



2021 Air Quality Annual Status Report (ASR)

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

Date: October 2021

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| Report Reference Number | PC/ASR2021 |
| Date | October 2021 |

Executive Summary: Air Quality in Our Area

Air Quality in Lancaster

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas^{1,2}.

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages³, with a total estimated healthcare cost to the NHS and social care of £157 million in 2017⁴.

As we all know too well, 2020 was not a normal year, and changes resulting from the COVID pandemic impacted on everyone, often in many different detrimental ways. As you may have noticed or heard, air quality was not one of these, as changes in behaviour resulting from the pandemic situation, led to people taking fewer journeys. This contributed to 2020 seeing better air quality and a more marked improvement than would have been anticipated otherwise. In fact for the first time in recent years, air quality monitoring in almost all part of Lancaster (including the Carnforth and Galgate AQMAs and most sites within the Lancaster AQMA), indicated compliance with air quality standards. The only exceptions were in two locations around the city centre gyratory within the Lancaster Air Quality Management Area. However even in these locations levels were indicated to be at or only just above the annual mean objective standard for nitrogen dioxide. Details of Lancaster's Air Quality Management Areas (AQMAs) and monitoring information can be found at [Lancaster Air Quality](#). A full national list of AQMAs can be found at [National AQMA list](#).

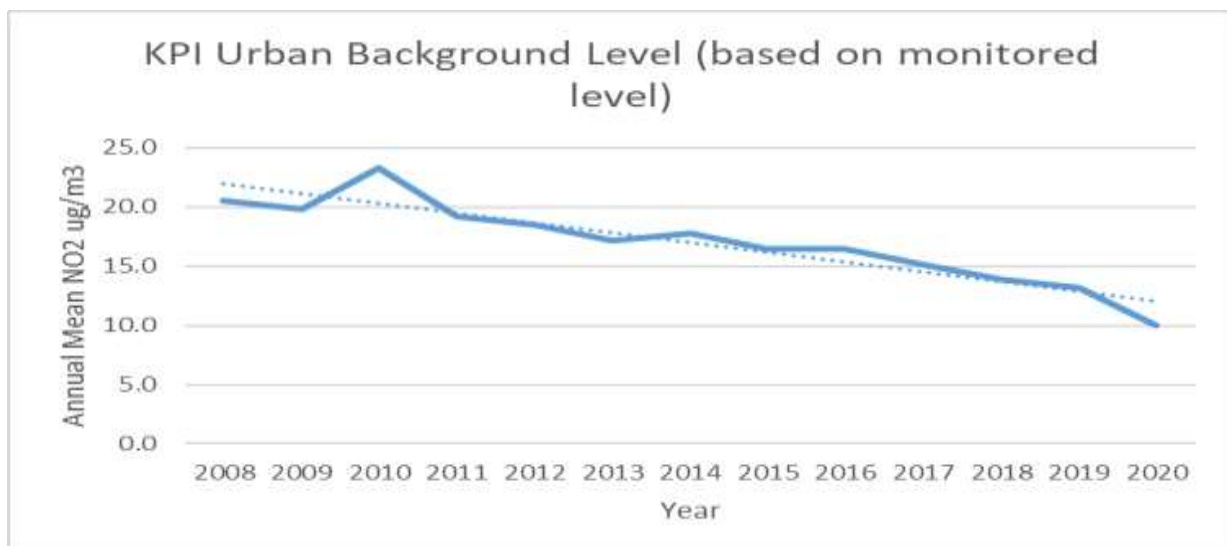
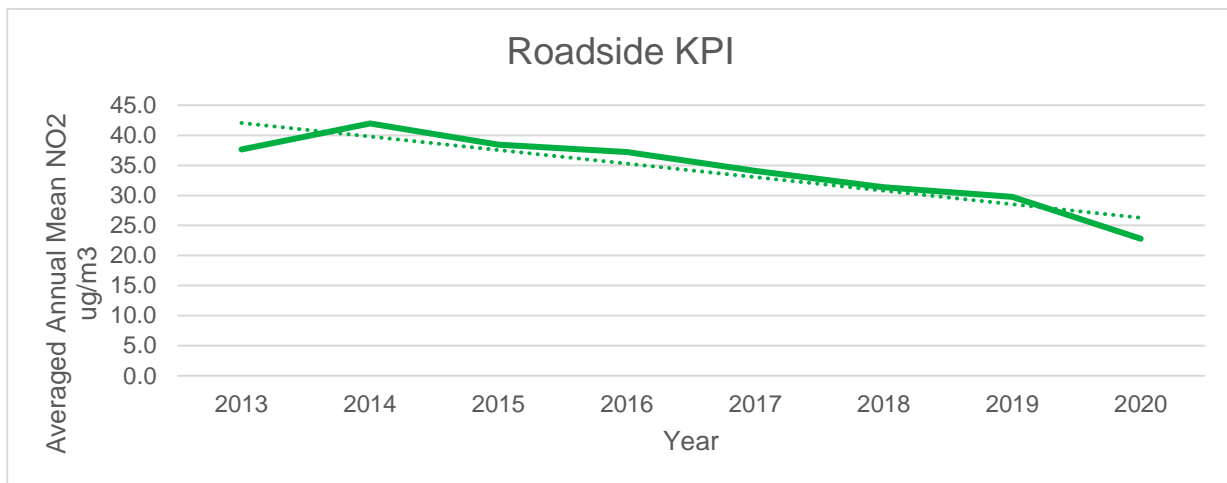
¹ Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

² Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

³ Defra. Air quality appraisal: damage cost guidance, July 2020

⁴ Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

The Council reports two key air quality indicators annually (shown below) which are based on local air quality monitoring within the district. These both show the marked improvement in 2020 beyond what would have been anticipated during a 'normal' year.



Although traffic levels have crept back to near pre-pandemic levels, it is hoped that patterns of behaviour adopted during recent times will have a more long lasting legacy leading to air quality improvement e.g. working from home, using TEAMS platforms for meetings etc.



In 2020 monitored roadside annual mean nitrogen dioxide levels at Dalton Square were indicated to be around 42 ug/m^3 . In China Street indicative levels were monitored to be around 40 ug/m^3 . Overall levels showed a large reduction on levels monitored in 2019. The objective level is 40 ug/m^3 .

Levels of particulate pollution (PM_{10}) measured at Cable Street Lancaster, also indicated compliance with the objective standard, but showed similar levels to the previous year rather than a reduction. A new Horiba FIDAS particulate monitor was installed in the Cable Street station in 2020 that measures both PM_{10} and $\text{PM}_{2.5}$ particulate fractions. Monitored $\text{PM}_{2.5}$ levels will therefore be reported next year.



Photographs showing Cable Street air quality station with new FIDAS particulate monitor.

Emissions from road traffic remain the key concern for air quality action however emissions from domestic burning of wood and other solid fuels and from bonfires is a growing national^{1&5} and local concern. Whereas 2020 saw general improvements in traffic pollution, the number of complaints relating to smoke pollution/nuisance increased by 300% in 2020. This increase was considered to be at least partly an off-shoot consequence of the COVID 19 situation (people spending more time at home), however the number of complaints clearly demonstrates the concerns of many individuals. It may also possibly be one of the reasons why particulate level monitoring on Cable Street did not see a reduction in 2020. The air quality grant application submitted in October 2020 by the Council to seek funding for a local, professionally marketed campaign, (with the aims of making people more aware of the air quality and environmental impacts arising from these sources and to hopefully to change behaviour) was not successful. A revised application (due October 2021), with similar aims is being considered at the time of writing this report.

A new air quality action plan (AQAP) was due to be delivered in 2021 but due to delays in the production of plans for the city centre, it remains under development and is now due to be consulted on and delivered in 2022. Following public consultation in spring 2021 (see [Movement Strategy consultation](#)), option proposals for the city centre have been reduced from 8 to 3 proposals, one incorporating a city centre clean air zone approach. These are all now being considered, modelled and assessed in detail and are anticipated to be put again to public consultation in spring 2022 with the aim of selecting one preferred option.

When decided, the strategy will provide the main element for air quality improvement in the city centre, which monitoring indicates to be only area in the district with remaining air quality standard exceedances. The choices arising from this consultation partnered with a linked AQAP consultation will form the basis for proposals in the new air quality action plan for central and south Lancaster and delivery will determine the pace and degree of air quality improvement can be achieved in future years.

In January 2019 Lancaster City's full council met and declared a climate emergency, and committed to actions to support this position (see [Lancaster Climate Emergency](#)). This position continues to provide support for air quality improvement as the majority of actions responding to climate change have air quality benefits. The council's response to support the uptake of electric vehicles (see below), the review of the local plan (see [Lancaster Local Plan Review](#) and steps to reduce emissions from its estate (see [Climate Emergency](#)

[News](#)) clearly demonstrates this commitment. The Council's aim is for its activities to be net carbon zero by 2030.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy⁵ sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero⁶ sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

The delivery of actions to improve local air quality is ongoing and is not wholly dependent on the new air quality plan being in place.

The four main actions for remainder of 2021 and for 2022 will be:

- (i) The delivery of a new air quality action plan for Lancaster linked to the development of new transport infrastructure plans for the city centre and south Lancaster.
- (ii) the delivery of more electric vehicle charging infrastructure and council electric fleet vehicles, including chargers for the taxi fleet enabled by OLEV grant funding. Chargers ultimately intended for electric taxi use are now all in place and should be operational by the end of October 2021.
- (iii) The local plan has been subject to review due to the locally declared climate emergency. Amendments to policies will result in a reduction in climate changing emissions, but also result in a general reduction in air polluting emissions from new development. Proposed policy changes included the provision of a separate electric vehicle charging Supplementary Planning

⁵ Defra. Clean Air Strategy, 2019

⁶ DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

Document (SPD). Consultation on proposed guidance is due to take place in 2021/22.

- (iv) If the Defra air quality grant application (2021) is successful, the delivery of a project to influence behaviour to help tackle the growing issue of air pollution from solid fuel/wood burning appliances and from bonfires (linked to work with local schools).

The main activity for 2021/22 is the development of transport infrastructure plans for the city centre and south Lancaster. This involves work with our key partner, the county council, to come up with detailed plans covering three options that will be modelled and then will go out for public consultation in 2022. They will form the core actions for the new air quality action plan for Lancaster.



Electric Vehicle Rapid Charging unit installed at Spring Garden Street Car Park, Lancaster

Conclusions and Priorities

Monitoring over 2020 indicated an overall improvement in air quality in the Lancaster district, which due to the changes brought about by the pandemic, was more significant

than anticipated. Although reduced, objective exceedances (annual mean nitrogen dioxide) remain, but only within the Lancaster Air Quality Management Area. No exceedances were identified in other locations. Due to the impacts of the pandemic it is anticipated that 2021 will see a rise in air pollution in comparison to 2020, but still hopefully indicating an overall declining trend. If monitoring continues to show air quality improvement over the next 2 years within the Carnforth and Galgate AQMAs, consideration will be given to revoke these two AQMA designations in 2023. Any such decision will however be mindful of new development proposed in either locality and its potential additional impact. In this regard it should be noted there are plans to provide new road infrastructure (through a Housing Infrastructure Fund bid) in south Lancaster which should serve to alleviate traffic impacts on Galgate. However, the new road is planned to be delivered to accommodate significant new housing development, and therefore additional impacts will arise from this source.

Following the consideration of movement strategy options for Lancaster city centre (which are being developed prior to detailed modelling) and using information from a public consultation on possible measures carried out in 2019, a new air quality action plan is now due to be delivered in 2022. Dependant on the allocation of Defra air quality grant funding, 2021/22 will also potentially see the launch of a project aimed at reducing particulate pollution (a specific aim of the national Clean Air Strategy⁴) and providing an educational air quality resource to schools.

Lancaster City Council's priorities for this and the coming year are:

- Delivery of new AQAP alongside new transport/highways plans for Lancaster
- Deliver a local plan review to acknowledge locally declared climate emergency
- Delivery of air quality/low emission Supplementary Planning Guidance
- Delivery of Electric vehicle charging infrastructure across the district.
- Transition the council vehicle fleet to electric vehicles where possible
- Deliver solid fuel/ schools projects (subject to Defra AQ grant funding)

Local Engagement and How to get Involved

The Council is working with key partners to deliver better air quality. Due to a focus remaining on traffic related pollution issues at this time, our main partner is Lancashire County Council (the Highways authority for Lancaster). The main stream of work with them

is around plans for the city centre and south Lancaster which are referenced in this report. Other key partners are the bus companies (Stagecoach and Kirkby Lonsdale Coach Hire being the two local operators) and Electricity North West (regarding charging for electric vehicles). Major local employers (the Universities, the NHS etc..) are also partners for air quality improvement and through related engagement through climate change response actions.

Air quality impacts are not generally the result of single source, nor due to the impacts of councils or businesses in isolation. Air quality impacts arise as a result of a number of combined impacts that come from everyone's daily activities. Small contributions to air pollution are therefore more important than they may seem and need to be recognised if current air quality issues are to be resolved and to generally deliver better air quality. The principle 'look after the pennies and the pounds will look after themselves' comes to mind. Road traffic is an obvious example of an impact arising from numerous sources with control in the hands of each vehicle owner. The choice to use a wood burning/solid fuel stove to heat your home or to have a garden bonfire is another example. The choices individuals (you) make are therefore crucial to improve air quality. The following are therefore some suggested actions which if adopted would significantly contribute to improving air quality in the Lancaster area: -

- 1) *Internet technology available today allows communication and transactions to take place without the need for personal travel. Wherever possible the use of technology can remove or reduce polluting emissions and also save you valuable time and often money.*
- 2) *Where a journey is needed, choosing to walk or cycle means that you are not adding to pollution and has the added benefit of keeping you fit and healthy. Some good information and suggestions can be found at the following link: [Travel Alternatives](#)*
- 3) *Traffic queues on our roads are regularly noticeable around school pick up and drop off times. This results in increased air pollution around these times. Where possible avoid using a car to take your children to and from school. Where possible please make safe and secure cycle or walking arrangements rather than use your*

car. If you do use your car, please do not leave your car engine idling while you are waiting as this further adds to the problem and can particularly impact on people who live in the vicinity of schools.

- 4) If you need a car, consider using or purchasing a lower emission vehicle such as an electric car. If an electric car does not currently meet your specific needs or is not a possibility, if you can, choose a smaller, more fuel-efficient car. This will usually have significant emission benefits. Electric bikes (E bikes) provide a new possibility for many.*
- 5) Covid presents a reason currently not to use public transport and therefore cycling and walking options are currently the best travel choice. Post Covid, please take the bus or train if this is an option. The Council and its partners are working to improve the emissions from public transport. Information on public transport is available from [Travel Planning](#), [Stagecoach buses](#) and other general information web sites such as [National Rail](#) .*

In addition to reducing the pollution you create, you can also do things to reduce your exposure to air pollution. These are a few suggestions: -

Get out of your car

Not only will you be reducing pollution if you don't drive, but you will also reduce how much pollution you breathe as often sitting in traffic surrounded by vehicles exhausts can be the worst place to be.

Choose where you walk

Air pollution along main roads with buildings close to the road can be particularly high. If possible, avoid walking along main roads, choose side roads. If you can't avoid them walk as far away from the kerb as possible – pollution levels usually decrease quickly the further you get away from them. If you need to cross the road, do this as quickly as you can, but don't get run over, as this would defeat the objective! Watch out for your young children also. If they are in a pram, don't forget that they can be even closer to a vehicle's exhaust!

Choose where you exercise

Don't run or cycle along busy roads if you can avoid them. Choose locations where traffic is lower or ideally, where there is no traffic at all.

Get out of town

Not always an option, but if you can go out to places where the air is cleaner (the country or the coastal areas of Lancashire are great). But if you can, use public transport, walk or cycle so you don't add to the problem.

Avoid times when pollution is worst

If you can, don't travel when traffic is busiest as this will usually be when the pollution is at its worst. This will not be a favourite for many, but walking in the rain reduces the pollution we breathe in.

Wear a mask?

You could wear a mask, but if you do it needs to fit tightly or its effect will be small. Also, if you don't change it regularly and it becomes dirty it could even be worse for you. Wearing a mask (for Covid 19 reasons) is now standard practice.

Air pollution indoors?

Air pollution inside can be an issue as we often produce dust for activities such as DIY, cleaning and also some pollution from cooking and heating our homes. Ventilate your home and minimise obviously dusty or smoky activities. Choose to heat your home using a 'clean' fuel. Obviously if you smoke, this the first thing to stop doing.

Wood burning stoves and garden bonfires

Pollution emissions from wood burning stoves are much higher than from gas or electric heating systems and the combined impact of a number of stoves in urban areas can lead to noticeably poorer air quality. Wood burning stoves and other solid fuel installations also significantly affect the air quality inside your home and therefore impacts on the health of you and your family. Garden bonfires can also similarly add to local pollution. It is therefore very helpful and beneficial to your health if these more polluting choices can be avoided.

Tell us what you think!

We will be consulting again on our selected measures proposed to form a new air quality action plan, most likely in spring 2022. If you would like to be

consulted on the plans, please provide your contact details (name, organisation (if any) and email address to:

environmentalhealth@lancaster.gov.uk

(Please present the email subject as ‘ Request to be a Consultee on the new Air Quality Action Plan for Lancaster District’)

or send by post to:-

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1 Local Air Quality Management

This report provides an overview of air quality in the Lancaster district during 2020. 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 Status Report (ASR) is an annual requirement showing the strategies employed by Lancaster City Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of AQMAs declared by Lancaster City Council can be found in Table 2.1. The table presents a description of the three AQMAs that are currently designated within the Lancaster district. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO₂ annual mean;
- NO₂ 1 hour mean

Table 2.1 – Declared Air Quality Management Areas

| AQMA Name | Date of Declaration | Pollutants and Air Quality Objectives | One Line Description | Is air quality in the AQMA influenced by roads controlled by Highways England? | Level of Exceedance: Declaration | Level of Exceedance: Current Year | Name and Date of AQAP Publication | Web Link to AQAP |
|------------------------|--|---------------------------------------|---|--|---|---|-----------------------------------|--|
| City of Lancaster AQMA | 2004 | NO2 Annual Mean | Covers gyratory system in Lancaster city centre | NO | 75ug/m ³ | 42ug/m ³ (COVID Lockdown Year) | 2007 (new Plan due 2022) | Available at:- Air Quality Action Planning Information |
| City of Lancaster AQMA | 2017 (new order replaced 2004 order above and covered both annual and 1 hr Objectives for NO2. The area covered by the AQMA was unchanged. | NO2 1 Hour Mean | Covers gyratory system in Lancaster city centre | NO | 75ug/m ³ (annual mean value) | 42ug/m ³ (COVID Lockdown Year) | 2007 (new Plan due 2022) | Available at:- Air Quality Action Planning Information |

| AQMA Name | Date of Declaration | Pollutants and Air Quality Objectives | One Line Description | Is air quality in the AQMA influenced by roads controlled by Highways England? | Level of Exceedance: Declaration | Level of Exceedance: Current Year | Name and Date of AQAP Publication | Web Link to AQAP |
|----------------|---------------------|---------------------------------------|--|--|----------------------------------|---|-----------------------------------|--|
| Carnforth AQMA | 2007 | NO2 Annual Mean | Covers main cross road area in Carnforth | NO | 42ug/m ³ | 26ug/m ³ (COVID Lockdown year) | 2007 (new Plan due 2022) | Available at:- Air Quality Action Planning Information |
| Galgate AQMA | 2009 | NO2 Annual Mean | Covers main cross road area in Galgate | NO | 43ug/m ³ | 24ug/m ³ (COVID lockdown year) | 2007 (new Plan due 2022) | Available at:- Air Quality Action Planning Information |

☒ Lancaster City Council **confirm the information on UK-Air regarding their AQMAs is up to date**

☒ Lancaster City Council **confirm that all current AQAPs have been submitted to Defra**

NB A new AQAP for the Lancaster District is now due in 2022

2.2 Progress and Impact of Measures to address Air Quality in Lancaster

Defra's appraisal of last year's ASR concluded that "The report is well structured, detailed, and provides the information specified in the Guidance."

Lancaster City Council has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 46 measures are included within Table 2.2, with the type of measure and the progress Lancaster City Council have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

The key overarching action for 2021/22 remains the delivery of a new air quality action plan for the district linked to transport, highways and movement strategy changes being co-ordinated by Lancashire County Council.

Key completed measures in 2020 are:

- Delivery of more electric vehicle charging infrastructure by the city council in car parks (a map showing the position of chargers delivered by the council and the private sector is shown in Appendix G)
- Delivery of additional electric vehicles (vans and cars) for use by Council staff and the public (by purchase of additional vehicles and partnering with national Co-wheels car share scheme).
- Review of local plan to acknowledge locally declared climate emergency (Public consultation completed September 2021)
- Commenting and raising issues with drafts for the city centre Movement Strategy and south Lancaster proposals.

Lancaster City Council expects the following measures to be completed over the course of the next reporting year:

Lancaster City Council's priorities for the coming year are :

- Delivery of a new air quality action plan covering the Lancaster district and specifically the city centre where objective exceedances (annual mean NO₂) persist.
- Delivery of rapid charging infrastructure for electric taxis in council car parks (due to be installed and operational by end of October 2021) and more chargers for electric vehicles generally through the delivery of an electric vehicle charging supplementary planning document (to cover requirements for new development) and a strategy for council led provision.
- Further consultation event with the taxi trade regarding perceived obstacles transition to the use of electric taxi vehicles (due before spring 2022 following the commissioning of electric taxi chargers).
- Further transition of council fleet/grey fleet vehicles to electric vehicles, particularly the purchase of two electric refuse vehicles.
- Delivery of project to inform behavioural change around the use of solid fuels and through working with schools (subject to Defra air quality grant funding).
- Adoption of new planning policies following the review of the local plan in response to the locally declared climate emergency.
- The adoption of an air quality supplementary planning document following the adoption of a new air quality action plan.
- The adoption of electric vehicle charging supplementary planning document to direct charging requirements for new development.
- The development of a plan to provide local electric bus services (to be in place in anticipation of suitable grant funding becoming available to help fund the provision of electric buses and charging Infrastructure).

The principal challenges and barriers to implementation that Lancaster City Council anticipates facing are :

- Issues faced by two-tier authority position - Lancaster City Council has no direct control over highways and is reliant on acknowledgement and suitable assessment of air quality issues and delivery of air pollution minimising traffic related measures

by Lancashire County Council. In arriving at a final plan, air quality improvement will not be the sole consideration of plans, and all changes will be limited by what is possible within constraints imposed by the existing built environment and by funding availability to implement significant changes to transport infrastructure and transport behaviour.

- The local plan proposes additional development, particularly housing, within the district that will potentially result in additional road traffic and potentially polluting emissions associated with new buildings. Impacts on air pollution and climate change are being considered through the transport master plan, the local transport plan (pending LTP4), the movement strategy for the city centre, the local development plan and related neighbourhood /area plans, infrastructure plans (new road, cycling and bus measures through the Housing Infrastructure Fund for south Lancaster) the air quality strategy, the declared climate emergency and through the arising air quality action plan.

Progress on the following measures has been slower than expected due to:

- Delivery of charging points for taxis was impacted by the pandemic (this was originally due by September 2020). The chargers are now all in position and should be operational by the end of October 2021 (City Council)
- Development of the movement strategy options for the city centre and dependant production of a new air quality action plan were delayed due to uncertainty over the future of the schemes and their funding. A decision has now been made to proceed with the schemes and now both are due in 2022 (County and City Councils).
- Delivery of Clean Bus Technology Fund DfT grant assisted works to improve emissions from local buses (County Council) - The county council advises that the CBT grant still remains to be spent. Progress has been paused since March 2020 when emergency measures were introduced in response to the Covid-19 pandemic. The parties will soon be re-engaging in order to re-examine the suitability and ongoing relevance of the agreed specification in light of the wider transport plans for Lancaster with a view to agreeing an approach to procurement in 2022/23 (County Council).

- Adoption of the Air Quality Supplementary Planning Document has been delayed until the adoption of a new air quality action plan. This has been decided as there needs to be a link to specific AQAP actions where funding contributions from new development may be sought.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Lancaster City Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of the City of Lancaster AQMA.

Table 2.2 – Progress on Measures to Improve Air Quality

| Measure No. | Measure | EU Category | EU Classification | Lead Authority | Planning Phase | Implementation Phase | Key Performance Indicator | Target Pollution Reduction in the AQMA | Progress to Date | Estimated Completion Date | Comments |
|-------------|------------------------------------|--------------------|---|---------------------------|------------------------------------|----------------------|---|---|--|---------------------------|---|
| 1 | Lancaster Transport Masterplan | Traffic Management | UTC, Congestion management, traffic reduction | Lancashire County Council | 2015/16 | 2016 to 2025 | M6/Heysham link Road, Lancaster Caton Road Park and Ride, Renumbering A6, Strategic Multiuser cycle network, Lancaster Reach express Public Transport service, reconfiguration of J33 of M6, Lancaster South Park and Ride, Lancaster Movement Strategy (incorporating Lancaster Centre network review and restraint measures), ULEV Strategy, Morecambe Movement Strategy, Morecambe to Lancaster Rail services, Heysham supporting development, Carnforth Town Centre Improvements, Carnforth Railway Station, Rural connections. | Plan aims to deliver air quality improvements to lead to general air quality improvement and revocation of three AQMA | Work to consider the detailed proposals for the Bus Rapid Transit Route and Cycle Superhighway is progressing. Traffic data for use in impact assessment is due to be gathered in October 2018 following reopening of the Greyhound Bridge. Formal consultation on options for the new plan (a movement strategy for city centre) is due to commence in October 2020 also. | 2025 | The production of a new air quality action plan for the district is linked and scheduled within Transport Masterplan delivery. Plan available at:- Highways and transport masterplans - Lancashire County Council Delivery of a new air quality action plan to cover the Lancaster district (including the three AQMAs) is due is scheduled for delivery in 2022. |
| 2 | Speed limits in residential areas | Traffic Management | Reduction of speed limits, 20mph zones | Lancashire County Council | - | 2012-2014 | - | - | Most residential areas designated 20mph zones | 2014 | Covers most residential areas in the Lancaster district |
| 3 | Transport Masterplan for Lancaster | Traffic Management | Strategic highway improvements, Re-prioritising road space away from cars, inc Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane | Lancashire County Council | Transport Masterplan for Lancaster | 2015/16 | 2016 to 2025 | Plan aims to deliver air quality improvements to lead to general air quality improvement and revocation of three AQMA | See item 1 above | Plan adopted October 2016 | Delivery of a new air quality action plan to cover the Lancaster district (including the three AQMAs) is scheduled for delivery in the plan for 2022 Highways and transport masterplans - Lancashire County Council |
| 4 | Lancaster Parking Strategy | Traffic Management | Emission based parking or permit charges | Lancaster City Council | 2015-18 | - | - | - | A scoping report with supporting evidence was commissioned and delivered in March/April 2019 Production of a new strategy will be linked to city centre movement strategy due in 2022. | 2022 | More information available at: Lancaster Parking |

| Measure No. | Measure | EU Category | EU Classification | Lead Authority | Planning Phase | Implementation Phase | Key Performance Indicator | Target Pollution Reduction in the AQMA | Progress to Date | Estimated Completion Date | Comments |
|-------------|---------------------------------------|-------------------------------|---------------------------|--|----------------|----------------------|---------------------------|--|---|--|---|
| 5 | AQ Station traffic management link | Traffic Management | Other | Lancaster City Council and Lancashire County Council | 2012/13 | 2013 | - | Assist with traffic management measures in Lancaster AQMA | Works to AQ Stations completed to facilitate link (City Council). Link to management system awaited (County Council). Still outstanding in 2020. | 2022 | LCC's traffic systems database was planned to be upgraded to receive real time information from Lancaster CC air quality monitoring stations to aid traffic management and reduce emissions. Unfortunately, procurement has been delayed. Lancashire County Council are still intending to pursue the procurement of a UTMC common database in 2021. |
| 6 | M6/Heysham Link Road(the Bay Gateway) | Traffic Management | Other | Lancashire County Council | Pre 2014 | 2014-16 | - | A maximum 10ug/m ³ annual mean NO ₂ reduction in Carnforth AQMA. Traffic reduction in range of 3-9% within the Lancaster AQMA and potential of up to 5ug/m ³ (annual mean NO ₂) in Galgate AQMA | 2019 monitoring results indicated a general small reduction on levels reported for 2018. Levels monitored within the Carnforth and Galgate AQMAs indicated compliance with objective standards. | Road opened October 2016 More information available at: Baygate way | AQ monitoring to assess changes will continue in 2021/22. Further analysis is planned following availability of traffic count data. Due to pandemic impacts, 2020 was not a year to consider trends. |
| 7 | Travel Plans for new development | Promoting Travel Alternatives | Workplace Travel Planning | Lancashire County Council | - | ongoing | - | - | ongoing | - | Lancaster County Council Sustainability Team was disassembled in 2015 due to County Council budget cuts. Transport planning function in relation to new development transferred to County Council Highways Team |
| 7a | School Travel Plans | Promoting Travel Alternatives | School Travel Plans | Lancashire County Council | - | 2003-2011 | - | - | 66 Schools with travel plans | - | Most Schools utilized grant funding to provide cycle storage facilities |

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|-------------|---|-------------------------------|---|--|----------------|----------------------|---------------------------|--|--|---------------------------|--|
| 8 | Promoting home working | Promoting Travel Alternatives | Encourage / Facilitate home-working | Lancaster City Council and Lancashire County Council | - | ongoing | - | - | ongoing | - | The Covid crisis has resulted in a large proportion of council staff working from home and being equipped (lap top computers) to do so. Such working continues in 2021 . |
| 9 | Lancashire Cycle September and other events | Promoting Travel Alternatives | Intensive active travel campaign & infrastructure | Lancashire County Council | - | Yearly | - | - | The Cycle September Challenge ran in 2021. | - | Events usually consist of try a bike sessions and fun activities such as mini bikes, penny farthing, provision of maps and other info and options to sign up for a personal journey plan. For more information see: :Love to ride Cycling Lancashire |
| 10 | Cycling Demonstration Town | Promoting Travel Alternatives | Promotion of cycling | Lancashire County Council | - | 2008-11 | - | - | Completed | - | 4 contra flow cycle lanes, 3 Toucan crossings, 7 on road cycle lanes, cycle links to canal tow path, cycling access to pedestrian areas, 12 crossing upgrades, new path links, 1176 cycle parking spaces, signage, workplace engagement, events (25.000 contacts),cycle training, schools engagement |
| 11 | Lancaster Rail Station Park and Ride | Promoting Travel Alternatives | Promote use of rail and inland waterways | - | - | - | - | - | ongoing | - | 60 Fee payable spaces |
| 12 | Camforth Rail Station Park and Ride | Promoting Travel Alternatives | Promote use of rail and inland waterways | - | - | - | - | - | ongoing | - | 64 Fee charged spaces |
| 13 | Bare Lane Rail Station Park and ride | Promoting Travel Alternatives | Promote use of rail and inland waterways | - | - | - | - | - | ongoing | - | 12 free spaces |
| 14 | Morecambe Rail Station Park and ride | Promoting Travel Alternatives | Promote use of rail and inland waterways | - | - | - | - | - | ongoing | - | 100 fee payable spaces but refundable with rail ticket purchase |
| 15 | Silverdale Rail Station Park and ride | Promoting Travel Alternatives | Promote use of rail and inland waterways | - | - | - | - | - | ongoing | - | 3 free parking spaces |

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|-------------|---------------------------------------|---------------------------------------|--|--|----------------|----------------------|---------------------------|--|--|---------------------------|---|
| 16 | Wennington Rail Station Park and ride | Promoting Travel Alternatives | Promote use of rail and inland waterways | - | - | - | - | - | ongoing | - | 7 free parking spaces |
| 17 | Information via web site | Promoting Travel Alternatives | Other | Lancashire County Council | - | - | - | - | ongoing | - | Traveline Northwest Alternative ways to travel Parking roads and public transport |
| 18 | Air Quality information | Public Information | via the Internet | Lancaster City Council | - | - | - | - | New PM ₁₀ /PM _{2.5} monitor installed at Cable Street monitoring station in 2020. Data available from ukairquality web site and summary reports from council web site. | - | Air Quality Lancaster UK air quality |
| 19 | Burning of waste Fact sheet | Public Information | via leaflets | Lancaster City Council and | - | 2014 | - | - | ongoing | - | Available at: Smoke Control |
| 20 | Direct Communication/Education | Public Information | Other | Lancaster City Council and Lancashire County Council | 2019/20 | - | - | - | Programme for schools being coordinated and planned through County Council Safe and Healthy Travel Schools programme | - | General communication through Environmental Health role and through schools education programme via County Council |
| 21 | Cycle Hire | Transport Planning and Infrastructure | Public cycle hire scheme | Lancaster City Council | - | - | - | - | ongoing | - | More information available at: Cycle Hire |

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|-------------|---|---------------------------------------|----------------------------|--|--------------------|----------------------|---------------------------|--|---|---------------------------|--|
| 22 | M6/Heysham link road (Bay Gateway) conditional complimentary measures | Transport Planning and Infrastructure | Other | Lancashire County Council | Before summer 2016 | 2016-2024 | - | - | Plan adopted October 2016. Consultation on movement strategy for Lancaster centre (key element of plan) due October 2020 | 2025 | Plan of measures to be submitted to prevent relief offered by new road being eroded. Plan to be submitted before link road is fully opened (Schedule 2, 10 requirements). See Transport Masterplan at Highways and transport masterplans - Lancashire County Council for more information. |
| 23 | Caton Road Park and Ride | Alternatives to private vehicle use | Bus based Park & Ride | Lancashire County Council | - | 2014-16 | - | - | Operational December 2016. Covid has affected trips/service since March 2020. The site was closed between April and mid June 2020 due to Covid. | 2016 | A daytime bus service is normally operational every 30 mins 6 days a week. In 2020 the site was closed during lockdown and also used as a COVID testing station. Use data for 2020 has therefore not been reported this year. Ticket detail is available at : Park and Ride See item '32' below. |
| 24 | Shared Wheels Car Sharing | Alternatives to private vehicle use | Car & lift sharing schemes | Lancashire County Council | - | - | Members registered | - | 4299 members registered in Lancashire area (Oct 2021). This was slightly down on members reported in Oct 2020 NB Covid will have significantly impacted on car sharing | - | See: Liftshare for further information |
| 25 | Lancaster Community Car Club | Alternatives to private vehicle use | Car Clubs | Lancaster Community Car Club –Community Interest Company | - | 2010 | - | - | - | - | - |

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| 26 | Sustainable Transport Fund Grants | Alternatives to private vehicle use | Other | Lancashire County Council | - | - | - | - | 13 further schemes in Lancaster during 2014/15. Over 100 businesses engaged and 50 grants provided over the period of the scheme. | 2015 | Main transport route between Lancaster and Preston targeted including Lancaster centre. Grants awarded for cycle storage, changing facilities and for pool bikes. Scheme ended April 2015 |
| 27 | Local Transport Plan | Policy Guidance and Development Control | Other policy | Lancashire County Council | 2019/21 (LTP4) | 2011-21(LTP3) | - | - | Development of new plan is currently in progress but has been delayed. (2017-21). The new plan (LTP4) is now due spring/ summer 2022. The plan will link to the transport masterplan for the district. | 2022 | Current plan available at: Local Transport Plan |
| 28 | Local air quality planning guidance | Policy Guidance and Development Control | Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality | Lancaster City Council | 2015/16(PAN) 2019/20 (SPD) | 2017 onwards (PAN) 2021 onwards (SPD) | - | - | Guidance produced. - Launch Event took place in October 2016 Guidance adopted as a planning advisory note September 2017. Adoption as supplementary planning document (SPD) anticipated summer 2022.following adoption of AQAP. | 2017(PAN adoption) and 2022(SPD adoption) | Templates also produced for regional adoption. Survey undertaken in May 2017 indicated 9 of 14 Lancashire authorities are looking to adopt the guidance in one of the three template forms. Delay to adoption is linked to the delay in delivery of the city centre movement strategy and linked AQAP. A stand alone EV charging SPD is due Spring 2022. |
| 29 | Lancashire Public Health Team AQ Coordination | Policy Guidance and Development Control | Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality | Lancashire County Council | 2015/16 | 2016 | - | - | Initial meeting Dec 2015.AQ briefing note produced April 2017 Public Health work has been dominated by Covid in 2020. | - | Public Health team at the County council are looking to coordinate roles of stakeholders at County Council to improve air quality (see overview above). In April 2017 an AQ Briefing note was produced with a list of priority actions. See AQ and County Council public health section above (p15) for more detail on action in 20/21 |

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|-------------|--|---|-------------------|------------------------|----------------|----------------------|---------------------------|--|---|---------------------------|--|
| 30 | Lancaster Air Quality Strategy | Policy Guidance and Development Control | Other policy | Lancaster City Council | 2013 | 2015-24 | - | - | Approach detailed in Strategy to be adopted in Transport Masterplan for Lancaster | 2025 | Available at: Lancaster Air Quality Strategy |
| 31 | Planning Policy - Lancaster City Council | Policy Guidance and Development Control | Other policy | Lancaster City Council | - | 2014 | - | - | New policy introduced for consultation in 2017 (DM28). Plan now adopted (2020). Local Plan | 2022 | To ensure new exposure to poor AQ is prevented and to minimise emissions from new development Available at: Local Plan Policy reviewed to support new air quality planning guidance (item 28 above). Majority of planning policies are being reviewed in 2021 to address locally declared climate emergency position see Local Plan Review |
| 32 | Guidance on electric vehicle charging point requirements for new development | Policy Guidance and Development Control | Other policy | Lancaster City Council | 2015 | 2016 | - | - | Guidance adopted as Planning Advisory Note 2016 – Updated Sept 2017 Due to be adopted as stand alone SPD in 2022 | 2022 | Guidance available at: About the Local Plan & Planning Policy - Lancaster City Council |
| 33 | Planning Policy – Carnforth former TDG site | Policy Guidance and Development Control | Other policy | Lancaster City Council | - | 2012 | - | - | Site is currently being returned to commercial use. Attempts by the owner to redevelop the site in line with the policy did not prove successful. The policy is therefore no longer active at the site. | 2018 | Planning Policy to direct use of former TDG Haulage site in Carnforth to reduce impact of site on Carnforth AQMA See 2014 Progress report for more information :Available at: Air Quality Reports Policy did not achieve objective. |

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| 34 | M6/Heysham Link Road – Traffic Regulation Order | Freight and Delivery Management | Route Management Plans/ Strategic routing strategy for HGV's | Lancashire County Council | - | 2016 | - | See item 6 above | Order placed 2016 | 2016 | HGV traffic to use J34 Link Road Baygateway . The link road must not be fully opened to vehicular traffic until the undertaker has completed statutory consultation upon a proposal to make a traffic regulation order prohibiting HGVs from roads forming part of the A6 in central Lancaster and along the A589 Morecambe Road east of the link road, except for access. |
| 35 | Clean bus technology fund grant Phase 1 | Vehicle Fleet Efficiency | Promoting Low Emission Public Transport | Lancashire County Council and Stagecoach (with Lancaster City Council) | 2015 | 2016/17 | NOx emissions from buses reduced by over 90% | 4% reduction in NOx levels in Lancaster AQMA (revised due to recalculation using Defra Emission Factor Toolkit V8/2017) | £288,150 grant to tackle (re-engine 8 buses grant spend amendment agreed in 2019 potential further amendment in 2022/23). | Now due 2022/23. | More information available at: Clean Bus Technology Fund . No progress in 2020/21. Flagged with county council. Delivery impact by pandemic. County Council propose delivery linked to wider transport plans for city centre and south Lancaster. |
| 35a | Clean bus technology fund grant bid Phase 2 | Vehicle Fleet Efficiency | Promoting Low Emission Public Transport | Lancaster City Council and Stagecoach | 2017 | - | NOx emissions from buses reduced by over 90% | Treatment of 57 buses resulting in a Reduction of 11.7% of NOx emissions in the Lancaster AQMA | Grant application was not successful (2017) | - | Response to application indicated that bid was not successful as Defra air quality modelling indicated Lancaster was not exceeding air quality objectives. |
| 36 | Modernisation of local bus fleet (Carnforth) | Vehicle Fleet Efficiency | Promoting Low Emission Public Transport | Lancaster City Council | 2010/17 | - | - | - | Bid made in 2017 however was unsuccessful (see item 35a above) | - | Enquiries are ongoing to see if new development generated funding could possibly be used to fund retrofit programme. |
| 37 | ULEV Cities/Fleet OLEV Grant applications | Vehicle Fleet Efficiency | Other | Lancashire County Council with Lancaster City Council | 2015 | - | - | - | Grant bids not successful | - | - |

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|-------------|---|----------------------------------|--|------------------------------------|----------------|----------------------|--|--|--|---------------------------|--|
| 38 | Lancaster City Council carbon reduction commitment | Promoting Low Emission Plant | Public Procurement of stationary combustion sources | Lancaster City Council | - | ongoing | 34% reduction in carbon emissions by 2020 (3.4% annual target) | - | This has been surpassed by Climate Emergency declaration and associated steps to make Council's activities carbon neutral by 2030 | - | Further information at: Carbon Reduction Commitment Climate Emergency |
| 39 | Provision of roadside electric charging points for electric vehicles | Promoting Low Emission Transport | Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging | Lancashire County Council Highways | 2015/16 | 2017/18 | - | - | Grant monies awarded for 150 points across Lancashire | Jan 2020 | Project delivered. See : County Council delivered chargepoints Appendix G shows a map of currently public chargepoints in the Lancaster district |
| 39a | Provision of electric charging points in public car parks for electric vehicles | Promoting Low Emission Transport | Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging | Lancaster City Council | 2018 | 2019/23 | Zap Map | | Charging points provided in following car parks: 1. Library Street Morecambe 2. Dallas Road Boys and Girls Club Lancaster 3. Auction Mart Lancaster 4. Westview Morecambe 5. Upper St Leonardsgate Lancaster 6. Charter House Lancaster 7. Dallas Road Lancaster 8. Salt Ayre Leisure Centre Morecambe 9. Festival .Market Morecambe 10. Williamson Park Lancaster | - | Strategy being developed for further charging facilities under climate emergency actions. |
| 40 | Green barriers | Other | Other | Lancaster City Council | 2017/18 | 2018/19 | - | - | LCC working with Lancaster University on deployment of green barriers in poor AQ locations and also to inform more general planting schemes (AQ beneficial plant species) | 2019/20 | Research project instigated at Cable Street Lancaster in June 2018. Report from University/Lancashire Public Health still awaited. |

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|-------------|--|----------------------------------|--|---|----------------|----------------------|---|--|---|---------------------------|--|
| 41 | Promoting the use of electric vehicles as taxis | Promoting Low Emission Transport | Taxi emission incentives | Lancaster City Council | 2017/18 | 2018/21 | Number of electric taxi vehicles in local taxi fleet | - | Ongoing through work associated with OLEV grant for charging infrastructure (see 42 below) and through local 'Climate Emergency' initiatives. And through changes to taxi licensing policies in January 2022 (requiring all taxis EV's by 2030 and transition policies) | 2022 | The Council has consulted local operators and drivers regarding the uptake of EV's. A further consultation (event) inviting the trade is planned for 2021/22. The Council is looking to ensure barriers that prevent the uptake of electric taxis are addressed. |
| 42 | Grant Bid for electric taxi vehicle charging infrastructure from OLEV scheme | Promoting Low Emission Transport | Taxi emission incentives | Lancaster City Council or Lancashire County Council | 2016/18 | 2019/21 | Installation of charging points | - | 4 rapid chargers for use by taxis (initially open to all vehicles) are due to be delivered October 2021. Covid has resulted in a delay as due initially to be delivered by Sept 2020 | 2021 | Chargers are now in place but waiting to be commissioned. 5 other Lancashire LAs are also installing chargers through the Lancaster co-ordinated bid. |
| 43 | Promoting the use of electric vehicles in Council fleet | Promoting Low Emission Transport | Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging | Lancaster City Council | 2017/18 | 2018/21 | Installation of charging points and purchase of electric vehicles | - | Currently 8 electric pool car vehicles are available for use and 18 electric vans. A further 8 vans are due to be delivered. Charging infrastructure is now available at White Lund Depot, Lancaster Town Hall and Morecambe Town Hall as well as council car parks detailed above (39a and 42) | - | The Council is planning to replace fleet vehicles with electric vehicle alternatives where possible. In line with this the Council is purchasing 2 electric refuse vehicles (due before end 2021) |

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|-------------|---|----------------------------------|--|------------------------|----------------|----------------------|---|--|--|---------------------------|---|
| 44 | Plan for electric buses in Lancaster | Promoting Low Emission Transport | Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging | Lancaster City Council | 2021/22 | 2022 onwards | Installation of charging points and delivery of electric vehicles | - | Plans are being developed to provide charging to accommodate 35 electric buses which operate between Morecambe and Lancaster University. It is hoped that developed plans can be implemented dependant on the availability of suitable grant funding (next round of Zebra funding) | 2022 | Planned transition to electric buses have been requested to form part of Bus Service Improvement Plans due for submission by the county council at the end of October 2021. |
| 45 | Non road mobile machinery emissions during construction | Promoting Low Emission Plant | Shift to installations using low emission fuels for stationary and mobile sources | Lancaster City Council | 2021/22 | 2022 onwards | Developments affected by requirement | - | Potential adoption of scheme to require use of low emission NRMM through adoption of specific AQAP requirement | 2022 | Subject to national scheme being available for national participation (Defra Consultation in August 2021 on proposal for national roll out). |
| 46 | Defra AQ Grant Bid to support behaviour change measures | Public Information | Other Mechanisms | Lancaster City Council | 2021 | 2022-2027 | | - | Grant bid due Oct 8 2021 to considered monitoring information project to trigger behaviour change to reduce local particulate pollution and working with schools | 2027 | Delivery of full scheme dependant on Defra AQ Grant support. |

2.3 PM_{2.5} – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of PM_{2.5} (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM_{2.5} has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Lancaster City Council is taking the following measures to address PM_{2.5}:

As previously reported Lancaster City Council is working to address PM_{2.5} through existing and proposed actions to reduce emissions. Many of the measures used to reduce emissions impact on nitrogen dioxide emissions also impact on particulate pollution (PM₁₀ and PM_{2.5}). For example measures that replace vehicle trips with cycling or walking will reduce all these pollutants and traffic alleviation provided by the Bay Gateway road will reduce pollutant emissions for both nitrogen dioxide and particulates in key areas. PM_{2.5} reduction measures are therefore similar to measures contained in the existing action plans and include:-

- Cycling and walking measures
- Traffic alleviation through new link road
- Measures contained in the transport Masterplan for Lancaster.
- Travel Planning
- Car Share/Car Clubs
- Requirements for new developments (policy and guidance driven)
- Promoting use of Ultra Low Emission Vehicles
- Green barriers
- Providing information on the impact of solid fuel use and proposing a project to affect behaviour change to reduce particulate emissions from these sources

The Council will be making an air quality grant bid to Defra in October 2021 to fund a project aimed at reducing particulate emissions arising from the use of solid fuel appliances and bonfires, linked to a general emission reducing/air quality impact educational scheme delivered to local schools. Emissions from domestic solid fuel

installations are estimated to contribute around 38% of PM_{2.5} emissions nationally (see 2019 national Clean Air Strategy⁴).

PM_{2.5} measurements are not available for 2020, however using the method described in technical guidance LAQM TG(16), monitored PM₁₀ levels can be adjusted using a factor (0.7) to give an indication of likely PM_{2.5} levels. Using this factor levels at Cable Street monitoring station are likely to be in the region of 12ug/m³.

Lancashire County Council's Public Health Summary for Air Quality Annual Status Reports, 2021

In Lancashire the strongest evidence we have on the population health impacts of air pollution comes from Public Health England's Public Health Outcomes Framework. This Framework estimates ['the fraction of adult mortality attributable to particulate air pollution \(PM_{2.5}\)'](#) each year. It shows that, while the overall mortality rate from particulate air pollution in Lancashire-12 (4.0%) is lower than the England average (5.1%), air pollution remains a significant public health issue for the county.

Working with district councils, Lancashire County Council (LCC) has an important role to play in taking action to reduce the health impacts of air pollution. Responsible for transport planning, network management, highway maintenance, public health and procuring local vehicle fleets, there are a number of ways LCC can support local and county wide efforts to improve air quality. In summary, the following activities are underway or in development:

1. Encouraging the use of sustainable forms of travel

- Lancashire's cycling and walking strategy, [Actively Moving Forward](#), sets out an ambitious plan for increasing the number of people walking and cycling in the county by 2028. By improving and increasing access to cycling and walking infrastructure, alongside training and promotional activities, it aims to significantly increase the amount of cycling and walking people do across the county. Information on the County Council's ongoing activities in this area can be found on the [Active Travel in Lancashire](#) website.
- As part of Lancashire's cycling and walking strategy, work has now commenced on developing Local Cycling and Walking Infrastructure Plans (LCWIPs) for the five Lancashire Highway and Transport Masterplan areas. The Plans will include a network

plan for cycling and walking infrastructure and a prioritised list of schemes for delivery over short, medium and long term timeframes. These plans will be used to support future infrastructure decisions and to access new funding schemes as they become available.

- The Road Safety Team work with schools, workplaces and the community to encourage safe and sustainable modes of travel. Initiatives for schools are promoted through the [Safer Travel Moodle](#) and include: a series of cycling and walking safety training programmes; guidance and resources for teachers to encourage safe and active travel; and support for creating travel plans.

2. Supporting the transition to low emission vehicles

- The County Council is working with BP Chargemaster to deliver 150 electric vehicle charge points across the County. [The charging network](#) will be accessible to drivers from all over the country and will support local and national efforts to increase the number of drivers purchasing electric vehicles.
- The County Council is supporting six district councils with a low emission taxi infrastructure scheme. Funded by the Office for Low Emission Vehicles, the scheme will provide taxi drivers with access to 24 new rapid electric vehicle charge points across the six districts. This, alongside a series of promotional activities and suggested regulatory changes, is designed to produce a transition towards more low emission taxi vehicles across Lancashire.

3. Creating cleaner, healthier road networks

- Work to develop the next Local Transport Plan (LTP4) for Lancashire, Blackpool and Blackburn with Darwen is now underway. The Public Health team has submitted an evidence base to the process, highlighting transport related health challenges affecting the population of Lancashire and making recommendations about how local transport planning policy can make a contribution to addressing these. Air quality is one of the key themes of the evidence base and will be an identified priority in LTP4. The local [Highways and Transport Masterplans](#) will be refreshed to align with the priorities of LTP4. This will provide an opportunity to identify longer-term network solutions that address issues in AQMAs and have a positive impact on air quality generally.

- The Lancaster City Centre Movement Strategy is looking at how vehicular, public transport and pedestrian walking movements can be improved across the city. A key facet of the study is to examine what improvements can be implemented to prioritise public transport, reduce severance, improve air quality and effectively make the city centre a more welcoming environment for people. The intention is for a similar approach to be adopted as part of future Highways and Transport Masterplans.

4. Embedding air quality into policy

- The County Council works with district planners to ensure air quality is a key consideration of Local Plans, alongside wider public health issues. It supports district councils in developing policies that seek to ensure new developments do not contribute to increasing levels of air pollutants and that requirements for appropriate mitigation are in place.
- The County Council, as part of its highways input into planning applications, actively encourages measures that aim to promote sustainable forms of travel. Working under the direction of the National Planning Policy Framework, the County Council seeks measures that facilitate cycling and walking, increase the use of public transport and provide access to electric vehicle charge points. The County Council also seeks funding from developers, through section 106 contributions, to support existing bus services or to provide new bus services suitable to serve development sites once their built.

5. Raising awareness and increasing engagement

- The Lancashire Insight website provides information on the sources and health impacts of air pollution across the county. Webpages include a [Summary of Emissions Data](#), [Monitoring of Air Quality and Health Impacts](#) and an [Air Quality and Health Dashboard](#).

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

This section sets out the monitoring undertaken within 2020 by Lancaster City Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed. However for 2020, due to the impact of the pandemic, consideration of trends arising from this year's new data is considered not to be appropriate. More trend analysis will be provided in next years report.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Lancaster City Council undertook automatic (continuous) monitoring at 2 sites during 2020. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The [Automatic Monitoring Results](#) page presents automatic monitoring results for Lancaster with automatic monitoring results also available through the UK-Air website (see www.ukairquality.net)

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

Lancaster City Council undertook non- automatic (i.e. passive) monitoring of NO₂ at 51 sites during 2020. Table A.2 in Appendix A presents the details of the non-automatic sites.

Maps showing the location of the monitoring sites are provided in Appendix D and map and results at [Diffusion Tube Map](#) .

Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias. Further details on adjustments are provided in Appendix C. Please note that no reported results for Lancaster have a data capture less than 75% and none have been distance corrected as monitoring locations are generally at relevant exposure positions, and where not, were below levels indicative of any potential air quality objective exceedance (below 36ug/m³).

3.2.1 Nitrogen Dioxide (NO₂)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO₂ annual mean concentrations for the past five years with the air quality objective of 40µg/m³. Please note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full dataset of monthly mean values is provided in Appendix B. Please note that the concentration data presented in

Table B.1 includes distance corrected values, only where relevant (none are determined to be relevant for Lancaster).

Table A.5 in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations for the past five years with the air quality objective of 200µg/m³, not to be exceeded more than 18 times per year.

The data shows a general declining trend in nitrogen dioxide levels in the Lancaster District which is more marked due to effects of the pandemic in 2020, with both monitored roadside and background levels generally being markedly lower than in 2019. There was no monitored exceedance of the hourly NO₂ objective at either continuous automatic monitoring site or indicated by levels monitored at diffusion tube sites. All monitored exceedances of the annual mean objective for nitrogen dioxide were located within the existing Lancaster AQMA and where only slight (monitored levels of 42ug/m³ and 40ug/m³ at Thurnham Street and China Street Lancaster respectively). It is anticipated that these levels will be higher in 2021 due to returning higher levels of road traffic in 2021. There were no exceedances monitored outside this area. A new AQMA designation is therefore not required. There were no exceedances monitored in the Galgate and Carnforth AQMAs for the fourth year running (although it should be remembered that 2020 was a pandemic affected year). Bearing in mind the potential impact of new development, revocation of the Galgate and Carnforth AQMAs will be considered in 2023 if monitoring continues to indicate a continued decline in nitrogen dioxide levels within the AQMAs and considering the possible impact of planned new development.

Changes to the monitoring network will be considered at the end of the year as is usual, however due to the proposed changes to movements within the city centre and development proposals, particularly in south Lancaster, it is considered that most monitoring locations will be maintained for the next few years.

3.2.2 Particulate Matter (PM₁₀)

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past five years with the air quality objective of 40µg/m³.

Table A.7 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past five years with the air quality objective of 50µg/m³, not to be exceeded more than 35 times per year.

PM₁₀ monitoring in 2020 indicated compliance with annual mean and 24hr objectives for PM₁₀ but did not show any decrease on the previous year as may have been expected due to traffic changes arising from the pandemic situation. This is discussed in the report included in Appendix F.

Despite PM₁₀ objectives being anticipated to be met at all locations within the Lancaster district, particulate pollution is considered to be a non-threshold pollutant and needs to be as low as possible to protect health and therefore pollutant level reduction is still an important priority for Lancaster City Council.

3.2.3 Particulate Matter (PM_{2.5})

Monitoring for PM_{2.5} only commenced in 2020 and insufficient data (21.7%) was available to report this year. PM_{2.5} data will be reported next year. Using the estimation method detailed in LAQM TG(16) (factoring PM₁₀ results by 0.7) levels in this location are likely to be around the 12µg/m³ level. When reporting next year consideration will be given to recent studies in Scotland which indicated that FIDAS monitors (as used in Lancaster), despite being an accepted monitoring method, may underreport levels. It is understood that work is ongoing to assess the performance of FIDAS monitors and outcomes will be considered (see [Technical reports - Air Quality in Scotland \(scottishairquality.scot\)](https://scottishairquality.scot/)).

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

| Site ID | Site Name | Site Type | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | 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) |
|---------|---------------|-----------|-------------------------|--------------------------|--|----------------------|-----------------------|--|---|------------------|
| AN1 | Cable Street | Roadside | 347684 | 461963 | NO ₂ | YES | APNA-370 NOx analyser | Y(0.4m) | 4 | 2 |
| APM1 | Cable Street | Roadside | 347684 | 461963 | PM ₁₀ and PM _{2.5} | YES | FIDAS | Y(0.4m) | 4 | 2 |
| AN2 | Dalton Square | Roadside | 347852 | 461611 | NO ₂ | YES | APNA-370 NOx analyser | Y – 0m (Dalton Square is a sitting area) | 3.5 | 2 |

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 (All sites reported for Lancaster are monitoring nitrogen dioxide)

| Site ID | Site Name | New / Existing | Single / Duplicate / Triplicate | Site Type | X OS Grid Reference | Y OS Grid Reference | Height (m) | Distance to Kerb of Nearest Road (m) |
|---------|--|----------------|---------------------------------|------------------|---------------------|---------------------|------------|--------------------------------------|
| LC1 | Great John Street, Lancaster AQMA | Existing | Single | Roadside | 347852 | 461682 | 3.5 | 2.5 |
| LC4 | Brunton Road, Lancaster | Existing | Single | Urban Background | 347904 | 460508 | 3.5 | 1.5 |
| LC5 | Owen Road, Lancaster AQMA(Resid) | Existing | Single | Roadside | 347846 | 462448 | 3 | 2.5 |
| LC8 | Rosemary Lane, Lancaster AQMA (Resid) | Existing | Single | Roadside | 347796 | 461853 | 3.5 | 1.7 |
| LC9 | Brock Street 1, Lancaster AQMA (Resid) | Existing | Single | Roadside | 347808 | 461564 | 3 | 2.7 |
| LC10 | Dalton Square, Lancaster AQMA(Resid) | Existing | Single | Roadside | 347834 | 461596 | 3 | 3.3 |
| LC11 | Thurnham Street, Lancaster AQMA(Resid) | Existing | Single | Roadside | 347821 | 461404 | 3 | 3.1 |
| LC13 | King Street 1, Lancaster AQMA(Resid) | Existing | Single | Roadside | 347580 | 461593 | 3 | 2.4 |
| LC14 | King Street 2 Lancaster AQMA (Resid) | Existing | Single | Roadside | 347685 | 461389 | 3 | 2.2 |

| | | | | | | | | |
|--------------|---|----------|-----------------------|----------|--------|--------|-----|-----|
| A | High School, Morecambe Road, Lancaster AQMA | Existing | Single | Kerbside | 347582 | 462451 | 3 | 0.3 |
| B1,B2, B3 | Dalton Square, Lancaster AQMA (Co-Located) | Existing | Triplicate Co-located | Roadside | 347852 | 461611 | 2 | 3.3 |
| C1,D1,E1 | Cable Street, Lancaster AQMA(Co-Located) | Existing | Triplicate Co-located | Roadside | 347685 | 461963 | 2 | 3.7 |
| H | South Road 1, Lancaster (Resid) | Existing | Single | Roadside | 347859 | 461126 | 3 | 9 |
| I | Parliament Street, Lancaster AQMA(Resid) | Existing | Single | Roadside | 347909 | 462015 | 3 | 3.5 |
| J | North Road, Lancaster AQMA(Resid) | Existing | Single | Roadside | 347852 | 461909 | 3 | 1.9 |
| K | Stonewell, Lancaster AQMA(Resid) | Existing | Single | Roadside | 347850 | 461791 | 3 | 4.4 |
| L | King Street, Lancaster AQMA(Resid) | Existing | Single | Roadside | 347613 | 461523 | 2.5 | 1.5 |
| CFO | Market Street, Carnforth AQMA (Resid) | Existing | Single | Roadside | 349909 | 470624 | 3 | 1.4 |
| Q | King Street 3, Lancaster AQMA(Resid) | Existing | Single | Roadside | 347664 | 461449 | 3 | 2 |
| V | Main Road, Galgate AQMA (Resid) | Existing | Single | Roadside | 348359 | 455352 | 3 | 1.6 |

| | | | | | | | | |
|------|--|----------|--------|----------|--------|--------|-----|-----|
| Z | Main Road, Galgate AQMA(Resid) | Existing | Single | Roadside | 348345 | 455272 | 2.5 | 2.3 |
| ZA | Salford Road, Galgate AQMA (Resid) | Existing | Single | Roadside | 348351 | 455381 | 3.5 | 1 |
| ZB | Main Road, Galgate (Resid) | Existing | Single | Roadside | 348388 | 455472 | 2 | 2 |
| ZC | Main Road, Galgate AQMA(Resid) | Existing | Single | Roadside | 348375 | 455393 | 3 | 2.3 |
| CF1 | Lancaster Road, Carnforth AQMA (Resid) | Existing | Single | Roadside | 349870 | 470524 | 2 | 5.9 |
| CF2 | Lancaster Road/Market Street, Carnforth AQMA (Resid) | Existing | Single | Roadside | 349934 | 470605 | 3.5 | 2.3 |
| CF3 | Market Street, Carnforth AQMA(Resid) | Existing | Single | Roadside | 349853 | 470615 | 3.5 | 2 |
| CF4 | Market Street, Carnforth AQMA(Resid) | Existing | Single | Roadside | 349888 | 470628 | 3 | 2.5 |
| CF5 | Scotland Road, Carnforth AQMA(Resid) | Existing | Single | Roadside | 349962 | 470618 | 3 | 1.8 |
| CF7 | Fernbank, Carnforth (Resid) | Existing | Single | Roadside | 349613 | 470223 | 2.5 | 5.9 |
| T1 | Lancaster Road Torrisholme (Resid) | Existing | Single | Roadside | 345631 | 463694 | 3.5 | 2.4 |
| LC18 | Brock Street 3, Lancaster (No. 14- Resid) | Existing | Single | Roadside | 347784 | 461565 | 3.5 | 2.5 |

| | | | | | | | | |
|------|--|----------|--------|----------|--------|--------|-----|-----|
| LC19 | China Street 1 Lancaster AQMA(Bombay Balti Lamp Post) | Existing | Single | Roadside | 347502 | 461841 | 3 | 1.5 |
| LC20 | China Street 2 Lancaster AQMA(Public House Lamppost) | Existing | Single | Roadside | 347515 | 461835 | 3 | 1.5 |
| LC22 | South Road 2, Lancaster (No. 69 Resid) | Existing | Single | Roadside | 347928 | 461025 | 3 | 7.2 |
| LC23 | Greaves Road 1 Lancaster (1 Alma Road - Resid) | Existing | Single | Roadside | 347948 | 460893 | 3 | 5 |
| LC24 | Greaves Road 2 Lancaster (No.138 Resid) | Existing | Single | Roadside | 347974 | 460514 | 3 | 2.8 |
| LC25 | Scotforth Road1, Scotforth (No.65 Resid.) | Existing | Single | Roadside | 348084 | 459844 | 3 | 5.2 |
| LC26 | Scotforth Road 2, Scotforth (No.100 Resid.) | Existing | Single | Roadside | 347990 | 459418 | 3 | 5.5 |
| LC27 | Scotforth Road 3, Scotforth (No.110 Resid.) | Existing | Single | Roadside | 347989 | 459396 | 3 | 6.5 |
| BLS1 | Main Road, Bolton Le Sands (11A Resid) | Existing | Single | Roadside | 348594 | 468500 | 3 | 4 |
| H1 | Heysham Road, Heysham (109 Resid - downspout) | Existing | Single | Roadside | 341964 | 463273 | 2.5 | 2.5 |
| CF8 | Lancaster Road Resid (No.101/103 downspout) | Existing | Single | Roadside | 349568 | 470044 | 3 | 2.4 |

| | | | | | | | | |
|------|---|----------|--------|----------|--------|--------|-----|-----|
| LC28 | Newton Terrace, Caton Road Lancaster (No 7) | Existing | Single | Roadside | 348517 | 463243 | 2.5 | 6 |
| LC29 | 11/12 Newton Terrace, Caton Road Lancaster | Existing | Single | Roadside | 348527 | 463270 | 2.5 | 5.3 |
| LC30 | 3 Newton Terrace, Caton Road Lancaster | Existing | Single | Roadside | 348511 | 463226 | 2.5 | 6.5 |
| LC31 | 3 St Leonards Gate Lancaster | Existing | Single | Roadside | 348114 | 462071 | 3 | 3 |
| LC33 | Avis Caton Road, Lancaster AQMA | Existing | Single | Roadside | 348045 | 462120 | 3 | 2.7 |
| M6 | 118 Newlands Road Lancaster | Existing | Single | Roadside | 349271 | 460208 | 2 | 23 |
| MC4 | Shrimp Roandabout Morecambe | Existing | Single | Kerbside | 345240 | 463663 | 3 | 1 |
| LC34 | Derwent Road Lancaster | Existing | Single | Roadside | 348623 | 461870 | 2.2 | 5 |

Table A.3 – Annual Mean NO₂ Monitoring Results: Automatic Monitoring (µg/m³)

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) ⁽¹⁾ | Valid Data Capture 2020 (%) ⁽²⁾ | 2016 | 2017 | 2018 | 2019 | 2020 |
|-----------------|-------------------------|--------------------------|-----------|---|--|------|------|------|------|------|
| AN1 - Cable St | 347684 | 461963 | Roadside | - | 90.8 | - | - | 39.6 | 34 | 28 |
| AN2 - Dalton Sq | 347852 | 461610 | Roadside | - | 97.6 | 34.9 | 32 | 32 | 34 | 21 |

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16**

☒ **Reported concentrations are those at the location of the monitoring site (annualised, as required), i.e. prior to any fall-off with distance correction**

Notes:

The annual mean concentrations are presented as µg/m³.

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(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 – Annual Mean NO₂ Monitoring Results: Non-Automatic Monitoring (µg/m³)

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) ⁽¹⁾ | Valid Data Capture 2020 (%) ⁽²⁾ | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------|-------------------------|--------------------------|------------------|---|--|-----------|-----------|-----------|-----------|-----------|
| LC1 | 347852 | 461682 | Roadside | - | 100 | 50 | 46 | 43 | 43 | 34 |
| LC4 | 347904 | 460508 | Urban Background | - | 100 | 17 | 15 | 14 | 13 | 10 |
| LC5 | 347846 | 462448 | Roadside | - | 100 | 41 | 31 | 30 | 29 | 23 |
| LC8 | 347796 | 461853 | Roadside | - | 91.7 | 33 | 30 | 25 | 29 | 20 |
| LC9 | 347808 | 461564 | Roadside | - | 100 | 39 | 37 | 32 | 30 | 22 |
| LC10 | 347834 | 461596 | Roadside | - | 100 | 66 | 62 | 55 | 53 | 42 |
| LC11 | 347821 | 461404 | Roadside | - | 100 | 61 | 57 | 48 | 48 | 37 |
| LC13 | 347580 | 461593 | Roadside | - | 100 | 34 | 34 | 34 | 32 | 26 |
| LC14 | 347685 | 461389 | Roadside | - | 91.7 | 32 | 32 | 28 | 27 | 25 |
| A | 347582 | 462451 | Kerbside | - | 91.7 | 36 | 25 | 26 | 23 | 19 |
| B1,B2, B3 | 347852 | 461611 | Roadside | - | 100 | 32 | 32 | 28 | 27 | 21 |
| C1,D1,E1 | 347685 | 461963 | Roadside | - | 100 | 42 | 38 | 36 | 36 | 27 |
| H | 347859 | 461126 | Roadside | - | 100 | 32 | 28 | 27 | 26 | 21 |
| I | 347909 | 462015 | Roadside | - | 100 | 38 | 36 | 33 | 32 | 23 |
| J | 347852 | 461909 | Roadside | - | 100 | 47 | 42 | 40 | 40 | 28 |
| K | 347850 | 461791 | Roadside | - | 100 | 42 | 38 | 35 | 34 | 27 |
| L | 347613 | 461523 | Roadside | - | 83.3 | 38 | 40 | 37 | 34 | 22 |
| CFO | 349909 | 470624 | Roadside | - | 100 | 40 | 36 | 34 | 34 | 26 |
| Q | 347664 | 461449 | Roadside | - | 100 | 37 | 35 | 28 | 26 | 21 |
| V | 348359 | 455352 | Roadside | - | 100 | 42 | 38 | 33 | 33 | 24 |
| Z | 348345 | 455272 | Roadside | - | 100 | 42 | 37 | 33 | 32 | 22 |
| ZA | 348351 | 455381 | Roadside | - | 100 | 31 | 27 | 26 | 24 | 18 |
| ZB | 348388 | 455472 | Roadside | - | 100 | 29 | 24 | 24 | 22 | 16 |
| ZC | 348375 | 455393 | Roadside | - | 100 | 37 | 34 | 31 | 31 | 22 |

| | | | | | | | | | | |
|------|--------|--------|----------|---|------|------------------|------------------|-----------|-----------|-----------|
| CF1 | 349870 | 470524 | Roadside | - | 100 | 33 | 27 | 27 | 30 | 25 |
| CF2 | 349934 | 470605 | Roadside | - | 100 | 42 | 38 | 33 | 25 | 17 |
| CF3 | 349853 | 470615 | Roadside | - | 100 | 30 | 30 | 28 | 25 | 20 |
| CF4 | 349888 | 470628 | Roadside | - | 100 | 36 | 34 | 33 | 31 | 24 |
| CF5 | 349962 | 470618 | Roadside | - | 100 | 39 | 33 | 32 | 29 | 22 |
| CF7 | 349613 | 470223 | Roadside | - | 100 | 30 | 27 | 25 | 22 | 17 |
| T1 | 345631 | 463694 | Roadside | - | 91.7 | 32 | 29 | 28 | 24 | 21 |
| LC18 | 347784 | 461565 | Roadside | - | 100 | 30 | 31 | 29 | 25 | 19 |
| LC19 | 347502 | 461841 | Roadside | - | 100 | <u>60</u> | <u>60</u> | 43 | 45 | 40 |
| LC20 | 347515 | 461835 | Roadside | - | 100 | 48 | 44 | 39 | 38 | 29 |
| LC22 | 347928 | 461025 | Roadside | - | 100 | 28 | 26 | 25 | 22 | 17 |
| LC23 | 347948 | 460893 | Roadside | - | 100 | 35 | 31 | 27 | 26 | 20 |
| LC24 | 347974 | 460514 | Roadside | - | 100 | 32 | 29 | 25 | 24 | 18 |
| LC25 | 348084 | 459844 | Roadside | - | 100 | 24 | 22 | 21 | 19 | 14 |
| LC26 | 347990 | 459418 | Roadside | - | 100 | 36 | 32 | 29 | 27 | 20 |
| LC27 | 347989 | 459396 | Roadside | - | 100 | 31 | 28 | 26 | 25 | 18 |
| BLS1 | 348594 | 468500 | Roadside | - | 100 | 32 | 27 | 26 | 24 | 18 |
| H1 | 341964 | 463273 | Roadside | - | 100 | 25 | 21 | 22 | 20 | 15 |
| CF8 | 349568 | 470044 | Roadside | - | 100 | 33 | 29 | 27 | 26 | 20 |
| LC28 | 348517 | 463243 | Roadside | - | 100 | 36 | 28 | 23 | 26 | 19 |
| LC29 | 348527 | 463270 | Roadside | - | 100 | 35 | 27 | 26 | 24 | 17 |
| LC30 | 348511 | 463226 | Roadside | - | 100 | 31 | 24 | 28 | 22 | 16 |
| LC31 | 348114 | 462071 | Roadside | - | 91.7 | 33 | 30 | 33 | 31 | 22 |
| LC33 | 348045 | 462120 | Roadside | - | 91.7 | | 35 | 35 | 34 | 23 |
| M6 | 349271 | 460208 | Roadside | - | 100 | | | 24 | 21 | 16 |
| MC4 | 345240 | 463663 | Kerbside | - | 100 | | | | 26 | 22 |
| LC34 | 348623 | 461870 | Roadside | - | 100 | | | | | 10 |

- ☒ Annualisation was not required as data capture was above 75%
- ☒ Diffusion tube data has been bias adjusted.
- ☒ Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance correction .

Notes:

The annual mean concentrations are presented as $\mu\text{g}/\text{m}^3$.

Exceedances of the NO_2 annual mean objective of $40\mu\text{g}/\text{m}^3$ are shown in **bold**.

NO_2 annual means exceeding $60\mu\text{g}/\text{m}^3$, 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.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(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%).

Figure A.1 – Trends in Annual Mean NO₂ Concentrations

Results for 2020 have been affected by the pandemic making trend comparisons inappropriate for 2020. An indication of the general marked reduction in nitrogen dioxide pollution levels is shown by the key indicators reported executive summary above; Trend data will again be shown in the next annual report.

Table A.5 – 1-Hour Mean NO₂ Monitoring Results, Number of 1-Hour Means > 200µg/m³

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) ⁽¹⁾ | Valid Data Capture 2020 (%) ⁽²⁾ | 2016 | 2017 | 2018 | 2019 | 2020 |
|-----------------|-------------------------|--------------------------|-----------|---|--|------|------|-------|------|------|
| AN1 - Cable St | 347684 | 461963 | Roadside | - | 90.8 | - | - | 0(98) | 0 | 0 |
| AN2 - Dalton Sq | 347852 | 461610 | Roadside | - | 97.6 | 0 | 0 | 0 | 0 | 0 |

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m³ have been recorded.

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ 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.6 – Annual Mean PM₁₀ Monitoring Results (µg/m³)

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) ⁽¹⁾ | Valid Data Capture 2020 (%) ⁽²⁾ | 2016 | 2017 | 2018 | 2019 | 2020 |
|---------------------|-------------------------|--------------------------|-----------|---|--|------|------|------|------|------|
| APM1 - Cable Street | 347684 | 461963 | Roadside | - | 81.7 | - | 22.5 | 22 | 17 | 17 |

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16**

Notes:

The annual mean concentrations are presented as µg/m³.

Exceedances of the PM₁₀ annual mean objective of 40µg/m³ are shown in **bold**.

All means have been “annualised” as per LAQM.TG16 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.7 – 24-Hour Mean PM₁₀ Monitoring Results, Number of PM₁₀ 24-Hour Means > 50µg/m³

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) ⁽¹⁾ | Valid Data Capture 2020 (%) ⁽²⁾ | 2016 | 2017 | 2018 | 2019 | 2020 |
|---------------------|-------------------------|--------------------------|-----------|---|--|-------|-------|------|------|-------|
| APM1 - Cable Street | 347684 | 461963 | Roadside | - | 81.7 | !(16) | 0(34) | 1 | 1 | 0(27) |

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m³ have been recorded.

Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th 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%).

Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO₂ 2020 Diffusion Tube Results (µg/m³)

| DT ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Easting) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean: Raw Data | Annual Mean: Annualised and Bias Adjusted (0.81) | Annual Mean: Distance Corrected to Nearest Exposure | Comment |
|-----------|-------------------------------|-------------------------------|-------|-------|------|-----|------|------|------|------|------|-------|-------|-------|-----------------------------|---|--|---------|
| LC1 | 347852 | 461682 | 48.8 | 40.2 | 31.2 | | 30.6 | 43.8 | 26.0 | 49.3 | 44.8 | 47.0 | 48.1 | 49.6 | 41.7 | 34 | | |
| LC4 | 347904 | 460508 | 18.0 | 11.8 | 9.0 | | 7.3 | 8.0 | 5.0 | 9.2 | 13.5 | 13.6 | 20.1 | 18.1 | 12.1 | 10 | | |
| LC5 | 347846 | 462448 | 29.7 | 24.2 | 21.7 | | 23.4 | 30.7 | 18.5 | 29.6 | 33.5 | 32.6 | 33.8 | 35.4 | 28.5 | 23 | | |
| LC8 | 347796 | 461853 | | 20.2 | 19.3 | | 18.9 | 25.6 | 15.5 | 23.6 | 27.5 | 28.3 | 31.1 | 33.0 | 24.3 | 20 | | |
| LC9 | 347808 | 461564 | 41.2 | 30.2 | 19.2 | | 15.9 | 22.1 | 16.7 | 25.3 | 29.1 | 30.9 | 34.1 | 33.2 | 27.1 | 22 | | |
| LC10 | 347834 | 461596 | 59.2 | 59.5 | 37.6 | | 38.8 | 50.2 | 39.0 | 48.9 | 60.8 | 64.6 | 56.9 | 53.7 | 51.8 | 42 | | |
| LC11 | 347821 | 461404 | 51.9 | 43.8 | 32.5 | | 34.2 | 47.8 | 37.0 | 49.0 | 57.1 | 54.9 | 50.2 | 44.8 | 45.7 | 37 | | |
| LC13 | 347580 | 461593 | 42.4 | 38.5 | 21.2 | | 21.8 | 28.6 | 24.5 | 29.8 | 32.7 | 35.6 | 38.7 | 35.5 | 31.7 | 26 | | |
| LC14 | 347685 | 461389 | 39.4 | | 22.4 | | 20.7 | 28.7 | 22.5 | 29.7 | 34.9 | 35.9 | 36.3 | 39.2 | 31.0 | 25 | | |
| A | 347582 | 462451 | 31.0 | 22.4 | 16.0 | | 17.5 | 22.5 | 17.9 | 23.7 | 27.5 | 28.1 | 28.2 | | 23.5 | 19 | | |
| B1,B2, B3 | 347852 | 461611 | 37.5 | 31.7 | 19.0 | | 17.0 | 19.8 | 18.2 | 22.4 | 27.1 | 28.4 | 33.5 | 32.4 | 26.1 | 21 | | |
| C1,D1,E1 | 347685 | 461963 | 36.0 | 33.7 | 24.8 | | 25.1 | 34.1 | 24.7 | 37.6 | 41.7 | 40.3 | 37.5 | 37.6 | 33.9 | 27 | | |
| H | 347859 | 461126 | 26.0 | 20.6 | 19.5 | | 21.0 | 25.9 | 14.3 | 25.0 | 30.0 | 27.4 | 32.2 | 38.6 | 25.5 | 21 | | |
| I | 347909 | 462015 | 38.0 | 33.3 | 21.7 | | 19.6 | 24.3 | 17.3 | 30.3 | 32.1 | 30.0 | 34.9 | 36.9 | 28.9 | 23 | | |
| J | 347852 | 461909 | 42.9 | 35.7 | 25.5 | | 24.8 | 30.8 | 21.2 | 37.6 | 36.2 | 41.5 | 43.7 | 46.8 | 35.2 | 28 | | |
| K | 347850 | 461791 | 40.6 | 33.3 | 26.5 | | 25.9 | 31.8 | 20.7 | 34.9 | 37.7 | 36.5 | 38.6 | 38.9 | 33.2 | 27 | | |
| L | 347613 | 461523 | 34.9 | | 23.1 | | 21.1 | | 13.4 | 29.9 | 23.2 | 17.9 | 37.0 | 40.3 | 26.8 | 22 | | |
| CFO | 349909 | 470624 | 39.1 | 32.9 | 22.9 | | 23.7 | 28.4 | 25.0 | 32.8 | 38.1 | 34.1 | 36.7 | 34.7 | 31.7 | 26 | | |
| Q | 347664 | 461449 | 31.7 | 25.6 | 18.4 | | 16.3 | 20.2 | 13.6 | 23.8 | 29.1 | 29.8 | 34.0 | 40.3 | 25.7 | 21 | | |
| V | 348359 | 455352 | 39.1 | 36.0 | 22.2 | | 21.8 | 26.1 | 23.9 | 28.2 | 32.9 | 33.0 | 34.0 | 35.0 | 30.2 | 24 | | |
| Z | 348345 | 455272 | 37.9 | 32.8 | 13.8 | | 21.0 | 21.7 | 11.7 | 26.3 | 31.1 | 29.9 | 32.2 | 34.2 | 26.6 | 22 | | |
| ZA | 348351 | 455381 | 30.6 | 21.5 | 16.0 | | 14.7 | 18.9 | 14.6 | 20.6 | 22.3 | 23.9 | 28.5 | 27.8 | 21.8 | 18 | | |
| ZB | 348388 | 455472 | 24.7 | 12.2 | 15.3 | | 12.9 | 17.6 | 21.9 | 18.3 | 21.6 | 21.5 | 26.3 | 25.8 | 19.8 | 16 | | |
| ZC | 348375 | 455393 | 42.3 | 25.4 | 19.9 | | 18.9 | 24.6 | 16.1 | 27.7 | 29.8 | 28.7 | 33.3 | 36.5 | 27.6 | 22 | | |
| CF1 | 349870 | 470524 | 40.4 | 39.1 | 21.7 | | 23.5 | 26.8 | 29.3 | 30.6 | 35.0 | 34.7 | 34.5 | 29.2 | 31.3 | 25 | | |
| CF2 | 349934 | 470605 | 23.2 | 22.7 | 15.8 | | 15.9 | 18.2 | 16.8 | 22.1 | 25.2 | 12.9 | 25.6 | 26.6 | 20.4 | 17 | | |
| CF3 | 349853 | 470615 | 32.4 | 27.1 | 19.1 | | 15.4 | 20.9 | 18.2 | 24.1 | 24.0 | 25.5 | 31.3 | 30.4 | 24.4 | 20 | | |
| CF4 | 349888 | 470628 | 38.9 | 29.6 | 23.3 | | 19.5 | 24.9 | 23.3 | 31.5 | 33.4 | 29.6 | 34.2 | 35.0 | 29.4 | 24 | | |
| CF5 | 349962 | 470618 | 29.6 | 26.1 | 20.7 | | 20.9 | 25.9 | 18.9 | 30.4 | 30.7 | 28.0 | 33.2 | 31.2 | 26.9 | 22 | | |
| CF7 | 349613 | 470223 | 26.2 | 24.7 | 15.6 | | 14.8 | 16.8 | 18.6 | 20.4 | 22.5 | 24.9 | 25.1 | 24.9 | 21.3 | 17 | | |
| T1 | 345631 | 463694 | 35.1 | 27.9 | 18.1 | | 16.5 | 19.9 | | 32.1 | 24.1 | 23.1 | 32.4 | 28.7 | 25.8 | 21 | | |
| LC18 | 347784 | 461565 | 28.7 | 21.6 | 17.9 | | 14.6 | 21.6 | 19.8 | 23.0 | 26.9 | 23.6 | 28.7 | 29.9 | 23.3 | 19 | | |
| LC19 | 347502 | 461841 | 63.6 | 54.6 | 36.1 | | 40.0 | 46.8 | 37.3 | 48.6 | 52.1 | 52.3 | 53.7 | 51.3 | 48.8 | 40 | | |
| LC20 | 347515 | 461835 | 43.3 | 40.1 | 26.3 | | 24.0 | 33.0 | 24.0 | 38.1 | 41.0 | 39.0 | 44.2 | 46.7 | 36.3 | 29 | | |
| LC22 | 347928 | 461025 | 29.6 | 21.3 | 15.4 | | 13.8 | 15.7 | 13.4 | 18.6 | 24.3 | 24.0 | 28.2 | 33.0 | 21.6 | 17 | | |
| LC23 | 347948 | 460893 | 34.9 | 32.1 | 17.7 | | 15.1 | 20.0 | 15.1 | 21.5 | 26.1 | 27.4 | 30.5 | 27.7 | 24.4 | 20 | | |
| LC24 | 347974 | 460514 | 32.4 | 23.0 | 13.5 | | 13.7 | 16.2 | 14.4 | 19.1 | 23.0 | 23.7 | 30.1 | 33.0 | 22.0 | 18 | | |
| LC25 | 348084 | 459844 | 26.1 | 15.1 | 13.0 | | 9.8 | 12.7 | 8.0 | 14.5 | 18.5 | 17.4 | 25.1 | 27.7 | 17.1 | 14 | | |
| LC26 | 347990 | 459418 | 33.6 | 26.3 | 19.0 | | 16.6 | 19.0 | 17.9 | 22.0 | 26.5 | 26.0 | 30.2 | 31.2 | 24.4 | 20 | | |
| LC27 | 347989 | 459396 | 29.3 | 20.2 | 17.2 | | 13.6 | 16.6 | 12.2 | 19.5 | 23.3 | 22.6 | 29.0 | 34.5 | 21.6 | 18 | | |
| BLS1 | 348594 | 468500 | 26.6 | 21.4 | 16.7 | | 16.4 | 20.6 | 16.9 | 22.2 | 25.5 | 20.2 | 25.4 | 27.9 | 21.8 | 18 | | |
| H1 | 341964 | 463273 | 25.0 | 16.8 | 16.1 | | 12.1 | 15.7 | 9.2 | 17.4 | 19.8 | 17.8 | 27.2 | 29.8 | 18.8 | 15 | | |
| CF8 | 349568 | 470044 | 33.5 | 23.4 | 18.9 | | 15.4 | 21.6 | 15.8 | 24.7 | 24.7 | 24.6 | 31.4 | 33.3 | 24.3 | 20 | | |
| LC28 | 348517 | 463243 | 32.8 | 24.9 | 19.2 | | 15.8 | 20.8 | 17.5 | 22.8 | 24.8 | 26.3 | 28.1 | 27.4 | 23.7 | 19 | | |
| LC29 | 348527 | 463270 | 27.7 | 23.5 | 17.5 | | 14.1 | 17.5 | 15.7 | 19.2 | 21.9 | 22.6 | 24.7 | 24.6 | 20.8 | 17 | | |
| LC30 | 348511 | 463226 | 27.7 | 18.3 | 17.4 | | 13.1 | 17.1 | 12.7 | 19.8 | 22.0 | 21.1 | 23.5 | 27.1 | 20.0 | 16 | | |
| LC31 | 348114 | 462071 | 35.5 | 35.4 | 20.5 | | 19.5 | 20.3 | 25.5 | 24.8 | 30.4 | | 30.7 | 28.8 | 27.1 | 22 | | |
| LC33 | 348045 | 462120 | 37.4 | 31.4 | 21.8 | | 18.0 | 21.5 | 21.5 | 27.5 | 35.1 | | 32.8 | 37.2 | 28.4 | 23 | | |
| M6 | 349271 | 460208 | 24.0 | 17.6 | 14.6 | | 14.2 | 18.7 | 10.1 | 23.7 | 22.0 | 21.3 | 24.7 | 26.2 | 19.7 | 16 | | |
| MC4 | 345240 | 463663 | 33.7 | 25.7 | 20.9 | | 20.1 | 24.6 | 18.8 | 27.2 | 28.6 | 27.9 | 33.2 | 34.1 | 26.8 | 22 | | |
| LC34 | 348623 | 461870 | 17.94 | 13.42 | 9.39 | | 7 | 6.8 | 6.59 | 7.04 | 11.5 | 13.36 | 18.44 | 23.94 | 12.3 | 10 | | |

- ☒ All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1
- ☒ Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16
- ☒ National bias adjustment factor used
- ☒ Lancaster City Council confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

Bias Adjustment Factor (National) 0.81. March tubes exposed 2 months due to pandemic/lab closure

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

New or Changed Sources Identified Within the Lancaster District During 2020/21

There have been various new development applications over the 2020/21, however the most significant pending developments in relation to impacts on local air quality are likely to be :-

- Housing development proposals (including proposals for Bailrigg Garden Village see [Bailrigg Garden Village](#)) in south Lancaster
- A Housing Infrastructure Funded new road scheme to alleviate and bypass traffic along the A6 to accommodate traffic associated with planned new housing development..
- Canal Quarter Development to the west of Lancaster city centre. Proposals are still under development.
- The Eden Project in Morecambe - a planning application has just been submitted.

Additional Air Quality Works Undertaken by Lancaster City Council During 2020/21

As detailed above, the City Council is working on an ongoing basis with the County Council to develop transport plans for the city centre that benefit air quality. This work is ongoing and will contribute (a main element) of the air quality action plan for Lancaster. Consultation on proposals is planned for spring 2022.

QA/QC of Diffusion Tube Monitoring

Diffusion Tubes are provided and analysed by Gradko International Ltd. (20% TEA in water method). Lab certification, inter-comparison, proficiency and blind testing information from Gradko in relation to nitrogen dioxide diffusion tube services are provided below.

Gradko Accreditation Certificate and Schedule (for provision and analysis of NO₂ diffusion tubes used in Lancaster)

United Kingdom Accreditation Service

ACCREDITATION CERTIFICATE



TESTING LABORATORY
No. 2187

Gradko International Ltd

is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005 - General Requirements for the competence of testing and calibration laboratories.

This accreditation demonstrates technical competence for a defined scope as detailed in and at the locations specified in the schedule to this certificate, and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated January 2009).

The schedule to this certificate is an essential accreditation document and from time to time may be revised and reissued by the United Kingdom Accreditation Service. The most recent issue of the schedule of accreditation, which bears the same accreditation number as this certificate, is available from the UKAS website www.ukas.com.

This accreditation is subject to continuing conformity with United Kingdom Accreditation Service requirements. The absence of a schedule on the UKAS website indicates that the accreditation is no longer in force.




Accreditation Manager, United Kingdom Accreditation Service

Initial Accreditation date
31 January 2001

This certificate issued on
04 November 2014

UKAS is appointed as the sole national accreditation body for the UK by The Accreditation Regulations 2009 (SI No 3155/2009) and operates under a Memorandum of Understanding (MoU) with the Department for Business, Innovation and Skills (BIS).

| | | |
|--|--|---|
|  2187 Accredited to ISO/IEC 17025:2005 | Schedule of Accreditation issued by United Kingdom Accreditation Service 2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK | |
| | Gradko International Ltd (Trading as Gradko Environmental) Issue No: 019 Issue date: 04 September 2015 | |
| Testing performed at main address only | | |
| Materials/Products tested | Type of test/Properties measured/Range of measurement | Standard specifications/ Equipment/Techniques used |
| ATMOSPHERIC POLLUTANTS Collected on diffusion (sorbent) tubes and monitors (cont'd) Flexible Scope encompassing Volatile Organic Compounds to in-house validation criteria | <u>Chemical Tests</u> (cont'd) Volatile Organic Compounds including: Benzene 1,3-Butadiene 1,2-Dichloro(Z)ethene, Ethylbenzene Indane Naphthalene Styrene Tetrachloroethylene Toluene Trichloroethylene 1,2,3-Trimethylbenzene 1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene p-Xylene o-Xylene The laboratory holds a flexible scope of accreditation for these tests. Please contact the laboratory for details of the individual compounds they can analyse using this method. | GLM 13 by Thermal Desorption GC-Mass Spectrometry |
| END | | |

Schedule of Accreditation

issued by

United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

| | | | |
|---|---|---|---|
|  <p>2187</p> <p>Accredited to ISO/IEC 17025:2005</p> | <p style="text-align: center;">Gradko International Ltd (Trading as Gradko Environmental)</p> <p style="text-align: center;">Issue No: 019 Issue date: 04 September 2015</p> <table border="1" style="width: 100%;"> <tr> <td style="width: 50%;"> St Martins House 77 Wales Street Winchester Hampshire SO23 0RH </td><td style="width: 50%;"> Contact: Mr A Poole Tel: +44 (0)1962 860331 Fax: +44 (0)1962 841339 E-Mail: diffusion@gradko.co.uk Website: www.gradko.co.uk </td></tr> </table> | St Martins House 77 Wales Street Winchester Hampshire SO23 0RH | Contact: Mr A Poole Tel: +44 (0)1962 860331 Fax: +44 (0)1962 841339 E-Mail: diffusion@gradko.co.uk Website: www.gradko.co.uk |
| St Martins House 77 Wales Street Winchester Hampshire SO23 0RH | Contact: Mr A Poole Tel: +44 (0)1962 860331 Fax: +44 (0)1962 841339 E-Mail: diffusion@gradko.co.uk Website: www.gradko.co.uk | | |
| Testing performed at the above address only | | | |

DETAIL OF ACCREDITATION

| Materials/Products tested | Type of test/Properties measured/Range of measurement | Standard specifications/ Equipment/Techniques used |
|---|---|--|
| ATMOSPHERIC POLLUTANTS Collected on diffusion (sorbent) tubes and monitors | <u>Chemical Tests</u> | Documented In-House Methods |
| | Ammonia | GLM 8 by Ion Chromatography |
| | Benzene | GLM 4 by Thermal Desorption/ FID Gas Chromatography |
| | Toluene | |
| | Ethyl benzene | |
| | Xylene | |
| | Hydrogen chloride | GLM 3 by Ion Chromatography |
| | Nitrogen dioxide | |
| | Sulphur dioxide | |
| | Hydrogen fluoride | |
| | Hydrogen sulphide | GLM 5 by Colorimetric determination (UV Spectrophotometry) |
| | Ozone | GLM 2 by Ion Chromatography |
| | Nitrogen Dioxide | GLM 7 by Colorimetric determination (UV Spectrophotometry) |
| | Nitrogen Dioxide (as Nitrite) | GLM 9 by continuous flow colorimetric analyser |
| | Sulphur dioxide | GLM 1 by Ion Chromatography |
| | Formaldehyde | GLM 18 by HPLC |

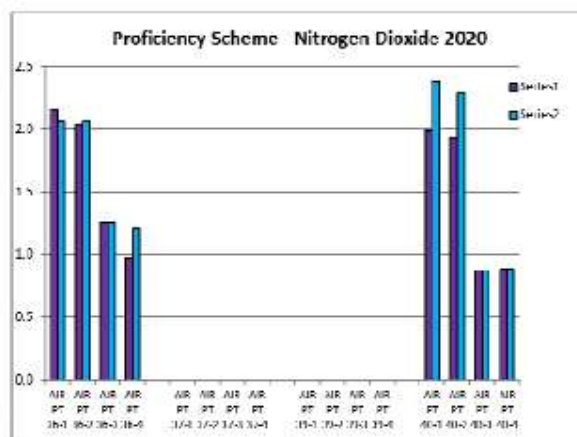


(A division of Gradko International Ltd.)
 St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
 tel.: 01962 860331 fax: 01962 841339 email: diffusion@gradko.com

AIR PT Nitrogen Dioxide Proficiency Scheme Results 2020

Methods: GLM 7 – CARY 60 Spectrophotometer

| AIR PT Proficiency Scheme - Nitrogen Dioxide 2020 | | | | | |
|---|-------------|----------------------------------|------------------------|---------|--------|
| Date | Round | Assigned value | Procedure GLM 7 | | |
| | | | Measured concentration | z-Score | % Bias |
| Feb-20 | AIR PT 36-1 | 2.06 | 2.15 | 0.58 | 4.4% |
| Feb-20 | AIR PT 36-2 | 2.06 | 2.03 | -0.19 | -1.5% |
| Feb-20 | AIR PT 36-3 | 1.26 | 1.26 | 0 | 0.0% |
| Feb-20 | AIR PT 36-4 | 1.21 | 0.98 | -2.43 | -19.0% |
| May-20 | AIR PT 31-1 | Proficiency scheme not available | | | |
| May-20 | AIR PT 31-2 | | | | |
| May-20 | AIR PT 31-3 | | | | |
| May-20 | AIR PT 31-4 | | | | |
| Aug-20 | AIR PT 33-1 | Proficiency scheme not available | | | |
| Aug-20 | AIR PT 33-2 | | | | |
| Aug-20 | AIR PT 33-3 | | | | |
| Aug-20 | AIR PT 33-4 | | | | |
| Oct-20 | AIR PT 34-1 | 2.38 | 1.99 | -2.08 | -16.4% |
| Oct-20 | AIR PT 34-2 | 2.28 | 1.93 | -1.90 | -15.4% |
| Oct-20 | AIR PT 34-3 | 0.87 | 0.87 | 0 | 0.0% |
| Oct-20 | AIR PT 34-4 | 0.88 | 0.88 | 0.08 | 0.0% |



The laboratory carried out internal blind testing in September 2020 as Air PT samples could not be provided due to Covid-19. This cannot be considered the same as proficiency testing, but is included below to provide reassurance of laboratory performance during this period.



Diffusion Tube Annualisation

All diffusion tube monitoring locations detailed in this report recorded data capture of 75% or more and therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2020 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Lancaster City Council have applied a national bias adjustment factor as is accepted good practice of 0.81 to the 2020 monitoring data. A summary of bias adjustment factors used by Lancaster City Council over the past five years is presented in Table C.1. If the highest local factor was used to adjust 2020 tube data (obtained from Cable Street co-location

study -1.07), reported results would all be slightly higher, however all sites showing exceedances would all lie within the Lancaster AQMA.

Table C.1 – Bias Adjustment Factor

Table C.5 Collected NO₂ diffusion tube bias adjustment factors for 2015-2020

| Tube/S upplier Analyst | Method | 2015 | 2016 | 2017 | 2018 | 2018 | 2019 | 2019 | 2020 | 2020 |
|--|------------------------|----------------------|----------------------|----------------------|----------------------|---------------------|---------------------|----------------------|---------------------|----------------------|
| <i>Local Factors</i> | | <i>Dalton Sq</i> | <i>Dalton Sq</i> | <i>Dalton Sq</i> | <i>Dalton Sq</i> | <i>Cable St</i> | <i>Cable St</i> | <i>Dalton Sq</i> | <i>Cable St</i> | <i>Dalton Sq</i> |
| Gradko 2015 - 2020 | 20% TEA in water | 1.030 | 0.97 | 0.91 | 1.09 | 0.89 | 0.86 | 0.98 | 1.07 | 0.83 |
| <i>National Factors</i> | | | | | | | | | | |
| Gradko (national factors) 2015 – 2020* | 20% TEA in water | 0.91 | 0.92 | 0.87 | 0.92 | | 0.91 | | 0.81 | |

* National bias adjustment factors available at : <http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

NB The National Bias Correction factor (0.81 from V06/21/final/V3 spreadsheet shown immediately below formed from 27 separate studies) was used to bias correct Lancaster diffusion tube results in 2020 (this report). Using the highest local bias factor (Cable St. – 1.07) results in tube results being slightly higher, but all exceedances lying within the AQMAs. The bias correction factor selected in this report (0.81) represents accepted good practice.

National Diffusion Tube Bias Adjustment Spreadsheet Studies for 2020 (Gradko/20% TEA water)

| National Diffusion Tube Bias Adjustment Factor Spreadsheet | | | | | Spreadsheet Version Number: 06/21 | | | | | |
|---|---------------------|--|-----------|--|--|---|--|----------|-----------------------------|------------------------------------|
| Follow the steps below in the correct order to show the results of relevant co-location studies | | | | | | | | | | |
| Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods | | | | | | | | | | |
| Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet | | | | | | | | | | |
| This spreadsheet will be updated every few months, the factors may therefore be subject to change. This should not discourage their immediate use. | | | | | | | | | | |
| The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECCM and the National Physical Laboratory | | | | | Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd. | | | | | |
| Step 1: | | Step 2: | | Step 3: | Step 4: | | | | | |
| Select the Laboratory that Analyzes Your Tubes from the Drop-Down List | | Select a Preparation Method from the Drop-Down List | | Select a Year from the Drop-Down List | Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor shown in blue at the foot of the final column. | | | | | |
| If a laboratory is not shown, we have no data for this laboratory. | | If a preparation method is not shown, we have no data for this preparation method. | | If a year is not shown, we have no data for this year. | If you have your own co-location study then see footnote ⁵ . If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQM-Helpdesk@bureauveritas.com or 0800 0327953 | | | | | |
| Analysed By ¹ | Method ² | Year ³ | Site Type | Local Authority | Length of Study (months) | Diffusion Tube Mean Conc. (Dm) (µg/m ³) | Automatic Monitor Mean Conc. (Cm) (µg/m ³) | Bias (B) | Tube Precision ⁴ | Bias Adjustment Factor (A) (Cm/Dm) |
| Gradko | 20% TEA in water | 2020 | R | Geolting Borough Council | 10 | 31 | 25 | 24.7% | G | 0.81 |
| Gradko | 20% TEA in water | 2020 | R | SOUTHAMPTON CITY COUNCIL | 12 | 37 | 27 | 37.1% | G | 0.73 |
| Gradko | 20% TEA in water | 2020 | R | Fareham Borough Council | 10 | 25 | 14 | 77.4% | G | 0.56 |
| Gradko | 20% TEA in water | 2020 | R | Fareham Borough Council | 12 | 30 | 22 | 35.1% | G | 0.74 |
| Gradko | 20% TEA in water | 2020 | R | Fareham Borough Council | 10 | 22 | 17 | 26.5% | G | 0.79 |
| Gradko | 20% TEA in water | 2020 | R | SOUTHAMPTON CITY COUNCIL | 11 | 32 | 31 | 4.3% | G | 0.95 |
| Gradko | 20% TEA in water | 2020 | K3 | Maylebone Road Intercomparison | 12 | 57 | 43 | 33.3% | G | 0.75 |
| Gradko | 20% TEA in water | 2020 | R | Bath & North East Somerset | 11 | 32 | 28 | 13.0% | G | 0.89 |
| Gradko | 20% TEA in water | 2020 | R | Gateshead Council | 12 | 22 | 17 | 28.1% | G | 0.78 |
| Gradko | 20% TEA in water | 2020 | R | Gateshead Council | 12 | 23 | 21 | 11.6% | G | 0.90 |
| Gradko | 20% TEA in water | 2020 | R | Gateshead Council | 10 | 26 | 25 | 6.5% | G | 0.94 |
| Gradko | 20% TEA in water | 2020 | R | Gateshead Council | 12 | 26 | 21 | 30.5% | G | 0.77 |
| Gradko | 20% TEA in water | 2020 | R | Gateshead Council | 12 | 31 | 32 | -3.4% | G | 1.03 |
| Gradko | 20% TEA in water | 2020 | R | Luton Borough Council | 9 | 30 | 28 | 33.0% | G | 0.75 |
| Gradko | 20% TEA in water | 2020 | R | Nottingham City Council | 12 | 31 | 34 | -8.5% | G | 1.09 |
| Gradko | 20% TEA in water | 2020 | R | Dudley MBC | 13 | 33 | 26 | 19.5% | G | 0.83 |
| Gradko | 20% TEA in water | 2020 | UB | Dudley MBC | 13 | 23 | 14 | 61.2% | G | 0.62 |
| Gradko | 20% TEA in water | 2020 | R | Dudley MBC | 13 | 44 | 34 | 30.8% | G | 0.77 |
| Gradko | 20% TEA in water | 2020 | R | Ards and North Down Borough Council | 10 | 27 | 20 | 34.0% | G | 0.75 |
| Gradko | 20% TEA in water | 2020 | R | Belfast City Council | 10 | 26 | 21 | 22.8% | G | 0.81 |
| Gradko | 20% TEA in water | 2020 | R | Belfast City Council | 10 | 41 | 36 | 12.6% | G | 0.89 |
| Gradko | 20% TEA in water | 2020 | R | Belfast City Council | 10 | 36 | 25 | 43.9% | G | 0.69 |
| Gradko | 20% TEA in water | 2020 | R | Lancaster City Council | 11 | 27 | 23 | 19.5% | G | 0.83 |
| Gradko | 20% TEA in water | 2020 | R | Lancaster City Council | 10 | 32 | 28 | 13.0% | G | 0.89 |
| Gradko | 20% TEA in water | 2020 | R | Eastleigh Borough Council | 9 | 23 | 20 | 13.6% | G | 0.88 |
| Gradko | 20% TEA in water | 2020 | UB | Eastleigh Borough Council | 9 | 22 | 19 | 17.5% | G | 0.85 |
| Gradko | 20% TEA in water | 2020 | R | Lisburn & Castlereagh City Council | 10 | 23 | 18 | 32.5% | G | 0.75 |
| Overall Factor ⁵ (27 studies) | | | | | | | | | Use | 0.81 |

NO₂ Fall-off with Distance from the Road

No diffusion tube NO₂ monitoring locations within the Lancaster district required distance correction during 2020.

QA/QC of Automatic Monitoring

The Council currently has two operational automatic air monitoring stations, one located at Cable Street, Lancaster, the other at Dalton Square, Lancaster. The Cable Street station monitors both nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}). The Dalton Square site monitors nitrogen dioxide only. The two stations commenced monitoring in 2011 and both currently (2020/21) remain operational.

Equipment at the two sites is (2 No. APNA 370 NO₂ analysers and 1No. particulate monitor). The particulate monitor was changed from a TEOM instrument monitoring PM₁₀ to a FIDAS instrument monitoring both PM₁₀ and PM_{2.5}. They are currently (2020) maintained and serviced by ESU1, servicing being undertaken twice a year. Routine calibration is undertaken by Lancaster City Council on a monthly basis. The sites are not

independently audited, however, data monitoring, validation and ratification for the two sites is undertaken by Air Quality Data Management.

Live and historic data is available at the <http://www.ukairquality.net/> web site.

PM₁₀ and PM_{2.5} Monitoring Adjustment

The type of PM₁₀ and PM_{2.5} monitor utilised within Lancaster City Council do not currently require the application of a correction factor.

Automatic Monitoring Annualisation

All automatic monitoring locations within Lancaster district recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

NO₂ Fall-off with Distance from the Road

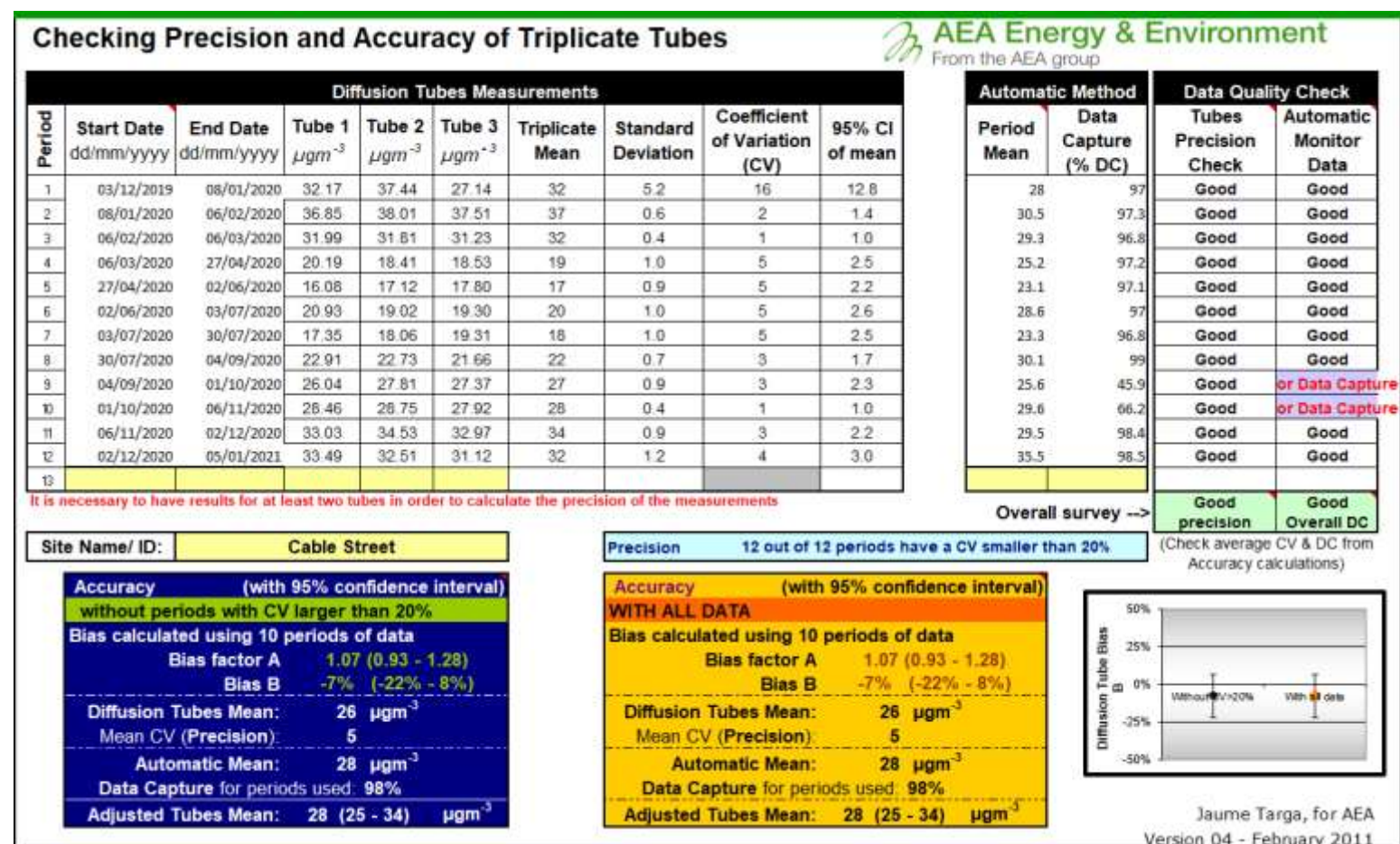
Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO₂ concentration at the nearest location relevant for exposure should be estimated using the NO₂ fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO₂ concentrations corrected for distance are presented in

Table B.1.

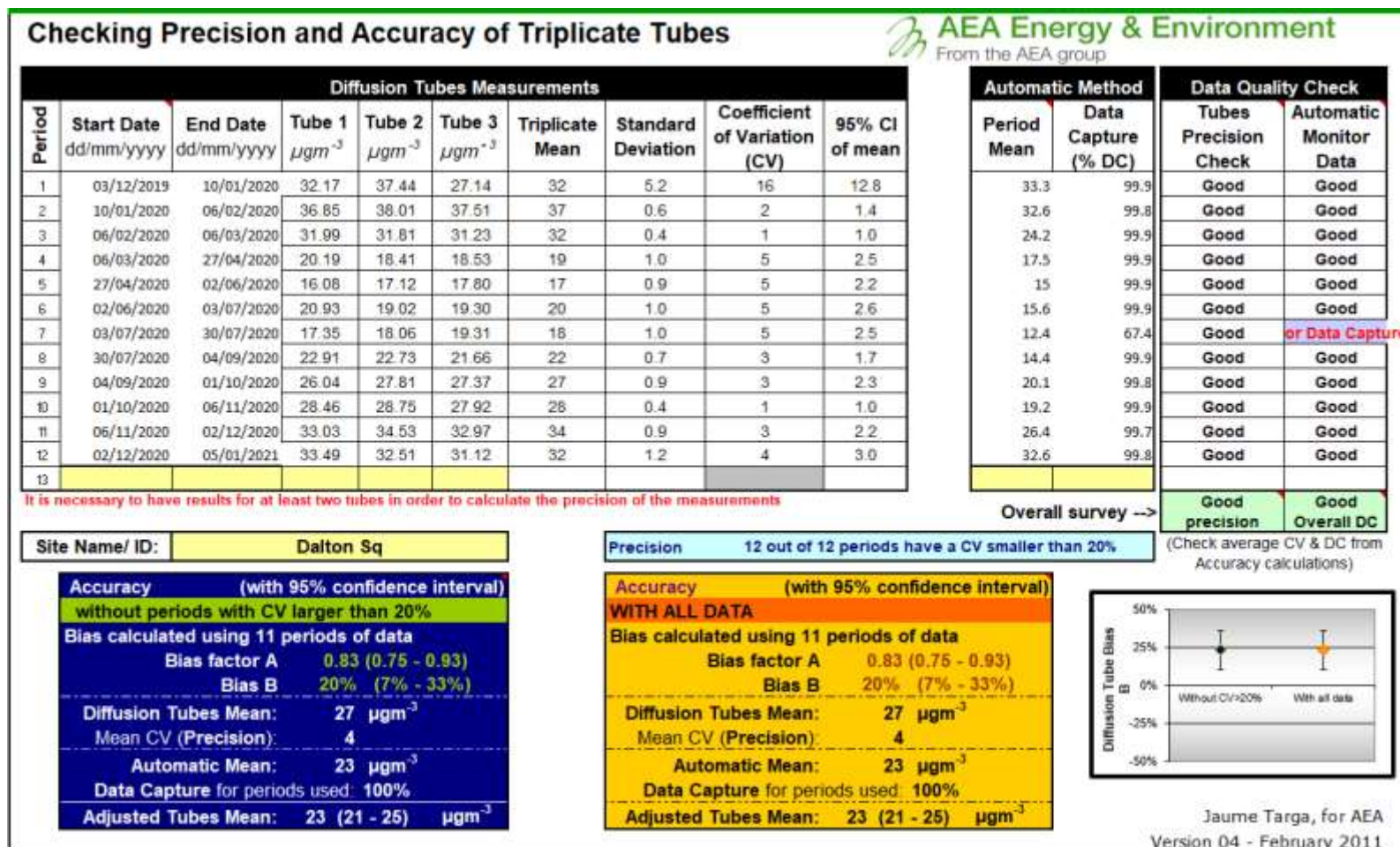
No automatic NO₂ monitoring locations within the Lancaster district required distance correction during 2020.

Table C.2 – Local Bias Adjustment Calculation

The two local bias adjustment calculations based on triplicate tubes located at the two automatic monitoring stations are shown in the two tables below

Cable Street

Dalton Square



Notes:

A national bias adjustment factor has been used to bias adjust the 2020 diffusion tube results. Lancaster's local results have been submitted and incorporated into the studies arriving at the national factor.

Appendix D: Map(s) of Monitoring Locations and AQMAs

Figure D.1 – Map of Non-Automatic Monitoring Site

A map showing monitoring locations of Lancaster's two automatic monitoring stations and monitoring data can be found at :

<http://www.ukairquality.net/home/map>

A map showing the position of nitrogen dioxide diffusion tube monitoring locations and monitoring data can be found at :

[Diffusion Tube Map](#)

Maps/order details for air quality management areas can be found at :

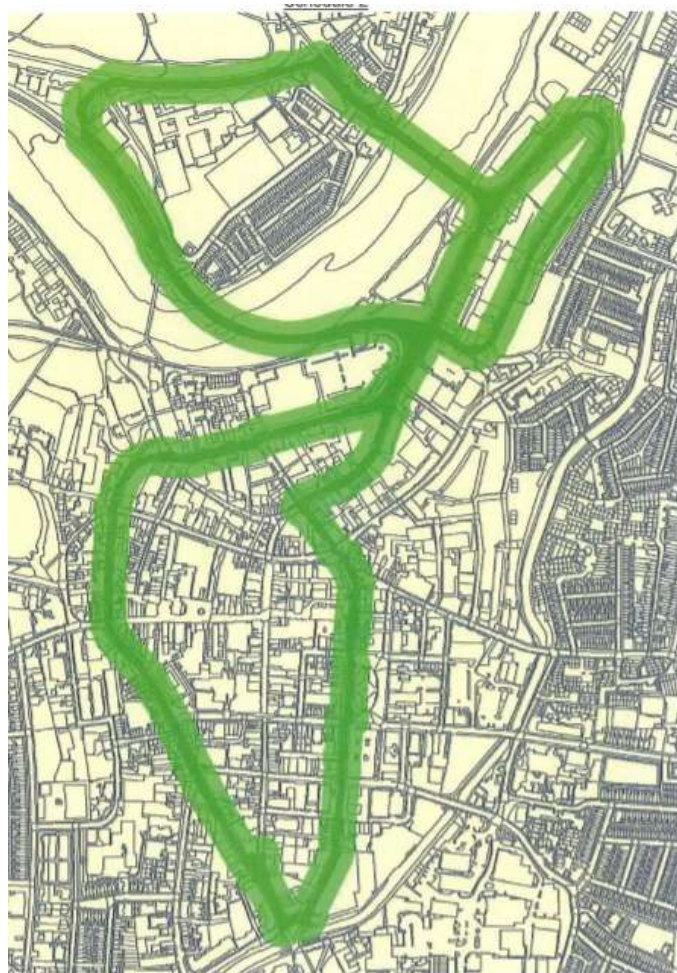
[Lancaster AQMA](#)

[Carnforth AQMA](#)

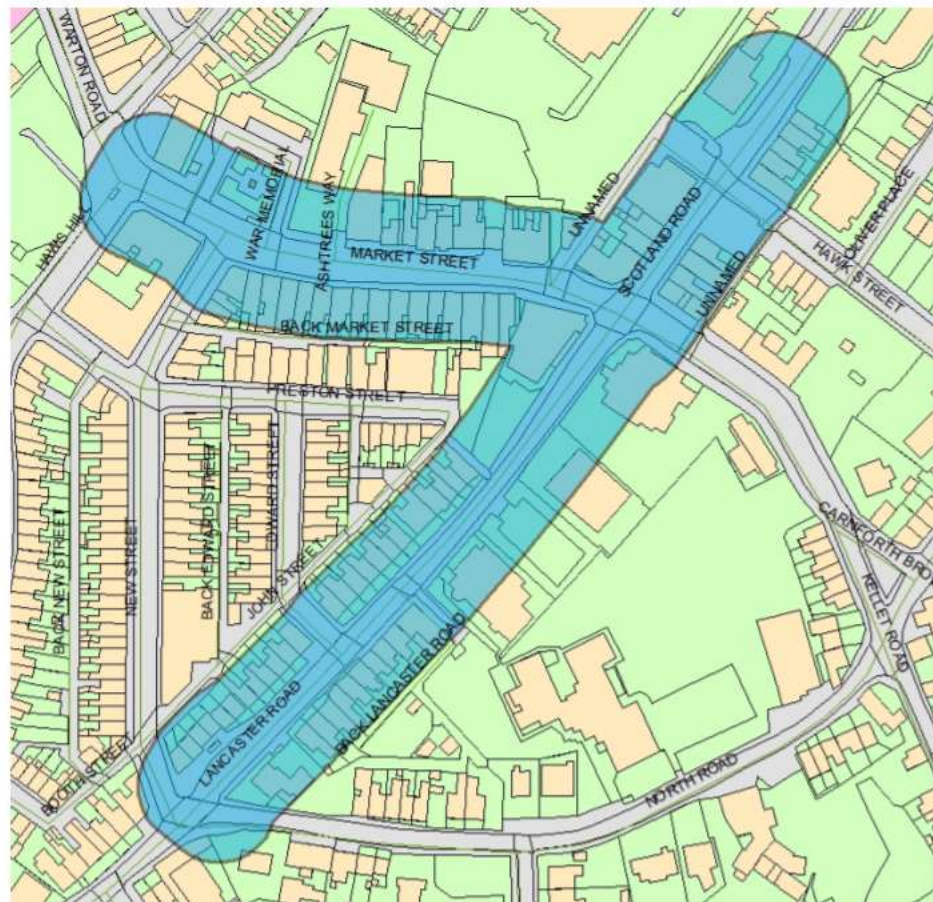
[Galgate AQMA](#)

Maps showing monitoring locations and AQMAs are also shown below.

Lancaster AQMA



Carnforth AQMA



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Galgate AQMA



Automatic Air Quality Monitoring Station (red square) at Cable Street Lancaster. Grey area is AQMA.



Automatic Air Quality Monitoring Station at Dalton Square Lancaster. Grey area is AQMA.

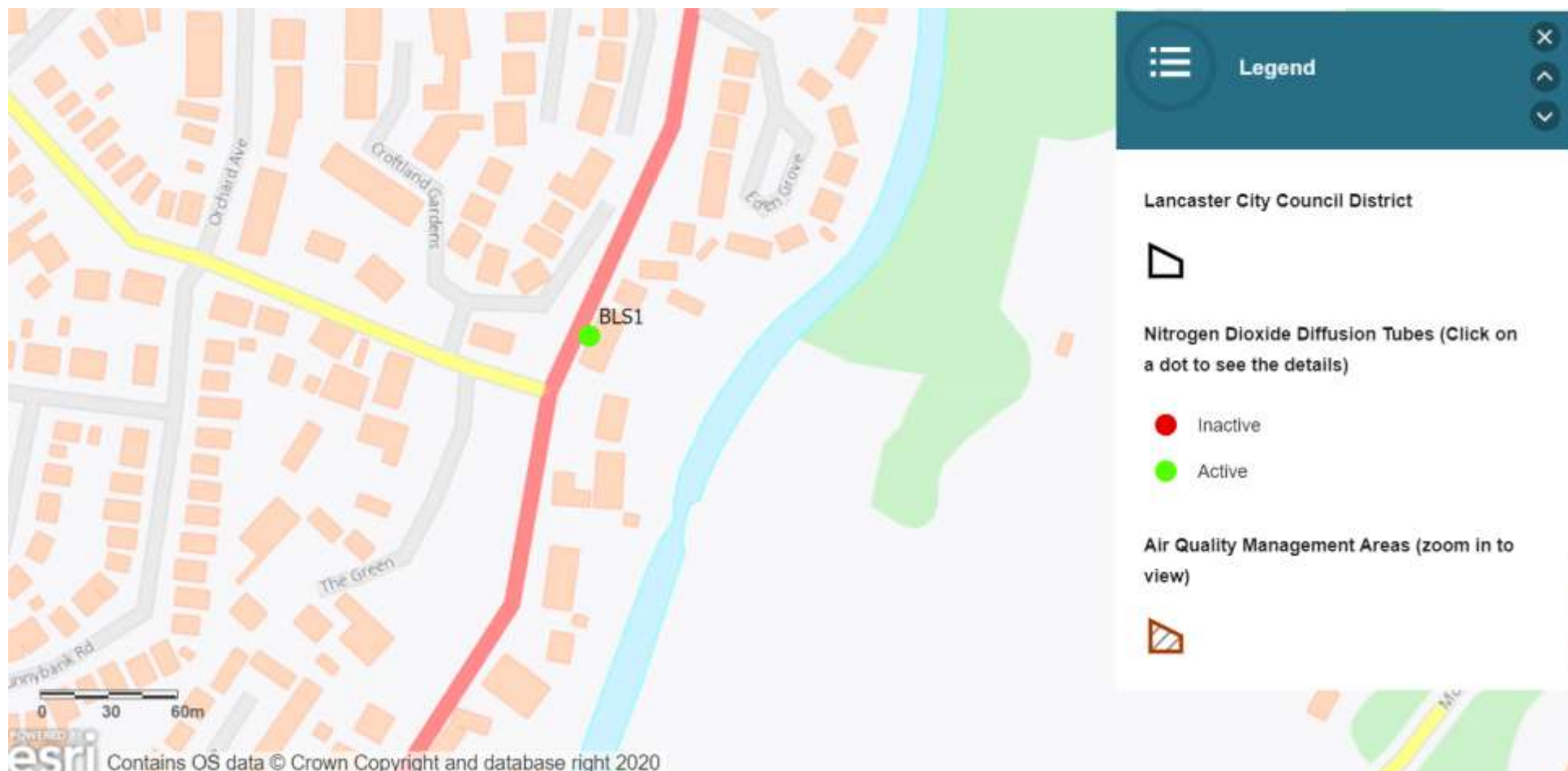


Diffusion Tube Monitoring Location Maps

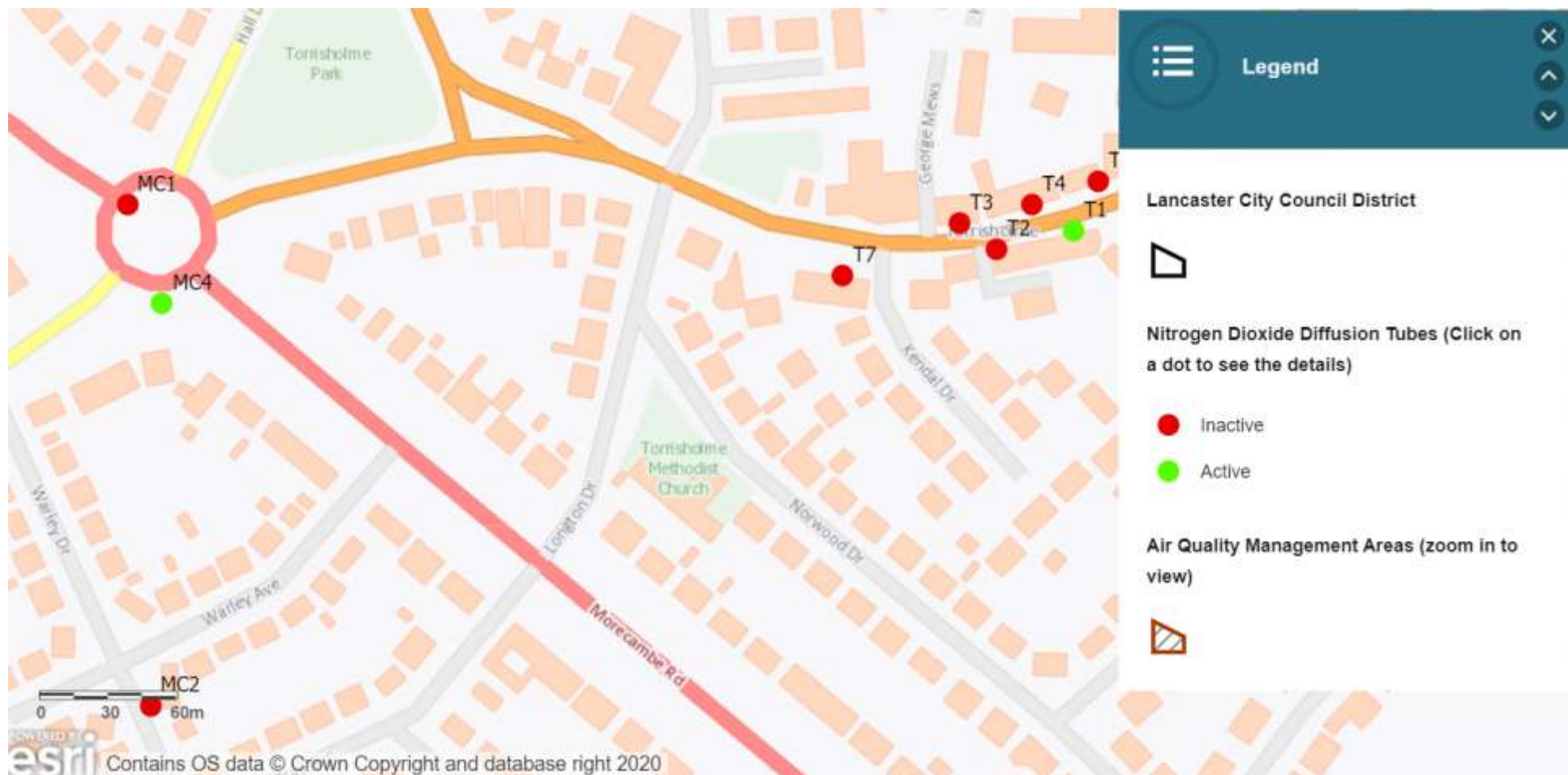
Carnforth



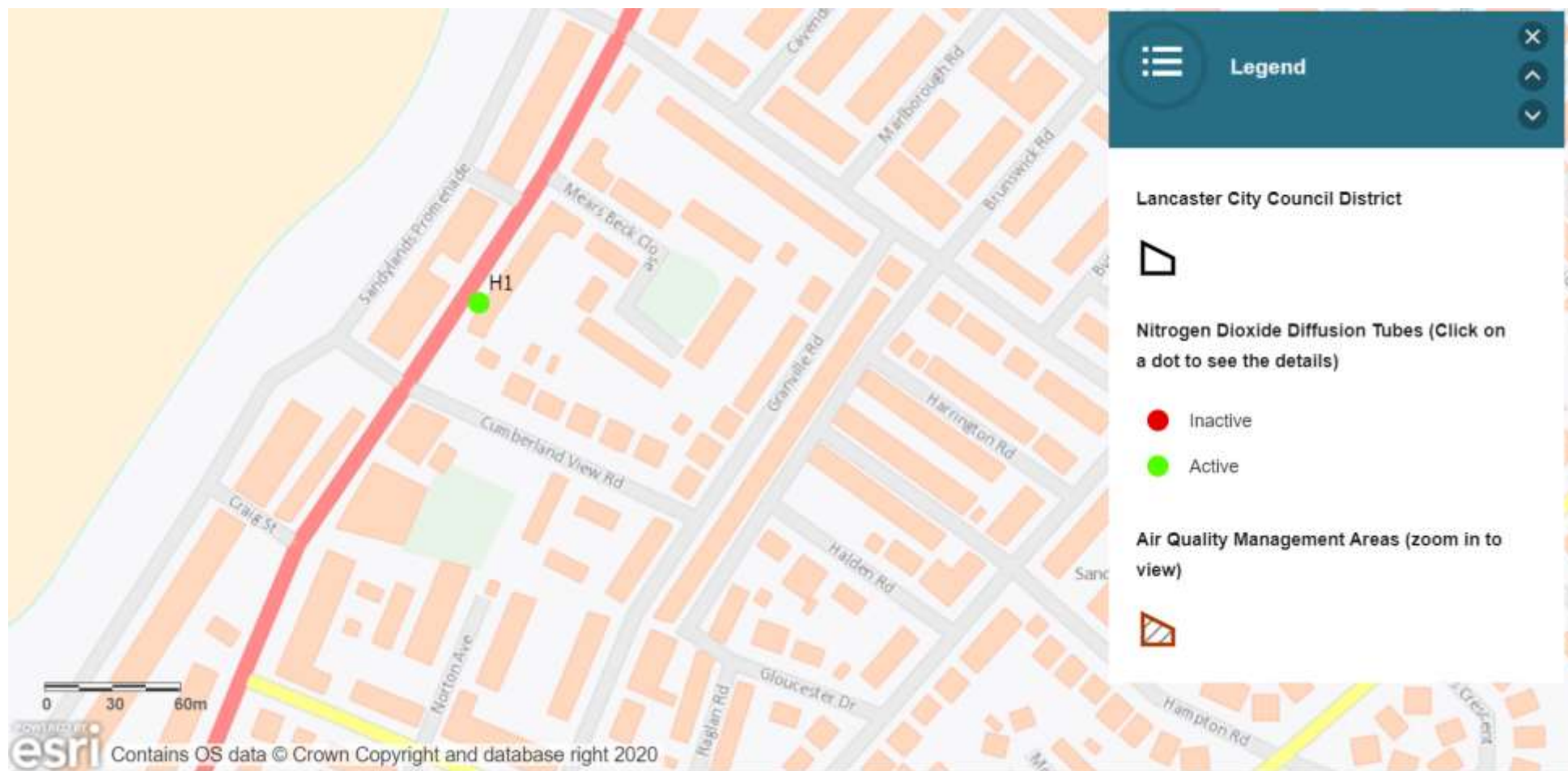
Bolton Le Sands



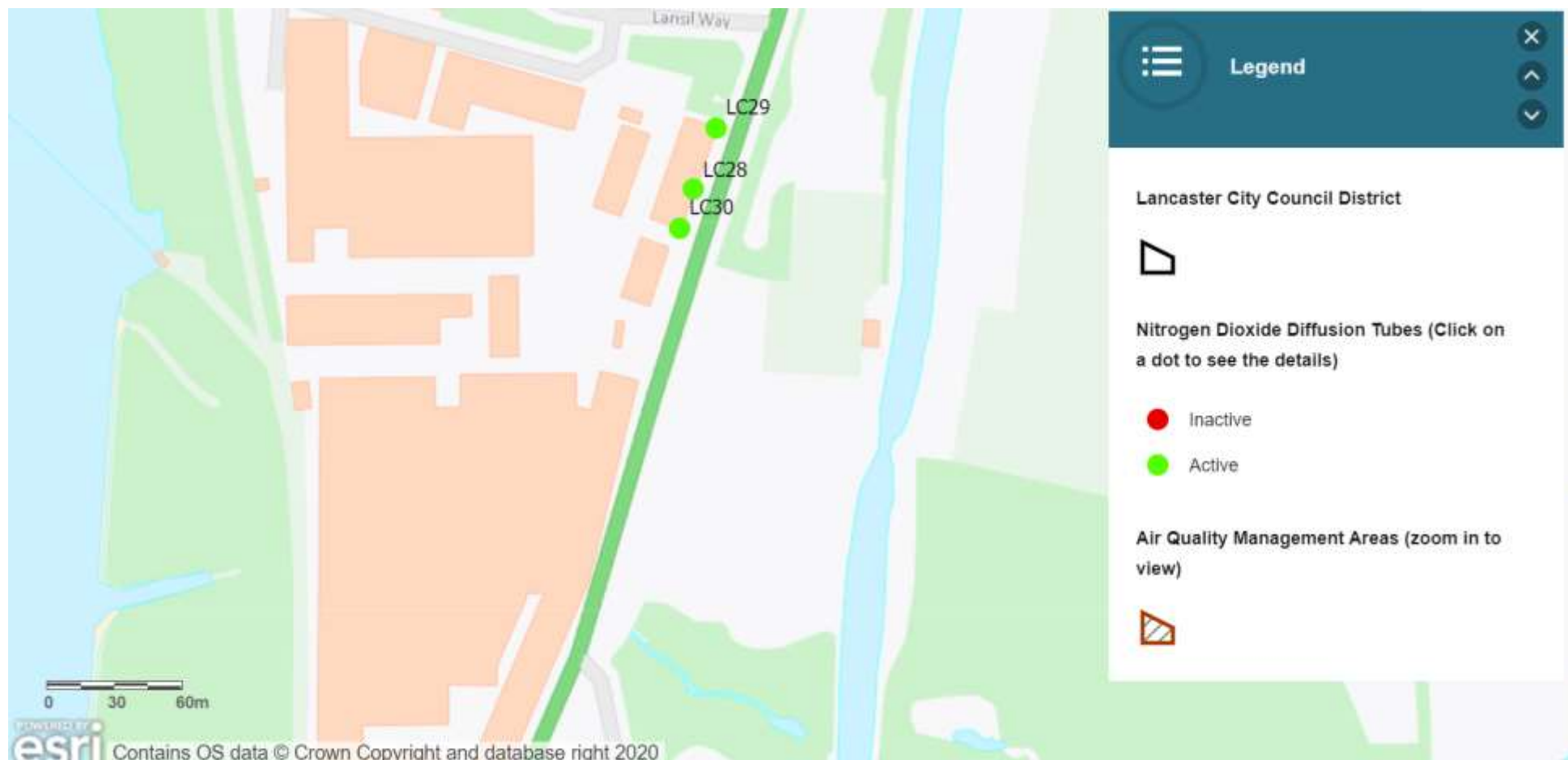
Morecambe



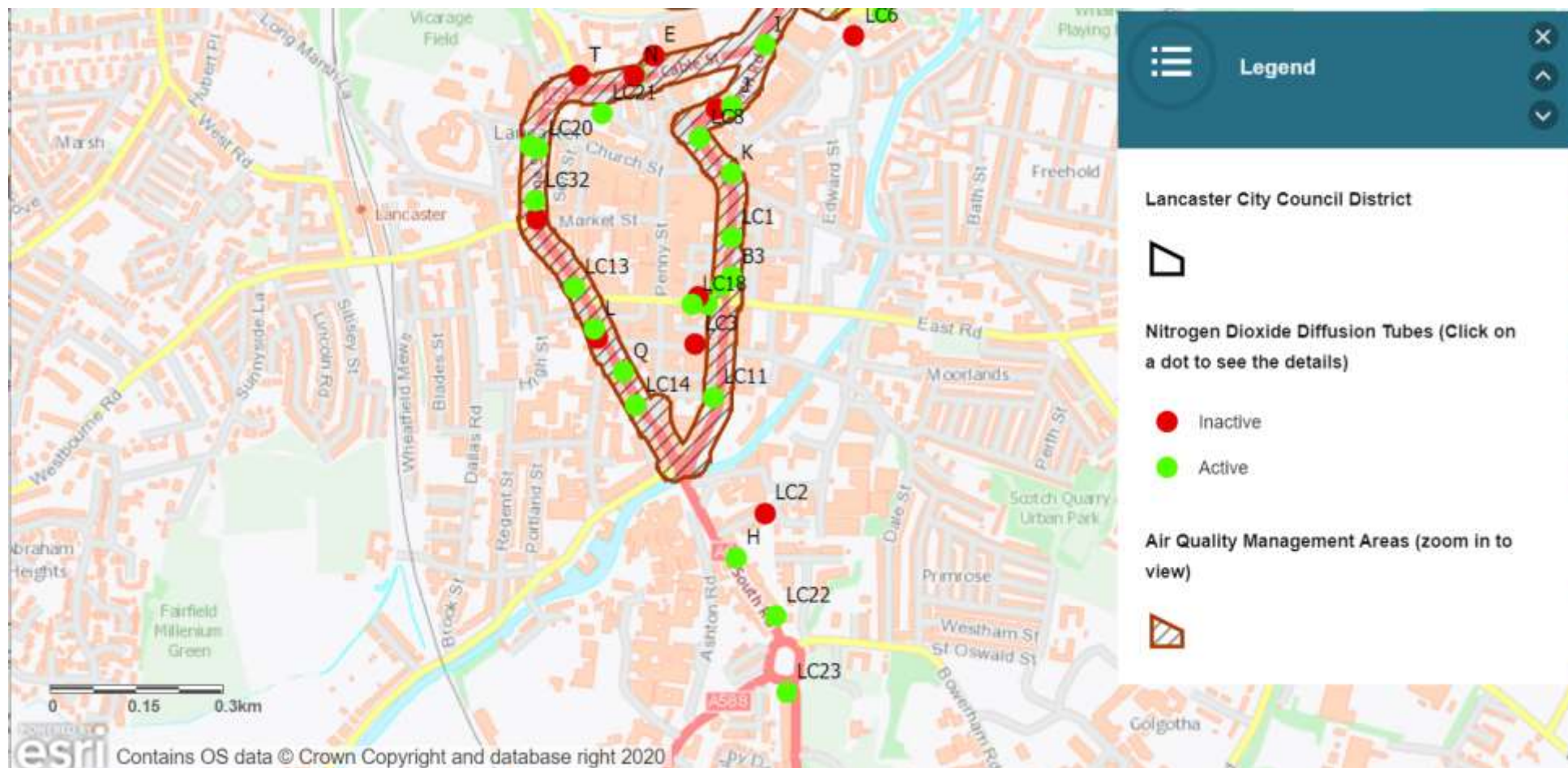
Heysham

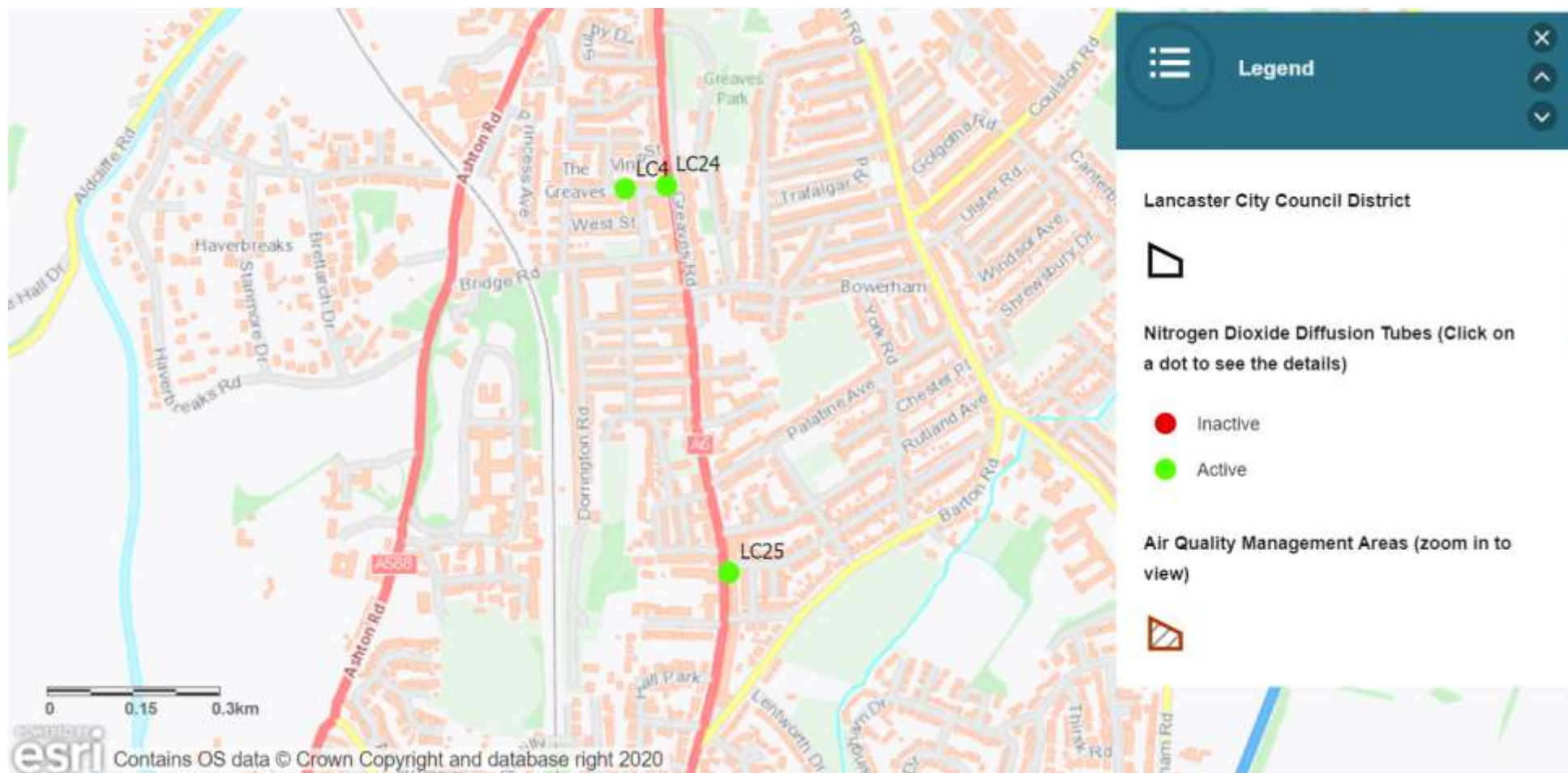


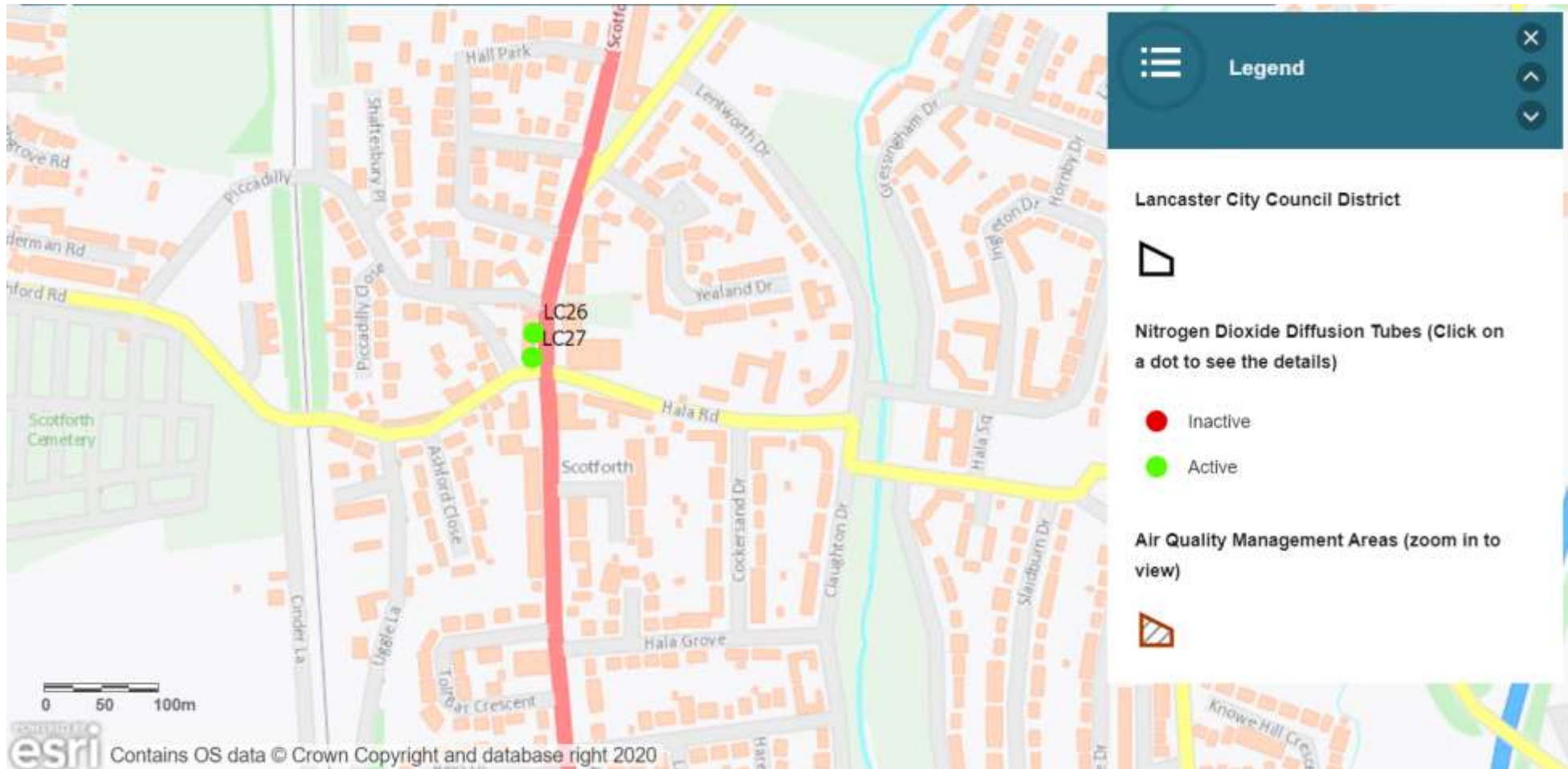
Lancaster











Galgate



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England⁷

| Pollutant | Air Quality Objective: Concentration | Air Quality Objective: Measured as |
|--|---|------------------------------------|
| Nitrogen Dioxide (NO ₂) | 200µg/m ³ not to be exceeded more than 18 times a year | 1-hour mean |
| Nitrogen Dioxide (NO ₂) | 40µg/m ³ | Annual mean |
| Particulate Matter (PM ₁₀) | 50µg/m ³ , not to be exceeded more than 35 times a year | 24-hour mean |
| Particulate Matter (PM ₁₀) | 40µg/m ³ | Annual mean |
| Sulphur Dioxide (SO ₂) | 350µg/m ³ , not to be exceeded more than 24 times a year | 1-hour mean |
| Sulphur Dioxide (SO ₂) | 125µg/m ³ , not to be exceeded more than 3 times a year | 24-hour mean |
| Sulphur Dioxide (SO ₂) | 266µg/m ³ , not to be exceeded more than 35 times a year | 15-minute mean |

⁷ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO₂) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data⁸ suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)⁹ has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO₂ annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

⁸ Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

⁹ Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

represents an absolute reduction of between 10 to 20µg/m³ if expressed relative to annual mean averages. During this period, changes in PM_{2.5} concentrations were less marked than those of NO₂. PM_{2.5} concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that PM_{2.5} concentrations during the initial lockdown period are of the order 2 to 5µg/m³ lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within Lancaster district

Air Quality Data Management (the company providing data management and ratification services to Lancaster City Council) carried out an assessment of pollution changes over the 2020 period over the general region. Their report is as follows:-

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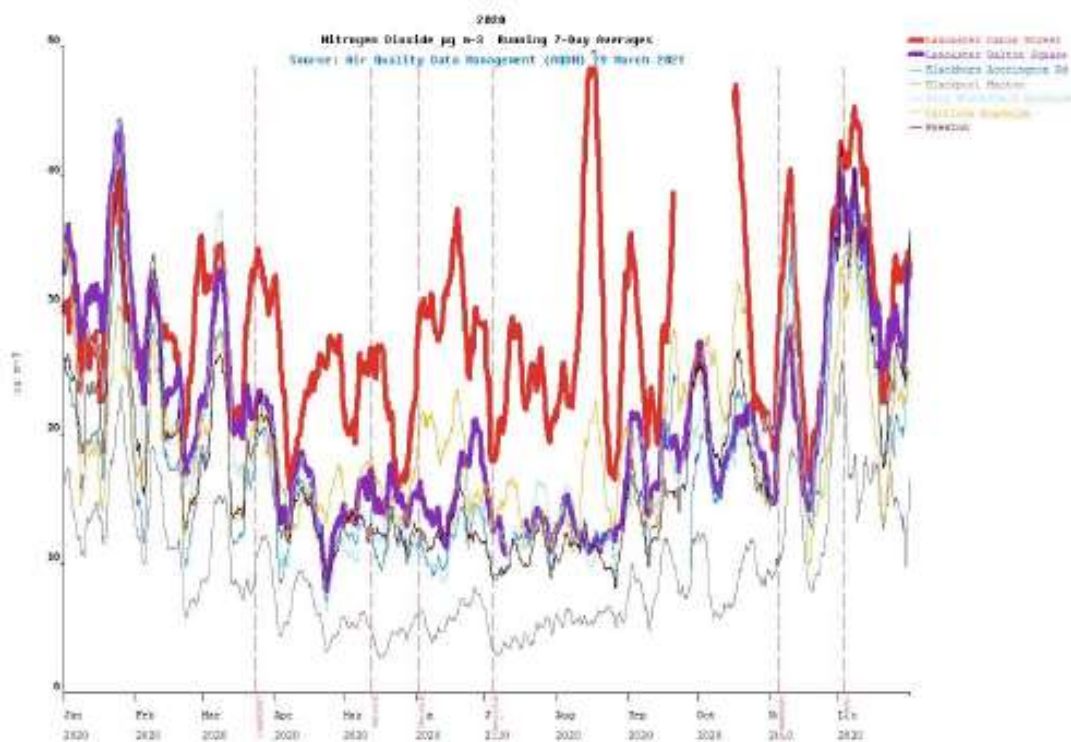


Lancaster Analysis of the March 2020 Lockdown on Local Air Quality

This is an analysis of the 2020 lockdown effect on local air quality at Lancaster. This may be reflected in the results from the NO₂ diffusion tube network. There has been no correction due to meteorology since seasonal records have been regularly broken in recent years. For instance, February 2020 was the wettest on record in England and the spring was the sunniest.

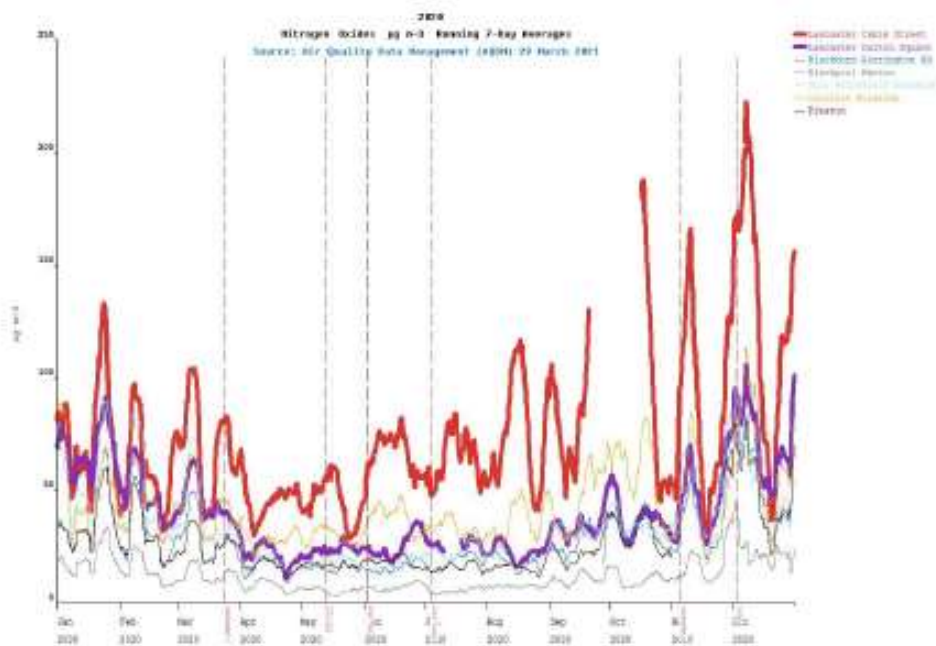
Changes between March and April 2020

The plot below compares the Lancaster running 7-day NO₂ concentration during 2020 (thick lines) with nearby stations. The second plot is for NO_x. The first lockdown began on 23rd March 2020 and was most effective during April 2020. The effect of the first lockdown can be estimated by comparing the change between March and April 2020.



Running 7-Day NO₂ at Lancaster compared with local stations

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Running 7-Day NOx at Lancaster compared with local stations

Estimated change due to the March 2020 lockdown

| Station(s) | Pollutant | $\mu\text{g m}^{-3}$ | % |
|---------------|-----------------|---------------------------|--------|
| Cable Street | NO ₂ | - 6 $\mu\text{g m}^{-3}$ | - 22 % |
| | NOx | - 29 $\mu\text{g m}^{-3}$ | - 41 % |
| Dalton Square | NO ₂ | - 10 $\mu\text{g m}^{-3}$ | - 43 % |
| | NOx | - 25 $\mu\text{g m}^{-3}$ | - 55 % |

- There were a large decreases in NO₂ and NOx concentrations at Lancaster due to the March 2020 lockdown. However, there is usually a large decrease between March and April at the start of spring.

Geoff Broughton of Air Quality Data Management (AQDM)
29 March 2021

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Expected Change during 2015 to 2019

There is usually a large change between March and April at the start of spring. This change in the seasons coincided with the start of the first lockdown. The effect of the first lockdown can, therefore, be estimated by comparing the change between March and April 2020 with the expected change (2015 to 2019).

Estimated change due to the March 2020 lockdown
compared to 2015-2019 at Urban Traffic Stations

| Station(s) | Pollutant | $\mu\text{g m}^{-3}$ | % |
|---------------|-----------------|---------------------------|--------|
| Cable Street | NO ₂ | - 14 $\mu\text{g m}^{-3}$ | - 50 % |
| | NO _x | - 33 $\mu\text{g m}^{-3}$ | - 46 % |
| Dalton Square | NO ₂ | - 6 $\mu\text{g m}^{-3}$ | - 24 % |
| | NO _x | - 12 $\mu\text{g m}^{-3}$ | - 26 % |
| NW England | NO ₂ | - 8 $\mu\text{g m}^{-3}$ | - 28 % |
| | NO _x | - 17 $\mu\text{g m}^{-3}$ | - 29 % |
| England | NO ₂ | - 6 $\mu\text{g m}^{-3}$ | - 21 % |
| | NO _x | - 15 $\mu\text{g m}^{-3}$ | - 26 % |

After correcting for the expected change between March and April.

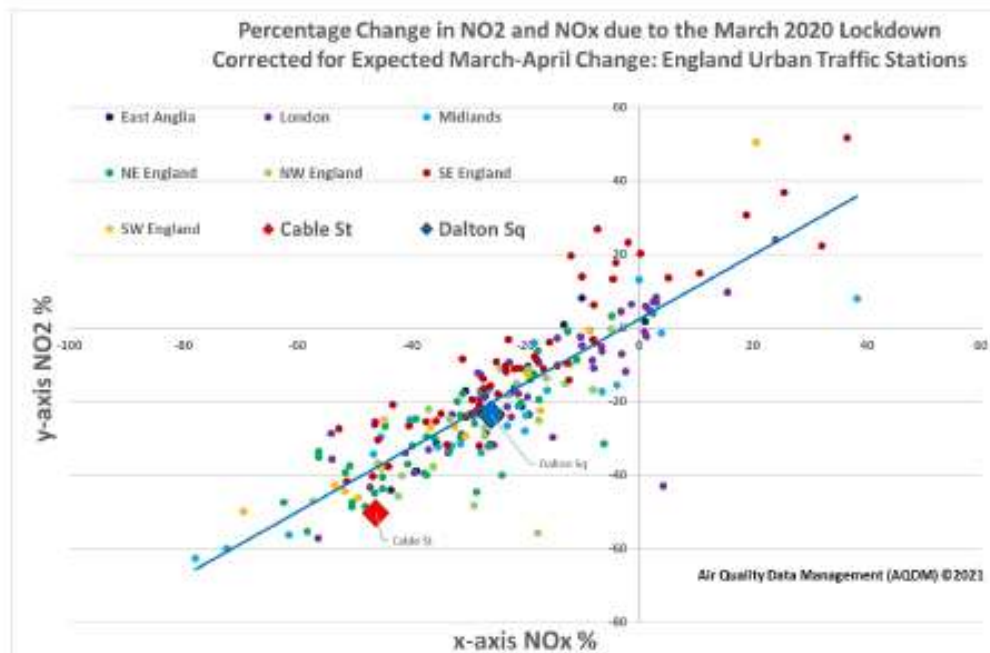
- The percentage decreases at Cable Street were greater than the average for the region and England.
- The percentage decreases at Dalton Square were similar to the average for the region and England.

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Comparison with Stations

The plot below compares the changes due to the March 2020 lockdown at Lancaster with other stations (Urban Traffic). The plot has the NO_x percentage change along the x-axis and NO₂ percentage change along the y-axis. Most stations are in the bottom left quarter which measured a decrease in NO₂ and NO_x concentrations. There were some stations that measured a negligible change (around the central origin) while a few measured increases (top right quarter).



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29 March 2021

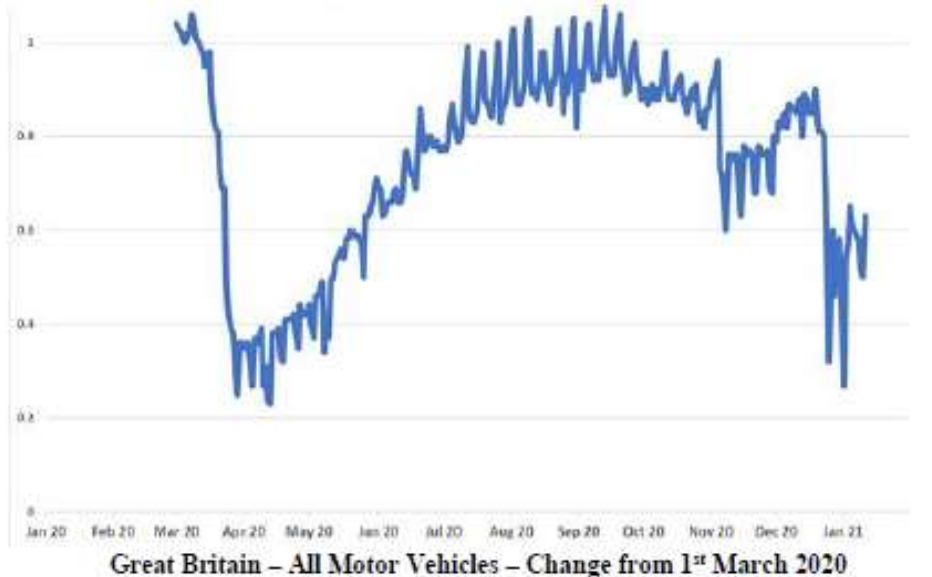
Page 4 of 7

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Changes in GB Traffic Flows since March 2020

NOx concentrations at Roadside locations are closely related to primary emissions from motor vehicles. The plot below shows the change in traffic flow in Great Britain since March 2020. The start of the lockdown on 23rd March and subsequent restrictions are very clear. The NOx concentrations at the monitoring station will resemble the local traffic pattern. NO₂ concentrations are a mixture of primary emissions and secondary chemical reactions over a longer time scale. The NO₂ concentrations should relate to the local traffic patterns.



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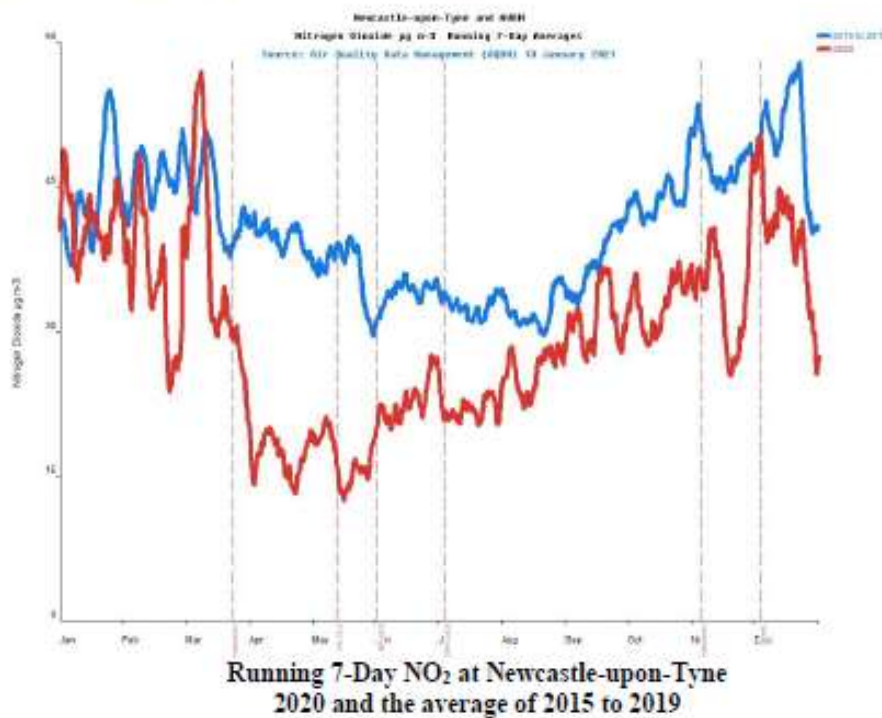
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Comparison with other Cities

The March 2020 lockdown effect was not observed everywhere. The two plots below demonstrate the extremes of the lockdown effect by comparing the 2020 NO₂ concentrations (red line) with the average of 2015 to 2019 (blue line). The 2015 to 2019 line is the expected seasonal profile throughout the year. The 2020 line is lower because of the progressive reduction of local NO₂ concentrations at the monitoring locations. The 2020 lockdown effect can be seen by comparing the red and blue lines.

The plot below is for Newcastle-upon-Tyne which shows a dramatic lockdown effect that matches the change in national traffic flows during 2020. The estimated percentage decreases for Newcastle-upon-Tyne were 50% NO₂ and 53% NO_x.



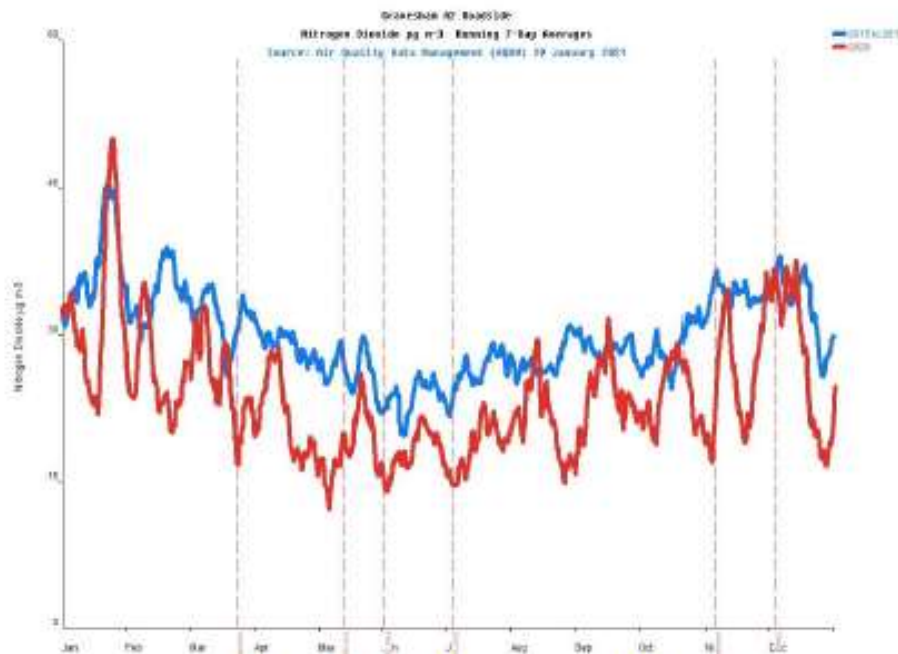
Geoff Broughton of Air Quality Data Management (AQDM)
29 March 2021

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The next plot is for Gravesend in Kent. The 2020 red profile follows closely the average of 2015 to 2019 shown in blue. The 2020 line is lower because of the progressive reduction in local NO₂ concentrations. There was no obvious 2020 lockdown effect measured at this location. The estimated percentage decreases for Gravesend were 4% NO₂ and 8% NO_x.



Running 7-Day NO₂ at Gravesend in Kent
2020 and the average of 2015 to 2019

- The March 2020 lockdown effect at Lancaster was more than Gravesend but less dramatic than Newcastle-upon-Tyne.

Conclusions

Analyses that attempt to remove the effect of weather assumes 2020 would have been a normal year. Except 2020 had the wettest February on record and the spring smashed the previous record for hours of sunshine in England. Isolating the lockdown effect from the exceptional meteorology and the long-term downward trend in concentrations is beyond this analysis.

These are the conclusions about the March 2020 effect after correcting for the expected change between March and April.

- There were a large decreases in NO₂ and NO_x concentrations at the Lancaster stations.
- The changes lie on the NO₂ NO_x distribution plot.
- The percentage decreases at Cable Street NO₂ 50% and NO_x 46% were greater than the average for the region and England.
- The percentage decreases at Dalton Square NO₂ 24% and NO_x 26% were similar to the average for the region and England.

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Opportunities Presented by COVID-19 upon LAQM within the Lancaster district

Although the pandemic caused many sad and unwelcome outcomes, there were some opportunities that arose as a consequence of our response to the situation. There were a few areas that saw specific actions that benefitted local air quality. A selection of these are as follows:-

- Working from home - A large proportion of Council staff worked from home, removing daily commute trips to and from their normal office premises. A large proportion of staff continue to work from home. No quantification is currently available, but it is thought that this also has been the situation for many businesses in Lancaster.
- Meetings held on TEAMS and ZOOM platforms removing the need to travel to and from meetings.
- Temporary Cycle Lanes and road closures as follows:-
 1. South Road - pop up cycle lanes both sides. REMOVED. Future plans: part of South Lancaster Growth Catalyst project, details TBC
 2. King Street - wands added to existing marked cycle lane. REMOVED. Future plans: forms part of Movement Strategy
 3. Queen Square - point closure. RETAINED. Future plans: Experimental TRO to make permanent (Kate Smith has been in discussion with Eddie Mills regarding this)
 4. Dalton Square - point closures. RETAINED. Future plans: Experimental TRO to make permanent (again Kate and Eddie in discussion)

Challenges and Constraints Imposed by COVID-19 upon LAQM within the Lancaster district

The following challenges and/or constraints have been experienced in relation to LAQM within 2020 that can be attributed to the pandemic.

- The implementation of action plan measure (providing charge points for taxis) has been delayed due to operational constraints on the charge point provider (E B Charging Limited) during 2020. The chargepoints are due to be operational by the end of October 2021. **Small Impact**
- Due to laboratory shut down, diffusion tubes put out in March 2020 were left out (exposed) for 2 months (over March and April) rather than the normal one month period in line with the national monitoring calendar. This decision was made to hopefully provide better coverage over the period rather than not deploy any tubes in April. There is therefore the potential for there to be a greater degree of uncertainty associated with the resultant annual mean NO₂ concentrations in 2020 than in previous years. **Medium Impact**
- The Clean bus technology fund grant allocation (to reduce emissions from Stagecoach buses operating in Lancaster) was not progressed by the county council. It is hoped that the scheme will finally be delivered in 2022/23. **Medium Impact**
- A revised AQAP is being developed for Lancaster. The COVID pandemic did not delay its production however delays to the production of the Movement Strategy for the city centre delayed progress. Current estimates are that the revised AQAP will be prepared in and sent out for draft consultation in spring 2022. **Medium Impact**
- The number of complaints received by the council (the majority smoke related) increased by around 300% during 2020. This occurrence would likely impact on local air quality. This increase was thought to be due to people staying at home more during lockdown, people undertaking more DIY/clearance/gardening work and perhaps the association and emphasis on problems that may affect breathing brought on by the pandemic.

The impacts as presented above are aligned with the criteria as defined in Table F 1, with professional judgement considered as part of their application.

Table F 1 – Impact Matrix

| Category | Impact Rating: None | Impact Rating: Small | Impact Rating: Medium | Impact Rating: Large |
|--|--|--|---|--|
| Automatic Monitoring – Data Capture (%) | More than 75% data capture | 50 to 75% data capture | 25 to 50% data capture | Less than 25% data capture |
| Automatic Monitoring – QA/QC Regime | Adherence to requirements as defined in LAQM.TG16 | Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes | Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved | Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved |
| Passive Monitoring – Data Capture (%) | More than 75% data capture | 50 to 75% data capture | 25 to 50% data capture | Less than 25% data capture |
| Passive Monitoring – Bias Adjustment Factor | Bias adjustment undertaken as normal | <25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019) | 25-50% impact on normal number of available bias adjustment studies (2020 vs 2019) | >50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime |
| Passive Monitoring – Adherence to Changeover Dates | Defra diffusion tube exposure calendar adhered to | Tubes left out for two exposure periods | Tubes left out for three exposure periods | Tubes left out for more than three exposure periods |
| Passive Monitoring – Storage of Tubes | Tubes stored in accordance with laboratory guidance and analysed promptly. | Tubes stored for longer than normal but adhering to laboratory guidance | Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date | Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used |
| AQAP – Measure Implementation | Unaffected | Short delay (<6 months) in development of a new AQAP, but is on-going | Long delay (>6 months) in development of a new AQAP, but is on-going | No progression in development of a new AQAP |
| AQAP – New AQAP Development | Unaffected | Short delay (<6 months) in development of a new AQAP, but is on-going | Long delay (>6 months) in development of a new AQAP, but is on-going | No progression in development of a new AQAP |

Appendix G: Map showing location of public accessible electric vehicle chargers in Lancaster



Glossary of Terms

| Abbreviation | Description |
|-------------------|---|
| AQAP | Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority 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 |
| ASR | Annual Status Report |
| Defra | Department for Environment, Food and Rural Affairs |
| DMRB | Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England |
| EU | European Union |
| 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 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 |
| | |

References

- AEA (2008), Analysis of the relationship between annual mean nitrogen dioxide concentration and exceedences of the 1-hour mean AQS Objective. AEA Energy and Environment - May 2008 [Relationship between annual and hourly mean NO₂](#)
- Air Quality Data Management, Dalton Square and Cable Street Automatic Monitoring Station Results 2020 (Jan 2021)*
- Air Quality Data Management, Dalton Square and Cable Street Automatic Monitoring Station Results 2019 (Jan 2020)*
- Air Quality Data Management, Dalton Square and Cable Street Automatic Monitoring Station Results 2018 (Jan 2019)*
- Air Quality Data Management, Dalton Square and Cable Street Automatic Monitoring Station Results 2017 (Jan 2018)*
- Air Quality Data Management, Dalton Square Automatic Monitoring Station Results 2016 (April 2017)*
- AQC (2016), Air Quality Monitoring: Lancaster City Council - January – December 2015, August 2015*
- Defra (2019) National Clean Air Strategy Jan 2019 , available at: [Clean Air Strategy 2019 - GOV.UK \(www.gov.uk\)](#)
- Defra (2009) LAQM Technical Guidance TG(09) February 2009.
- Defra (2016) LAQM Technical Guidance TG(16) April 2021. Available at:
- [Guidance | LAQM \(defra.gov.uk\)](#)
- Defra (2016), Local Air Quality Management Policy Guidance PG(16) – Defra April 2016. Available at: [Guidance | LAQM \(defra.gov.uk\)](#)
- Defra (2009), Local Air Quality Management Policy Guidance PG(09) – Defra 2009 [Guidance | LAQM \(defra.gov.uk\)](#)
- Lancaster City Council (2014). 2014 Air Quality Progress Report, Dec 2014*
- Lancaster City Council (2010), Draft Air Quality Action Plan for Carnforth, Final Draft, March 2010*
- Lancaster City Council (Feb 2018) Air Quality Management Area (Lancaster)(No.2) Order 2018. *
- Lancaster City Council (April 2007) Air Quality Management Area (Carnforth)(No.1) Order 2007 *
- Lancaster City Council (2007), Air Quality Action Plan for Lancaster, 2007*

- LCC, 2008, Lancaster District Development Framework Core Strategy, 2003-2021, Adopted July 2008 available at: [Local Plan policy](#)
- LCCP, 2009, The Lancashire Climate Change Strategy 2009 – 2020, Lancashire Climate Change Partnership 2009 available at: [Lancashire Climate Change Strategy](#)
- LCC, 2011, Local transport Plan 2011-2021 – A Strategy for Lancashire, Lancashire County Council, May 2011 available at: [Local Transport Plan](#)
- LCC, 2013, The Air Quality Strategy for Lancaster, Lancaster City Council, November 2013*
- LCC, 2016, LAQM Annual Status Report 2015, January 2016*
- LCC, 2016, Provision of Electric Vehicle Charging Points for New development – Guidance for Developers February 2016, available at : [Local Plan policy](#)
- LCC, 2016, LAQM Annual Status Report 2016, September 2017*
- LCC, 2017, LAQM Annual Status Report 2017, October 2017*
- LCC, 2018, LAQM Annual Status Report 2018, October 2018*
- LCC, 2019, LAQM Annual Status Report 2019, Jan 2020*
- LCC, 2020, LAQM Annual Status Report 2019, Oct 2020*
- LCC, 2017, Low Emissions and Air Quality Planning Advisory Note and EV Charging Infrastructure PAN, September 2017, available at : [Local Plan policy](#)

- **Internet links**

- [Local Air Quality Management \(LAQM\) Support Website | DEFRA](#)
- [Environment Agency](#)
- [Lancaster Air Quality](#)
- * Access to the Council's air quality reports is provided on the Council's website (link provided above).