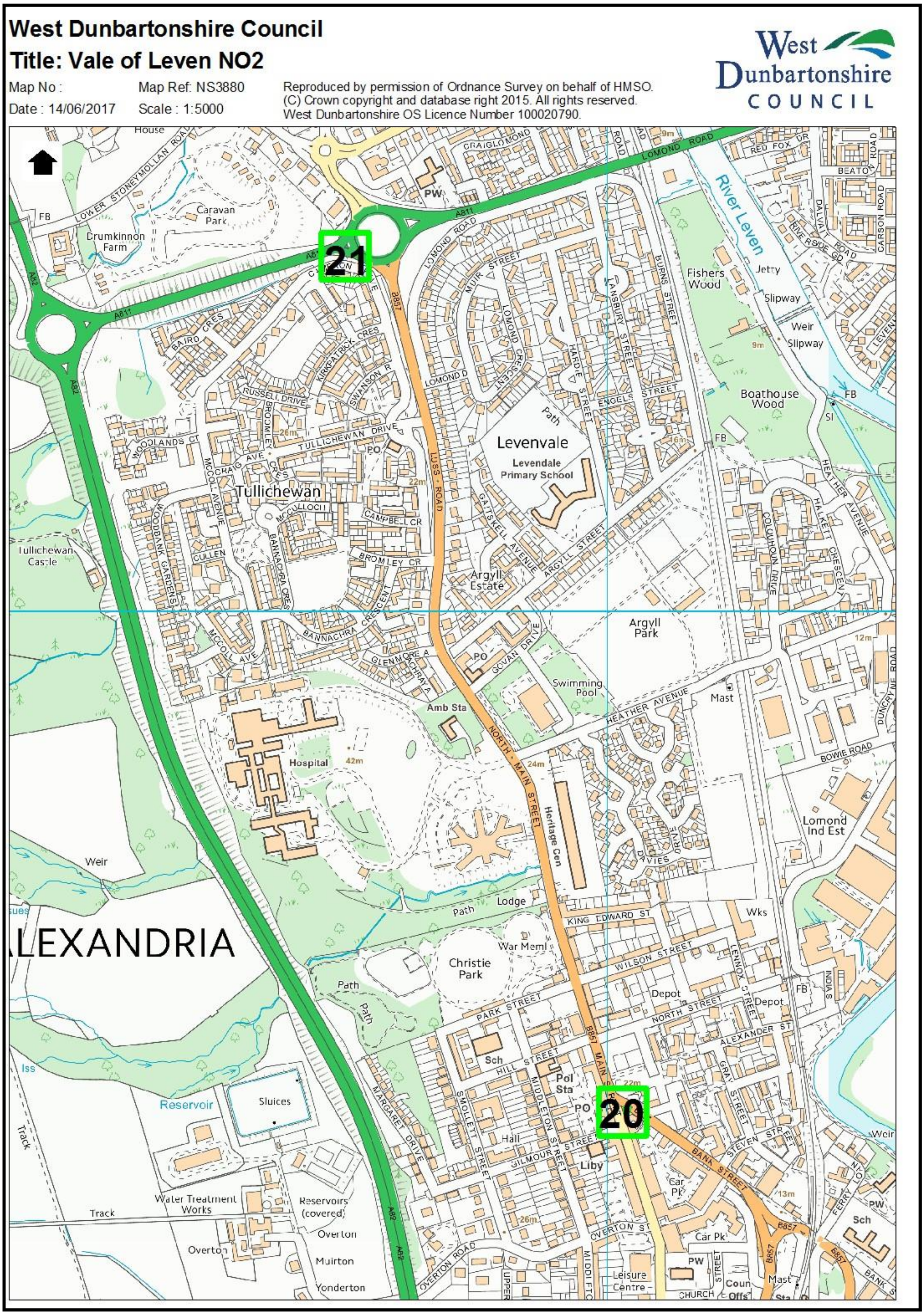
West Dunbartonshire Council
Title: Vale of Leven NO2
Map No :
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ALEXANDRIA
Tullichewan
Levenvale
Levendale Primary School
Argyll Estate
Argyll Park
Hospital
Christie Park
River Leven
Lomond Ind Est
Reservoir
Water Treatment Works
LUSS ROAD
NORTH MAIN STREET
BANK STREET
HEATHER AVENUE
LOMOND ROAD

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
APR	Air quality Annual Progress Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
GSS	Glasgow Scientific Services

References

Department for Environment, Food and Rural Affairs (Defra). 2016. *Technical Guidance LAQM.TG (16)*, Defra publications. http://laqm.defra.gov.uk/technical-guidance/

Local Air Quality Management Policy Guidance LAQM.PG(16). May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland