2020 Air Quality Annual Status Report (ASR)

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

October 2020

LANCASTER CITY COUNCIL

Promoting City, Coast & Countryside

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Executive Summary: Air Quality in Our Area

Air Quality in the Lancaster District

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 and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

Specifically in Lancaster, air quality monitoring indicated another year of general improvement. Overall monitoring showed a small improvement in air quality at the majority of local monitoring sites. Monitoring also again indicated compliance with the air quality objectives in the Carnforth and Galgate Air Quality Management Areas (AQMAs) for the third year running.

Despite improvement, monitoring still indicated air quality objective exceedances within the Lancaster AQMA (exceedance of the annual mean objective for nitrogen dioxide). No monitoring site in the centre of Lancaster or elsewhere indicated breach of the hourly nitrogen dioxide objective standard.

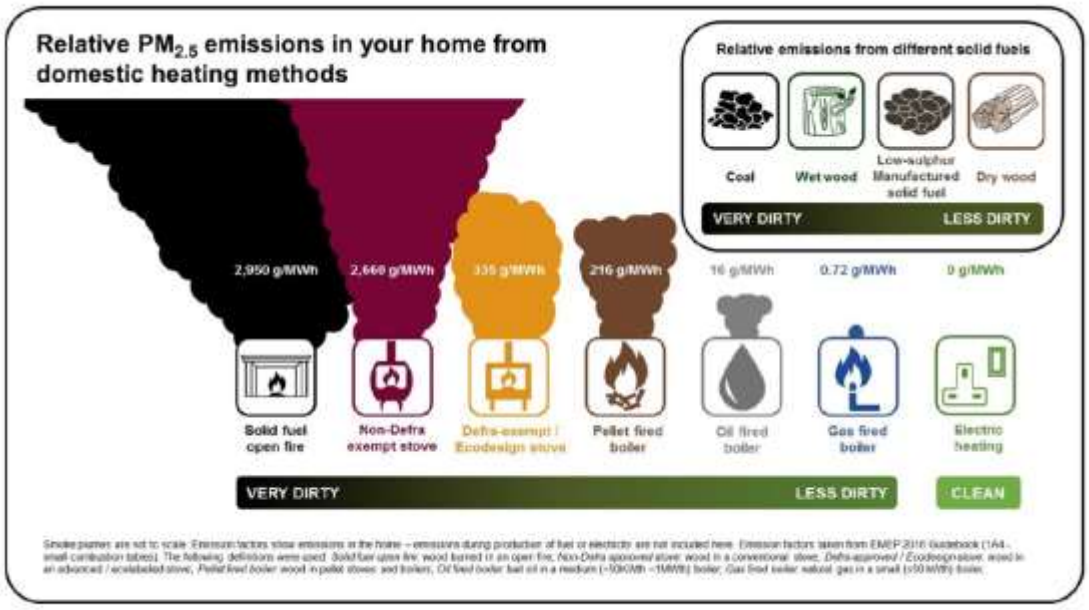
In 2019 monitored roadside annual mean nitrogen dioxide levels at Dalton Square and Thurnham Street, Lancaster exceed the objective by around 20% (levels currently monitored are around 48 and 53 ug/m^3 respectively). In China Street indicative levels monitored are between 37-45ug/m^3. Overall levels showed a small reduction on levels monitored in 2018 although one site on China Street showed a small increase. The objective level is 40ug/m^3.)

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013
[4] Nation Clean Air Strategy available at: https://www.gov.uk/government/publications/clean-air-strategy-2019
[5] Environment Bill details - available at: https://www.gov.uk/government/publications/environment-bill-2020

Levels of particulate pollution (PM_{10}) measured at Cable Street Lancaster, also indicated compliance with objective standards and also an improvement on previous years. The TEOM PM_{10} monitor in the Cable Street station could no longer be maintained and therefore was replaced this year with a FIDAS particulate monitor, that measures both PM_{10} and $PM_{2.5}$ particulate fractions.

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[4&5] and local concern. The number of complaints relating to smoke have increased and look likely to have nearly doubled in 2020. This increase is considered to be at least partly an off-shoot consequence of the COVID 19 situation (people spending more time at home), however clearly demonstrates the concerns of many individuals. There will most likely be many more individuals who are affected or are concerned by smoke impacts but tolerate the situation and do not complain to the Council. An air quality grant application has been 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.



Source : Consultation on draft National Clean Air Strategy 2018, available at : https://consult.defra.gov.uk/environmental-quality/clean-air-strategy-consultation/

A new air quality action plan (AQAP) remains under development, its delivery being very much reliant on inputs from the County Council, particularly through the development of a movement strategy for Lancaster city centre and south Lancaster. The current COVID 19 crisis has resulted in a delay in the delivery of this strategy and therefore delayed the production of the new air AQAP. Consultation on options for movement strategy for the city centre is now planned this year (possibly due October/November 2020). Given its importance to the AQAP, persons consulted on the Air Quality Action Plan measures in 2019 will be advised of this consultation and advised to comment on the proposals (directing comments to the County Council). The strategy proposes 8 possible options for the city centre gyratory that provides changes to traffic movements, introducing traffic restrictions and includes the possibility of a city centre clean air zone.

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 will therefore most likely form the basis for proposals in the new air quality action plan for Lancaster and delivery will determine the pace and degree of air quality improvement can be achieved in future years .

The movement strategy consultation seeks views and comments on the proposed options which will enable a number of these to be shortlisted. The selected options will them be subject to detailed traffic modelling and air quality impact assessment. This detailed modelling will inform the selection of a preferred air quality action plan proposal, which then in turn will be subject to city council approval and public consultation in 2021.The air quality action plan is now due to be delivered in 2021 (previously advised to be 2020).

In January 2019 Lancaster City's full council met and declared a climate emergency, and committed to actions to support this position (see https://www.lancaster.gov.uk/sites/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) clearly demonstrates this commitment.

A main transport priority for the Council is to convert it fleet to electric vehicles wherever possible. The Council is also working with the taxi trade, to help assist the transition of the local taxi flee to electric vehicles. The Councils aim is for its activities to be net carbon zero by 2030.

Actions to Improve air quality

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 2020 and for 2021 will be:

(i) The delivery of a new air quality action plan for Lancaster

(ii) the delivery of more electric vehicle charging infrastructure, including chargers for the taxi fleet enabled by OLEV grant funding. Taxi chargers should be in place spring/summer 2021 as should additional chargers in council car parks.

(iii) The development and adoption of Supplementary Planning Guidance. Consultation on proposed guidance is due to take place in 2020. The guidance has progressed the previous planning advisory note to provide a stronger footing for the provision of measures to facilitate better air quality and mitigate impacts of new development.

(iv) If the Defra air quality grant application is successful, the delivery of a campaign to help tackle the growing issue of air pollution from solid fuel/wood burning appliances and from bonfires.

Conclusions and Priorities

Monitoring over 2019 indicated an overall improvement in air quality in the Lancaster district. 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. 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.

Following the consideration of movement strategy options for Lancaster city centre and using information from a public consultation on possible measures carried out in 2019 (see Appendix E for summary of measures put forward), a new air quality action plan is due to be delivered in 2021. Dependant on the allocation of Defra air quality grant funding, 2021 will also potentially see the launch of a campaign aimed at reducing particulate pollution (a specific aim of the national Clean Air Strategy[4]) from solid fuel appliances and bonfires.

Local Engagement and How to get Involved

Air quality impacts are not generally the result of single source but are as a result of a number of combined impacts. 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*: *http://www.lancashire.gov.uk/roads-parking-and-travel/alternative-ways-to-travel.aspx*

3) *Traffic queues on are 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 http://www.traveline-northwest.co.uk/cms/content/lancashire.xhtml , https://www.stagecoachbus.com/about/cumbria-and-north-lancashire and other general information web sites such as http://www.nationalrail.co.uk/ .*

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, you will 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 out homes. Ventilate you 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 in 2021. 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:-

FAO Paul Cartmell,
Senior Environmental Health Officer,
Lancaster City Council,
Morecambe Town Hall,
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1 Local Air Quality Management

This report provides an overview of air quality in Lancaster district during 2019. 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 can be found in Table E.1 in Appendix F.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives. The Council is currently in the process of producing a new AQAP and consulted on measures in 2019. The plan is due to be now due to be delivered in 2021. This has been delayed due to the COVID 19 crisis and due changes to the process leading to the production of the movement strategy for Lancaster centre.

A summary of AQMAs declared by Lancaster City Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality . They are also available at https://uk-air.defra.gov.uk/aqma/list.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)		Action Plan		
						At Declaration	Now	Name	Date of Publication	Link
City of Lancaster AQMA	2004	NO_2 Annual Mean	Lancaster	Covers gyratory system in Lancaster city centre	No	75 µg/m	53 µg/m	Lancaster Air Quality Action Plan	2007 (new Plan due 2021)	Available at:- http://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality
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.	NO_2 1 Hour Mean	Lancaster	Covers gyratory system in Lancaster city centre	No	75 µg/m (annual mean value)	53 µg/m (annual mean value) µg/m3	Lancaster Air Quality Action Plan	2007 (new Plan due 2021)	Available at:- http://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality

Carnforth AQMA	2007	NO_2 Annual Mean	Carnforth	Covers main cross road area in Carnforth	No	42	µg/m3	34	µg/m3	Lancaster Air Quality Action Plan	2007 (new Plan due 2021)	Available at:- http://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality
Galgate AQMA	2009	NO_2 Annual Mean	Galgate	Covers main cross road area in Galgate	No	43	µg/m3	32	µg/m3	Lancaster Air Quality Action Plan	2007 (new Plan due 2021)	Available at:- http://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality

☒ **Lancaster City Council confirm the information on UK-Air regarding their AQMA(s) is up to date**
NB A new AQAP for the Lancaster District is due in 2021

2.2 Progress and impact of measures to address air quality in the Lancaster district

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

Despite the COVID crisis, Lancaster City Council has continued to pursue a number of direct measures during the current reporting year of 2020 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2 below.

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

Key completed measures are:

- Delivery of more electric vehicle charging infrastructure by the city and county councils in car park, council premises and street locations (a map showing the position of chargers delivered by the councils and the private sector is shown in Appendix G)
- Delivery of additional electric vehicles (vans) for use by Council officers and workers.
- Drafting of new supplementary 'low emission and air quality' planning guidance for new development (to be consulted on in 2020).
- Submission of a Defra air quality grant application bid to secure funding to support a local campaign aimed at reducing polluting smoke emissions from solid fuel appliances and bonfires.
- Commenting and raising issues with drafts for the city centre Movement Strategy consultation proposals

:

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

- Delivery of a new air quality action plan (AQAP) covering the Lancaster district and specifically the city centre where objective exceedances (annual mean NO_2) persist.
- Delivery of rapid charging infrastructure for electric taxis in council car parks (due to be installed and operational by spring/summer 2021) and more chargers for electric vehicles generally (including the Council's own fleet).
- Further consultation event with the taxi trade regarding perceived obstacles transition to the use of electric taxi vehicles.
- Further transition of council fleet/grey fleet vehicles to electric vehicles.
- Delivery of campaign at reducing emissions/smoke arising from solid fuel appliances and bonfires (subject to Defra air quality grant funding).

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

- Delivery of new AQAP
- Delivery of air quality/low emission Supplementary Planning Guidance
- Delivery of Electric vehicle charging infrastructure across the district.
- Deliver solid fuel/appliance bonfire campaign (subject to grant funding)

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.
- 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 heating new buildings. Impacts on air pollution and climate change are being considered through the transport master plan, the local transport plan (LTP4), the movement strategy for the city centre, the local development plan, 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 the COVID19 crisis or other reasons as stated:

- Delivery of charging points for taxis (originally due by September 2020) (City Council)
- Development of the movement strategy options for the city centre and dependant production of a new air quality action plan - both now due 2021 (County and City Council).
- 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 remains to be spent due to protracted legal and procurement matters to be addressed. A specification and grant fund agreement have been drafted and the county council as local transport authority and Stagecoach as bus operator remain committed to delivering these improvements. 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 for the end of the year in order to re-examine the suitability and ongoing relevance of the agreed Specification given changes to public transport services and patronage during this period, with a view to agreeing an approach to procurement of a technology provider.

Whilst the measures stated above and detailed in Table 2.2 below 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, progressive air quality improvement, and enable particularly the revocation 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 2024	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.	2024	The production of a new air quality action plan for the district is linked and scheduled within Transport Masterplan delivery. Plan available at:- http://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/highways-and-transport-masterplans.aspx Delivery of a new air quality action plan to cover the Lancaster district (including the three AQMAs) is due is scheduled for delivery in 2020.
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 2024	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 2021 http://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/highways-and-transport-masterplans.aspx

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
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 2021.	2021	More information available at: https://www.lancaster.gov.uk/parking/
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.	2021	*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: http://heyshamlink.lancashire.gov.uk/	AQ monitoring to assess changes will continue in 2020/21. Further analysis is planned following availability of traffic count data.

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
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
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.
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 2020.	-	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: :http://www.lovetoride.net/lancashire https://www.cyclinguk.org/cycle/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

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
11	Lancaster Rail Station Park and Ride	Promoting Travel Alternatives	Promote use of rail and inland waterways	-	-	-	-	-	ongoing	-	60 Fee payable spaces
12	Carnforth 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
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	-	http://www.traveline-northwest.co.uk/cms/content/lancashire.xhtml http://www3.lancashire.gov.uk/corporate/web/index.asp?siteid=4404&pageid=19915 http://www.lancashire.gov.uk/roads-parking-and-travel/alternative-ways-to-travel.aspx http://www.lancashire.gov.uk/roads-parking-and-travel/public-transport.aspx
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.	-	http://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality http://www.ukairquality.net

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
19	Burning of waste Fact sheet	Public Information	via leaflets	Lancaster City Council and	-	2014	-	-	ongoing	-	Available at: http://www.lancaster.gov.uk/environmental-health/environmental-protection/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: http://www.visitlancashire.com/cycling-lancashire/cycle-hire
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	2024	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 http://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/highways-and-transport-masterplans.aspx for more information.

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
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 operational every 30 mins 6 days a week. Passenger journeys have increased from approximately 380 in Dec/Jan 2017 to around 2,900 in Feb/March 2020. Ticket detail is available at : http://www.lancashire.gov.uk/roads-parking-and-travel/public-transport/park-and-ride/lancaster-park-and-ride.aspx See item '32' below.
24	Shared Wheels Car Sharing	Alternatives to private vehicle use	Car & lift sharing schemes	Lancashire County Council	-	-	Members registered	-	4314 members registered in Lancashire area (Oct 2020) NB Covid will have significantly impacted on car sharing	-	See: https://sharedwheels.liftshare.com/ for further information
25	Lancaster Community Car Club	Alternatives to private vehicle use	Car Clubs	Lancaster Community Car Club –Community Interest Company	-	2010	-	-	-	-	-
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 rout 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 2021. The plan will link to the transport masterplan for the district.	2021	Current plan available at: http://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/local-transport-plan.aspx

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
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 spring/summer 2021.	2017(PAN adoption) and 2021(SPD adoption)	Templates also produced for regional adoption. Survey undertaken in May 2017 indicted 9 of 14 Lancashire authorities are looking to adopt the guidance in one of the three template forms.
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 Heath 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 2019/20
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	2024	Available at: http://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality/air-quality-reviews-and-assessments

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
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). http://www.lancaster.gov.uk/planning/planning-policy/examination-stage	2020	To ensure new exposure to poor AQ is prevented and to minimise emissions from new development Available at: http://www.lancaster.gov.uk/planning/local-plan/local-planning-policy/adopted-documents/development-management-dpd/ Policy reviewed to support new air quality planning guidance (item 28 above).
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 SPD in 2020	2020	Guidance available at: https://www.lancaster.gov.uk/planning/planning-policy/supplementary-planning-documents-spds
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: http://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality/air-quality-reviews-and-assessments Policy did not achieve objective.

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
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 place 2016	2016	HGV traffic to use J34 Link Road http://heyshamlink.lancashire.gov.uk/ 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)	Now due 2021.	More information available at: https://www.gov.uk/government/collections/clean-bus-technology-fund
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	-	-

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
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 Councils activities carbon neutral by 2030	-	Further information at: https://www.lancaster.gov.uk/sustainable-living/climate-change/responding-climate-change/ http://www.lancaster.gov.uk/sites/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 : https://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/installation-of-electric-vehicle-charge-points/ 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			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		Charging points to be provided in following car parks in 2021: 1 Dallas Road Lancaster 2 Salt Ayre Leisure Centre Morecambe 3 Festival Market Morecambe 4 Williamson Park Lancaster
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 awaited.

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
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	2020/21	The Council is consulting local operators and drivers regarding the uptake of EV's A further consultation (event) inviting the trade is planned for 2020. 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 spring 2021. Covid has resulted in a delay as due initially to be delivered by Sept 2020	2021	5 other Lancashire LAs are also installing chargers through the Lancaster coordinated 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 2 electric pool car vehicles are available for use and 7 Kangoos (electric vans). Charging infrastructure is now available at White Lund Depot, Charter House, Upper Leonards Gate car park, Lancaster Town Hall and Morecambe Town Hall	-	The Council is planning to replace fleet vehicles with electric vehicle alternatives where possible. In line with this the Council is planning to purchase 2 electric refuse vehicles

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. Requirements relating to $PM_{2.5}$ feature in the Environment Bill currently being considered in Parliament.

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 (PM_{10} 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

The City Council purchased a replacement particulate monitor in 2020 replacing the TEOM PM_{10} particulate monitor in the Cable Street air quality monitoring station. The new FIDAS monitor measures levels of both PM_{10} and $PM_{2.5}$ particulate pollution and therefore both PM_{10} and $PM_{2.5}$ levels at this location will be reported in future ASR reports. Using the suggested ratio factor of 0.7 from Technical Guidance

LAQM:TG(16) Chapter 7, annual mean $PM_{2.5}$ levels at the Cable Street Station for 2019 are estimated to be around 12 ug/m^3.

The Council has also specifically made an air quality grant bid to Defra in October 2020 to fund a campaign aimed at reducing particulate emissions arising from the use of solid fuel appliances and bonfires. Emissions from domestic solid fuel installations are estimated to contribute around 38% of $PM_{2.5}$ emissions nationally (see 2019 national Clean Air Strategy[4]).

Lancashire County Council and air quality

In Lancashire, the strongest evidence we have concerning 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 (5.2%), air pollution is still a significant public health issue for the county.

Working with district councils, Lancashire County Council has an important role to play in taking action to reduce these 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. Through 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.
- 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 access new funding schemes as they become available.

- Connecting East Lancashire is a 'smarter travel choices' campaign designed to encourage healthier and greener ways of travelling in East Lancashire. A dedicated team of Business Travel Planners work with individuals and organisations across east Lancashire to support a shift towards more sustainable and active forms of travel.
- The Road Safety Team work with schools, workplaces and the community to encourage safe and sustainable modes of travel. Initiatives for schools are promoted though 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, which 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.
- The County Council's vehicle fleet will be fitted with a driver behaviour tracking system to monitor and influence driver behaviour. The aim of the tracking system is to improve driver performance, reducing fuel costs, road accidents and vehicle emissions.

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 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.
- The County Council is working with Lancaster and Birmingham Universities to develop evidence based guidance for the use of green infrastructure as an approach to mitigating the health impacts of road transport emissions. The

guidance will enable organisations to introduce the most effective infrastructure at the most appropriate sites. In time, there may be opportunities for further projects around this work.

5. Raising awareness and increasing engagement

- The Lancashire Insight website provides information on the sources and health impacts of air pollution. Webpages include a Summary of Emissions Data, Monitoring of Air Quality and Health Impacts and an Air Quality and Health Dashboard.
- The County Council is the process of developing a clean air programme for schools. The toolkit will include: guidance and support for schools on developing a clean air strategy; lesson plans, activities and resources for teachers; provision of LCC's cycling and walking programmes; and resources for delivering a Clean Air Day event and creating a clean air banner.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with objectives.

Lancaster City Council undertook automatic (continuous) monitoring at two sites during 2019 and this continues in 2020. Table A.1 in Appendix A shows the details of the sites. Monitoring results and a map showing the location of monitoring stations are available at http://www.ukairquality.net/home/map

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 (passive) monitoring of NO_2 at 54 sites during 2019. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites and monitoring results are provided at :- https://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality/background-to-air-pollution-measurement-and-monitoring .

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[4], “annualisation” (where the data capture falls below 75%), and distance correction[5]. Further details on adjustments are provided in Appendix C.

[4] https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html
[5] Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3. Please note that the concentration data presented in Table A.3 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 2019 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 considered relevant.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

Appendix H contains information on the key local performance indicators for nitrogen dioxide pollution adopted bt Lancaster City Council (indicators for averaged roadside and monitored urban background levels).

The data as shows a general declining trend in nitrogen dioxide levels in the Lancaster District with both monitored roadside and background levels generally being lower than in 2018. There was no monitored exceedance of the hourly NO_2 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. 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 third year running. Bearing in mind the potential impact of new development, revokation 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. A more detailed report for the 2019 results from the Dalton Square and Cable Street sites is available at : https://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality/air-pollution-measurement-and-monitoring .

3.2.2 Particulate Matter (PM_{10})

Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

PM_{10} monitoring in 2019 indicated compliance with annual mean and 24hr objectives for PM_{10}.

Despite PM_{10} objectives being anticipated to be met at all locations within the Lancaster district, particulate pollution is considered to be a none 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 ($PM_{2.5}$)

No $PM_{2.5}$ monitoring was carried out in Lancaster in 2019. A new replacement monitor was installed in the Cable Street Lancaster Station in 2020 which monitors bot PM_{10} and $PM_{2.5}$ levels at this location. $PM_{2.5}$ data from this source will therefore be reported in the next report.

Using the suggested ratio factor of 0.7 from Technical Guidance LAQM:TG(16) Chapter 7, annual mean $PM_{2.5}$ levels at the Cable Street Station for 2019 are estimated to be around 12 ug/m^3.

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?	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	NO2	YES	APNA-370 NOx analyser	Y(0.4m)	4	2
APM1	Cable Street	Roadside	347684	461963	PM10	YES	PM10 – TEOM 1400a	Y(0.4m)	4	2
AN2	Dalton Square	Roadside	347852	461611	NO2	YES	APNA-360 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

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
LC1	Lancaster 1	Roadside	347853	461682	NO2	Y	2.5	2.5	n	3.5
LC4	Lancaster 4	Urban Background	347517	461714	NO2	N	N/A	1.5	n	3.5
LC5	Lancaster 5	Roadside	347847	462448	NO2	Y	0.2	2.5	n	3
LC8	Lancaster 8	Roadside	347792	461858	NO2	Y	0.2	1.7	n	3.5
LC9	Lancaster 9	Roadside	347808	461563	NO2	Y	0.2	2.7	n	3
LC10	Lancaster 10	Roadside	347834	461594	NO2	Y	0.2	3.3	n	3
LC11	Lancaster 11	Roadside	347823	461406	NO2	Y	0.2	3.1	n	3
LC13	Lancaster 13	Roadside	347582	461593	NO2	Y	0.2	2.4	n	3
LC14	Lancaster 14	Roadside	347684	461389	NO2	Y	0.2	2.2	n	3
A	Lancaster A	Kerbside	347579	462450	NO2	Y	N/A	0.3	Y	3
B1*	Lancaster B1	Roadside	347852	461610	NO2	Y	N/A	3.3	Y	2
B2*	Lancaster B2	Roadside	347852	461610	NO2	Y	N/A	3.3	y	2
B3*	Lancaster B3	Roadside	347852	461610	NO2	Y	N/A	3.3	y	2
C1*	Lancaster C1	Roadside	347684	461963	NO2	Y	0.4	3.7	y	2
D1*	Lancaster D1	Roadside	347684	461963	NO2	Y	0.4	3.7	y	2
E1*	Lancaster E1	Roadside	347684	461963	NO2	Y	0.4	3.7	y	2
H	Lancaster H	Roadside	347860	461127	NO2	N	0.2	9	n	3
I	Lancaster I	Roadside	347909	462015	NO2	Y	0.2	3.5	n	3

J	Lancaster J	Roadside	347852	461909	NO2	Y	0.2	1.9	n	3
K	Lancaster K	Roadside	347852	461791	NO2	Y	0.2	4.4	n	3
L	Lancaster L	Roadside	347612	461523	NO2	Y	0.2	1.5	n	2.5
O	Carnforth O	Roadside	349906	470624	NO2	Y	0.2	1.4	n	3
Q	Lancaster Q	Roadside	347665	461447	NO2	Y	0.2	2	n	3
V	Galgate V	Roadside	348359	455352	NO2	Y	0.2	1.6	n	3
Z	Galgate Z	Roadside	348345	455273	NO2	Y	0.2	2.3	n	2.5
ZA	Galgate ZA	Roadside	348351	455381	NO2	Y	0.2	1	n	3.5
ZB	Galgate ZB	Roadside	348386	455471	NO2	N	0.2	2	n	2
ZC	Galgate ZC	Roadside	348375	455391	NO2	Y	0.4	2.3	n	3
CF1	Carnforth CF1	Roadside	349871	470525	NO2	Y	0.2	5.9	n	2
CF2	Carnforth CF2	Roadside	349934	470605	NO2	Y	0.2	2.3	n	3.5
CF3	Carnforth CF3	Roadside	349853	470615	NO2	Y	0.2	2	n	3.5
CF4	Carnforth CF4	Roadside	349890	470628	NO2	Y	0.4	2.5	n	3
CF5	Carnforth CF5	Roadside	349963	470618	NO2	Y	0.2	1.8	n	3
CF6	Carnforth CF6	Roadside	350000	470667	NO2	Y	0.2	2.6	n	3.5
CF7	Carnforth CF7	Roadside	349613	470225	NO2	N	0.2	5.9	n	2.5
T1	Torrisholme T1	Roadside	345631	463693	NO2	N	0.2	2.4	n	3.5
LC15	Lancaster 15	Roadside	348199	462361	NO2	Y	0.2	4.9	n	5
LC18	Lancaster 18	Roadside	347784	461565	NO2	N	0.2	2.4	n	3.5
LC19	Lancaster 19	Roadside	347502	461841	NO2	Y	0.5	1.6	n	3
LC20	Lancaster 20	Roadside	347515	461835	NO2	Y	0.4	1.6	n	3
LC22	Lancaster 22	Roadside	347928	461025	NO2	N	0.2	7.2	n	3
LC23	Lancaster 23	Roadside	347948	460893	NO2	N	0.2	5	n	3
LC24	Lancaster 24	Roadside	347974	460514	NO2	N	0.2	2.8	n	3

LC25	Lancaster 25	Roadside	348084	459844	NO2	N	0.2	5.3	n	3
LC26	Lancaster 26	Roadside	347990	459418	NO2	N	0.2	5.5	n	3
LC27	Lancaster 27	Roadside	347989	459396	NO2	N	0.2	6.5	n	3
BLS 1	Bolton-le-Sands 1	Roadside	348594	468500	NO2	N	0.2	4	n	3
H1	Heysham 1	Roadside	341964	463273	NO2	N	0.5	2.5	n	2.5
CF8	Carnforth CF8	Roadside	349568	470044	NO2	N	0.2	4.5	n	3
LC28	Lancaster 28	Roadside	348517	463243	NO2	N	0.2	6	n	2.5
LC29	Lancaster 29	Roadside	348527	463270	NO2	N	0.2	5.3	n	2.5
LC30	Lancaster 30	Roadside	348511	462226	NO2	N	0.2	6.5	n	2.5
LC31	Lancaster 31	Roadside	348114	462071	NO2	N	0.4	3	n	3
LC32	Lancaster 32	Roadside	347511	461744	NO2	Y	0.3	2	n	3.5
LC33	Lancaster 33	Roadside	348043	462118	NO2	Y	-	2	n	3.5
M6	Lancaster M6	Roadside	349271	460208	NO2	N	0.2	-	n	2
MC4	Morecambe 4	Roadside	345240	463663	NO2	N	20	1	n	3
LC34	Lancaster 34	Roadside	348623	461870	NO2	N	0.2	5	n	2.2

Notes:

(1) 0.2m 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.3 – Annual Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3) (4)				
							2015	2016	2017	2018	2019
AN1 -Cable St	347684	461963	Roadside	Automatic		98.4			39.6	34	34
AN2 - Dalton Sq	347852	461610	Roadside	Automatic		95.9	34.9	32	32	34	29
LC1	347853	461682	Roadside	Diffusion Tube		100	**50**	**50**	**46**	**43**	**43**
LC4	347517	461714	Urban Background	Diffusion Tube		100	16	**17**	15	14	13
LC5	347847	462448	Roadside	Diffusion Tube		100	**42**	**41**	31	30	29
LC8	347792	461858	Roadside	Diffusion Tube		100	34	33	30	25	29
LC9	347808	461563	Roadside	Diffusion Tube		100	39	39	37	32	30
LC10	347834	461594	Roadside	Diffusion Tube		100	**71**	**66**	**62**	**55**	**53**
LC11	347823	461406	Roadside	Diffusion Tube		100	**60**	**61**	**57**	**48**	**48**
LC13	347582	461593	Roadside	Diffusion Tube		83.3	**41**	34	34	34	32
LC14	347684	461389	Roadside	Diffusion Tube		91.7	35	32	32	28	27
A	347579	462450	Roadside	Diffusion Tube		91.7	35	36	25	26	23
B1	347852	461610	Roadside	Diffusion Tube		100	35	31	32	28	27
B2	347852	461610	Roadside	Diffusion Tube		100	36	33	32	28	27

B3	347852	461610	Roadside	Diffusion Tube		100	37	33	32	28	27
C1	347684	461963	Roadside	Diffusion Tube		100	39	**41**	39	35	35
D1	347684	461963	Roadside	Diffusion Tube		100	**41**	**41**	37	36	36
E1	347684	461963	Roadside	Diffusion Tube		100	**41**	**43**	38	38	38
H	347860	461127	Roadside	Diffusion Tube		100	32	32	28	27	26
I	347909	462015	Roadside	Diffusion Tube		100	37	38	36	33	32
J	347852	461909	Roadside	Diffusion Tube		100	**45**	**47**	**42**	**40**	**40**
K	347852	461791	Roadside	Diffusion Tube		100	**42**	**42**	38	35	34
L	347612	461523	Roadside	Diffusion Tube		100	**43**	38	**40**	37	34
O	349906	470624	Roadside	Diffusion Tube		100	**41**	**40**	36	34	34
Q	347665	461447	Roadside	Diffusion Tube		100	39	37	35	28	26
V	348359	455352	Roadside	Diffusion Tube		100	**46**	**42**	38	33	33
Z	348345	455273	Roadside	Diffusion Tube		100	**43**	**42**	37	33	32
ZA	348351	455381	Roadside	Diffusion Tube		100	30	31	27	26	24
ZB	348386	455471	Roadside	Diffusion Tube		100	27	29	24	24	22
ZC	348375	455391	Roadside	Diffusion Tube		100	39	37	34	31	31
CF1	349871	470525	Roadside	Diffusion Tube		100	34	33	27	27	30
CF2	349934	470605	Roadside	Diffusion Tube		100	**41**	**42**	38	33	25

CF3	349853	470615	Roadside	Diffusion Tube		100	38	30	30	28	25
CF4	349890	470628	Roadside	Diffusion Tube		100	39	36	34	33	31
CF5	349963	470618	Roadside	Diffusion Tube		100	39	39	33	32	29
CF6	350000	470667	Roadside	Diffusion Tube		100	36	35	35	28	25
CF7	349613	470225	Roadside	Diffusion Tube		100	33	30	27	25	22
T1	345631	463693	Roadside	Diffusion Tube		100	34	32	29	28	24
LC15	348199	462361	Roadside	Diffusion Tube		100	38	35	29	27	27
LC18	347784	461565	Roadside	Diffusion Tube		100	32	30	31	29	25
LC19	347502	461841	Roadside	Diffusion Tube		100	**61**	**60**	**60**	**43**	**45**
LC20	347515	461835	Roadside	Diffusion Tube		100	**45**	**48**	**44**	39	38
LC22	347928	461025	Roadside	Diffusion Tube		91.7	27	28	26	25	22
LC23	347948	460893	Roadside	Diffusion Tube		100	35	35	31	27	26
LC24	347974	460514	Roadside	Diffusion Tube		100	33	32	29	25	24
LC25	348084	459844	Roadside	Diffusion Tube		100	24	24	22	21	19
LC26	347990	459418	Roadside	Diffusion Tube		100	38	36	32	29	27
LC27	347989	459396	Roadside	Diffusion Tube		100	31	31	28	26	25
BLS1	348594	468500	Roadside	Diffusion Tube		100	34	32	27	26	24
H1	341964	463273	Roadside	Diffusion Tube		91.7	25	25	21	22	20

CF8	349568	470044	Roadside	Diffusion Tube		100	36	33	29	27	26
LC28	348517	463243	Roadside	Diffusion Tube		100	39	**36**	28	23	26
LC29	348527	463270	Roadside	Diffusion Tube		100	38	**35**	27	26	24
LC30	348511	462226	Roadside	Diffusion Tube		100	32	**31**	24	28	22
LC31	348114	462071	Roadside	Diffusion Tube		100	36	**33**	30	33	31
LC32	347511	461744	Roadside	Diffusion Tube		83.3	**53**	**49**	**46**	**44**	37
LC33	348043	462118	Roadside	Diffusion Tube		100			35	35	34
M6	349271	460208	Roadside	Diffusion Tube		100			20	24	21
MC4	345240	463663	Roadside	Diffusion Tube		75					26

☒ **Diffusion tube data has been bias corrected**

☒ **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 adjustment**

Notes:

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

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

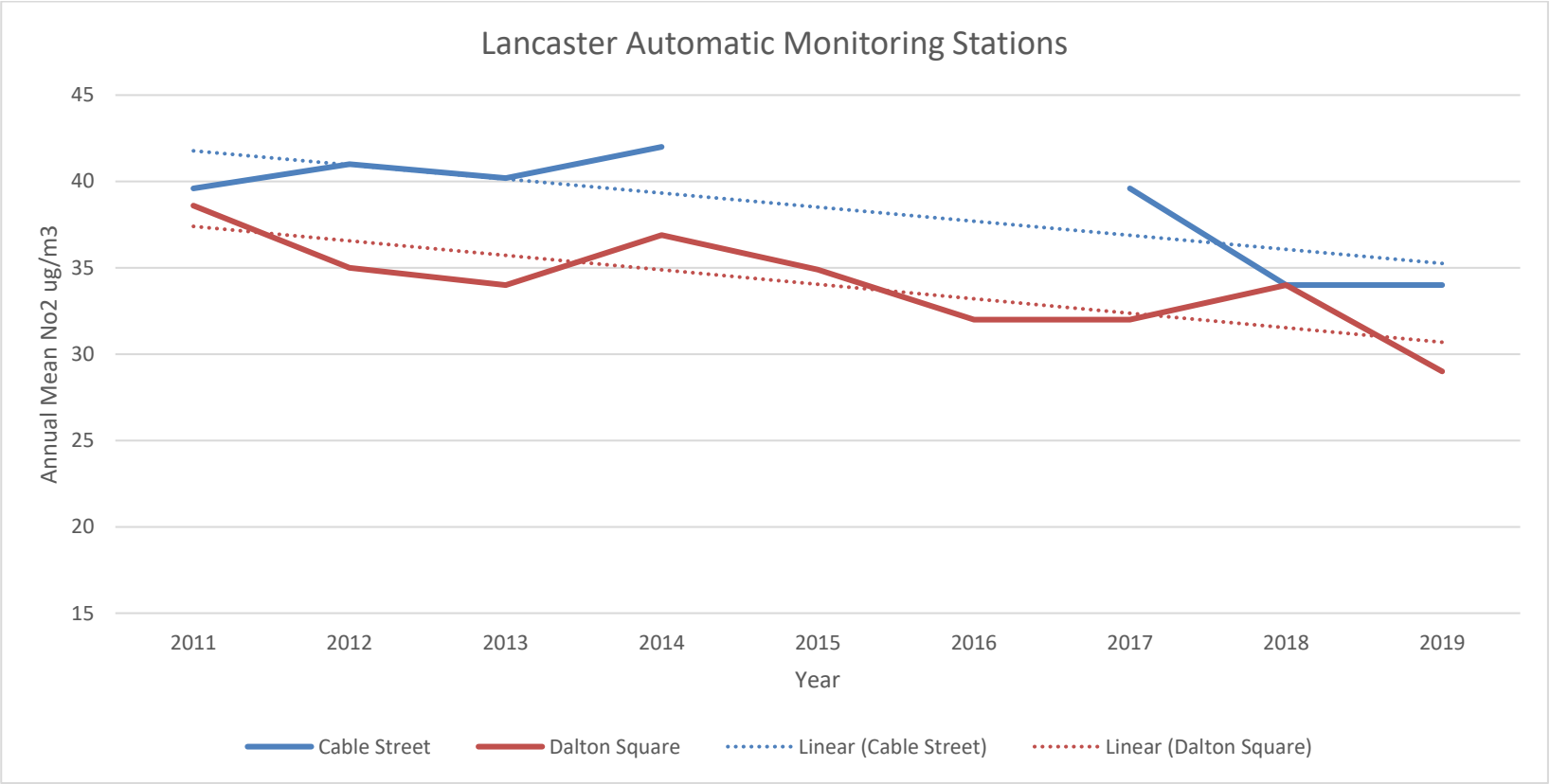
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

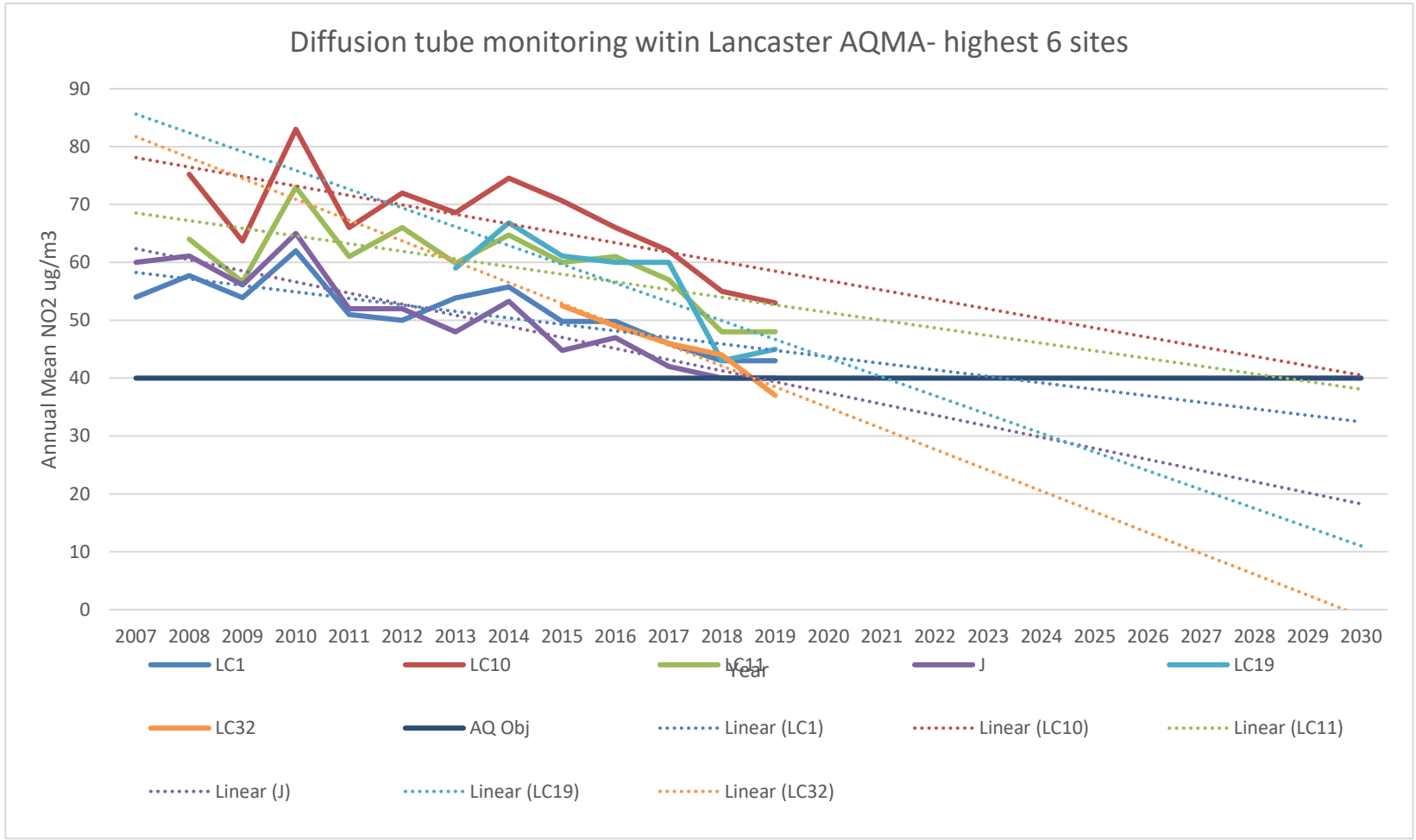
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

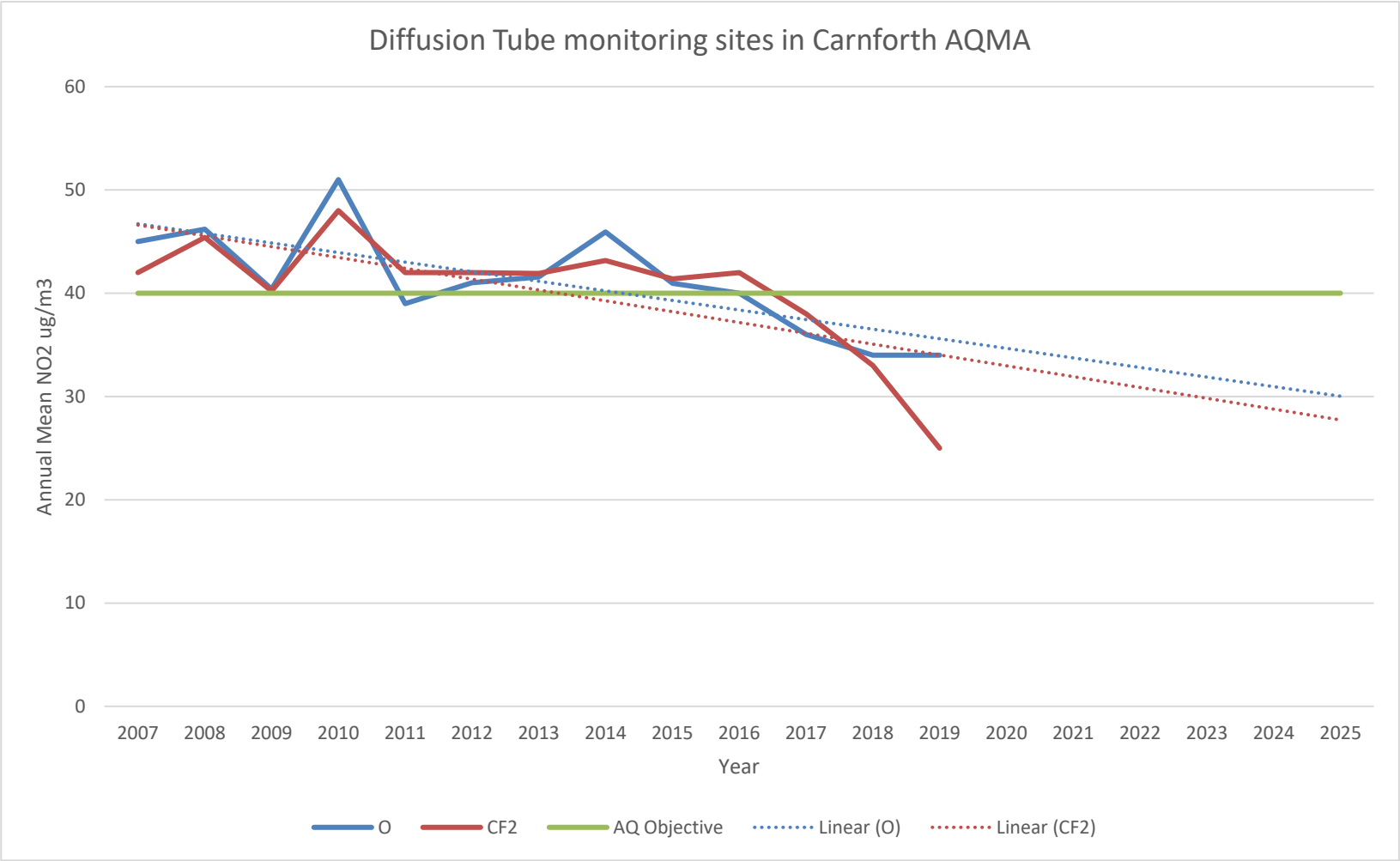
(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

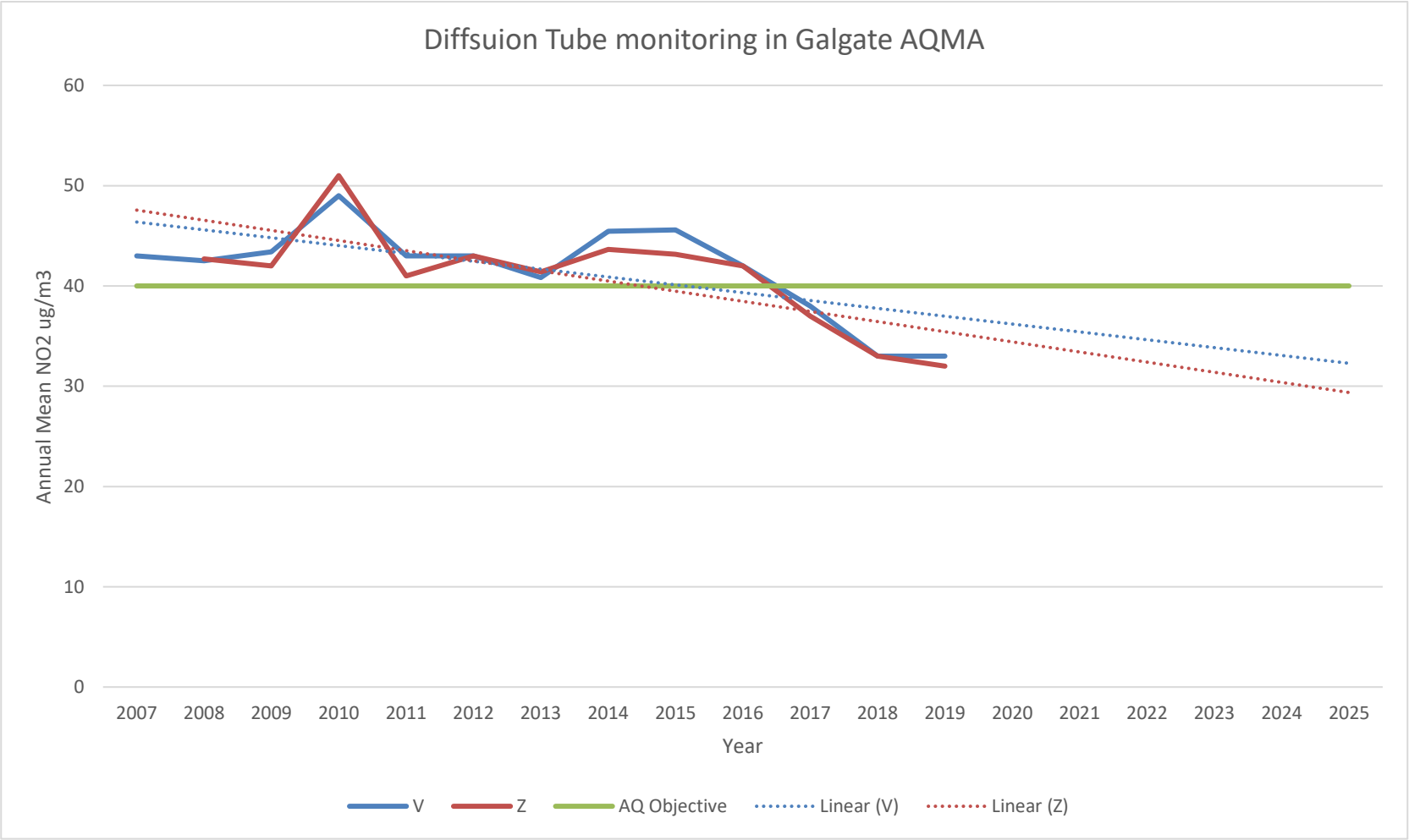
(4) Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

Figure A.1 – Trends in Annual Mean NO_2 Concentrations




Diffusion tube monitoring witin Lancaster AQMA- highest 6 sites
Annual Mean NO2 ug/m3
90
80
70
60
50
40
30
20
10
0
2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
Year
LC1
LC10
LC11
J
LC19
LC32
AQ Obj
Linear (LC1)
Linear (LC10)
Linear (LC11)
Linear (J)
Linear (LC19)
Linear (LC32)


Diffusion Tube monitoring sites in Carnforth AQMA
Annual Mean NO2 ug/m3
60
50
40
30
20
10
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
Year
O
CF2
AQ Objective
Linear (O)
Linear (CF2)


Diffsuion Tube monitoring in Galgate AQMA
Annual Mean NO2 ug/m3
60
50
40
30
20
10
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
Year
V
Z
AQ Objective
Linear (V)
Linear (Z)

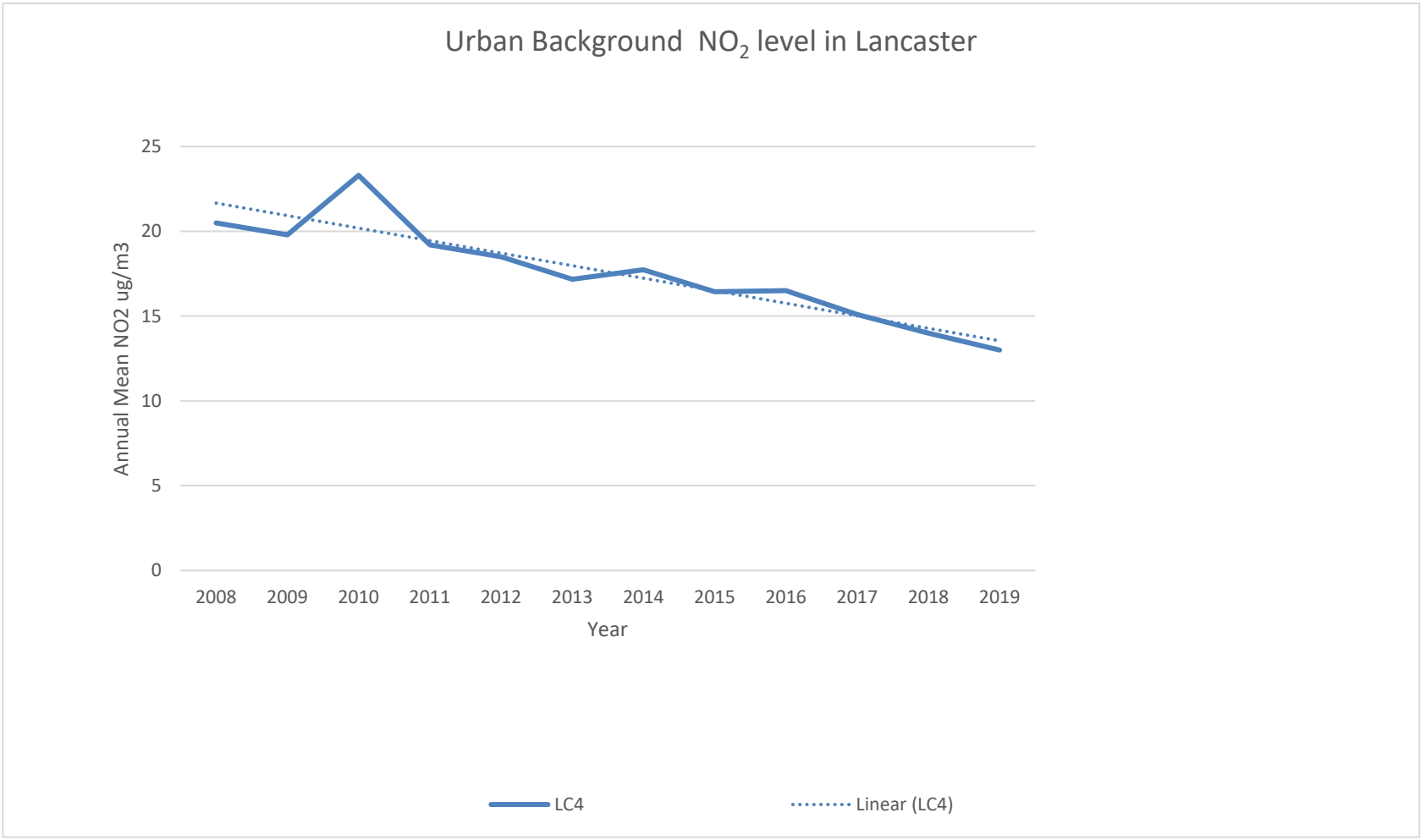

Urban Background NO2 level in Lancaster
Annual Mean NO2 ug/m3
25
20
15
10
5
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Year
LC4
Linear (LC4)

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 1-Hour Means > 200µg/m³ (3)				
							2015	2016	2017	2018	2019
AN1 - Cable St	347684	461963	Roadside	Automatic		98.4			0(98)	0	0
AN2 - Dalton Sq	347852	461610	Roadside	Automatic		95.9	0	0	0	0	0

Notes:

Exceedances of the NO_2 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold.**

(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%).

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

Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} Annual Mean Concentration (µg/m³) (3)				
						2015	2016	2017	2018	2019
APM1 - Cable Street	347684	461963	Roadside		93.1	24.6	-	22.5	22	17

Notes:

Exceedances of the PM_{10} annual mean objective of 40µg/m³ are shown in **bold.**

(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%).

(3) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations

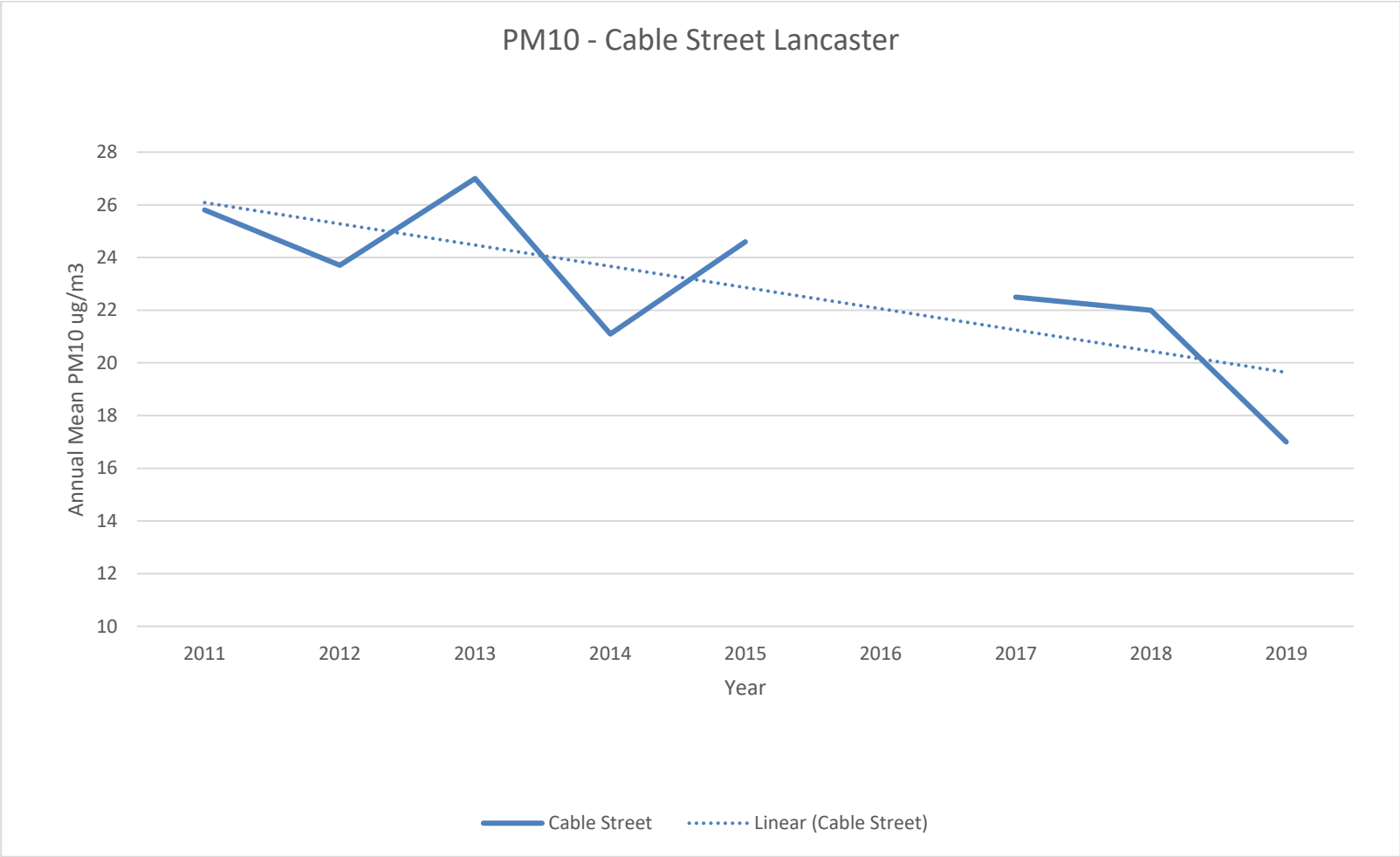


Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
						2015	2016	2017	2018	2019
APM1 - Cable Street	347684	461963	Roadside		93.1	9(38.9)	!(16)	0(34)	1	1

Notes:

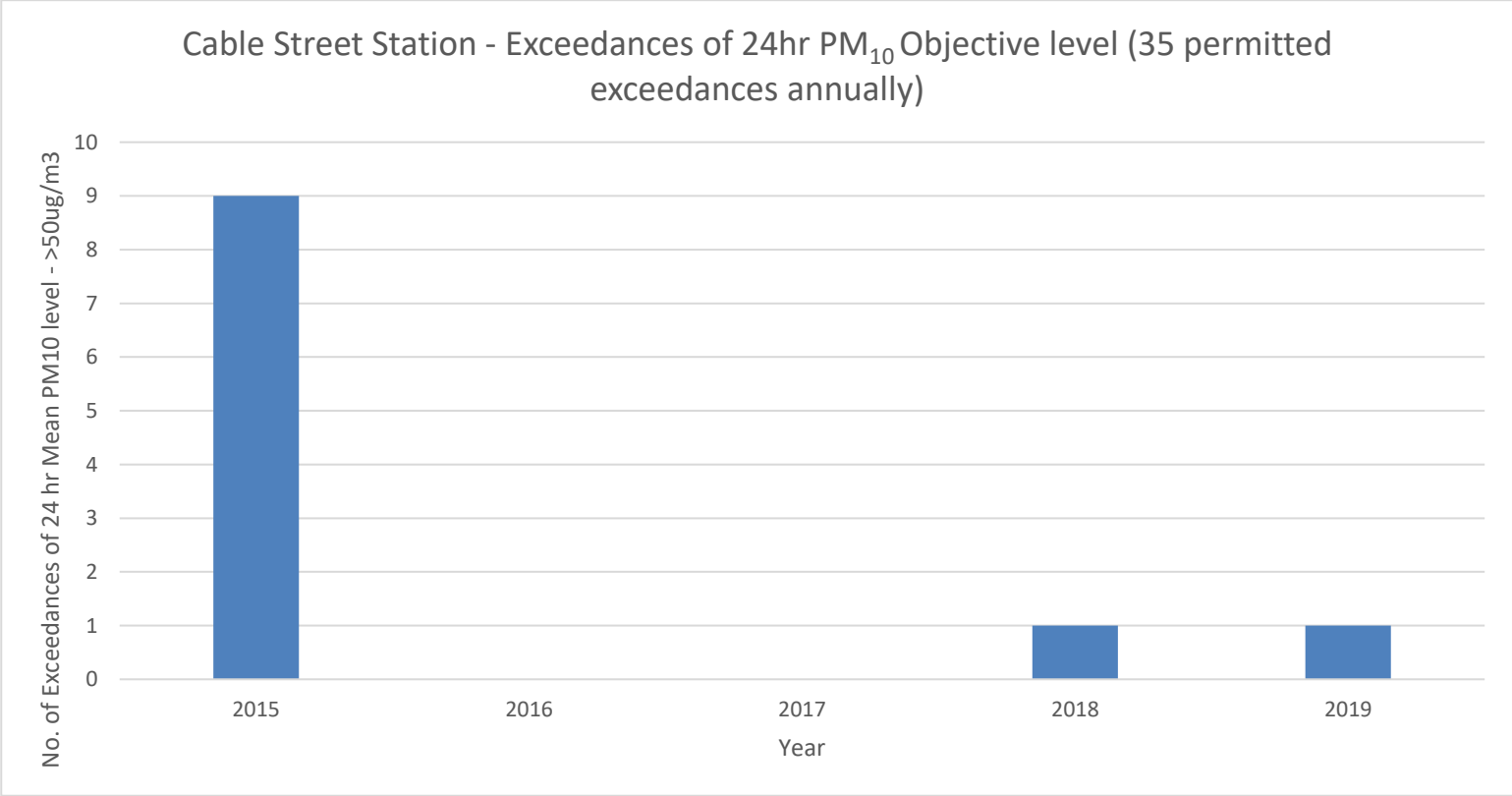
Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold.**

(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%).

(3) If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

Figure A.3 – Trends in Number of 24-Hour Mean PM_{10} Results >50µg/m^3



Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO_2 Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Annual Mean		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.91) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
L/C1	347853	461682	65.4	47.6	41.5	57.1	28.6	41.9	43.7	40.0	42.6	49.4	56.6	45.8	47	**43**	37.9
L/C4	347517	461714	27.2	18.9	11.4	12.7	6.0	9.3	9.3	7.8	13.4	14.4	25.1	17.2	14	13	
L/C5	347847	462448	47.56	30.96	28.52	38.03	16.99	29.53	28.59	23.94	28.49	30.56	41.22	31.02	31	29	
L/C8	347792	461858	43.08	36.16	27.21	39.62	17.37	27.96	25.53	22.08	29.48	30.79	43.16	29.93	31	29	
L/C9	347808	461563	49.05	41.87	35.06	33.9	20.02	31.46	19.56	26.23	28.03	35.24	39.39	33.76	33	30	
L/C10	347834	461594	80.26	67.94	61.99	52.32	40.03	53.78	57.95	59.14	55.84	54.04	59.14	50.7	58	**53**	
L/C11	347823	461406	73.85	59.6	61.21	47.27	35.23	49.93	51	48.87	49.01	46.16	55.02	45.68	52	**48**	
L/C13	347582	461593	49.22	40.15	40.52	32.06	20.78	31.52	35.08			28.01	35.54	34.42	35	32	
L/C14	347684	461389	48.86		30.34	29.24	16.09	26.31	26.26	21.61	29.85	28.4	39.6	30.43	30	27	
A	347579	462450	34.84	27.89	27.23	24.94	15.2	24.87	0.48		26.67	24.86	38.41	30.3	25	23	

B1	347852	461610	44.72	36.37	33.71	24.98	16.78	25.21	29.02	27.15	26.67	25.03	34.45	32.17	30	27	
B2	347852	461610	45.5	40.87	33.43	24.61	16.3	24.19	26.1	24.29	27.18	19.24	34.53	37.44	29	27	
B3	347852	461610	46.33	40.79	32.1	23.77	14.11	23.95	25.48	26.27	26.52	26.55	37.28	27.14	29	27	
C1	347684	461963	54.12	35.05	37.09	41.46	24.27	41.52	37.32	28.85	37.42	37.37	53.07	30	38	35	
D1	347684	461963	53.78	34.75	40.21	40.42	25.63	41.29	34.56	31.01	53.42	41.89	52.44	24.04	39	36	
E1	347684	461963	54.29	37.82	41.42	46.39	27.13	43.09	36.88	33.42	55.93	36.18	53.54	32.13	42	38	
H	347860	461127	42.3	29.18	22.22	38.46	14.75	27.84	21.34	17.02	28.56	27.7	43.84	24.59	28	26	
I	347909	462015	50.51	41.87	28.87	39.68	19	33.35	30.52	26.39	34.58	31.91	48.31	32.46	35	32	
J	347852	461909	63.93	49.5	41.15	44.04	24.47	37.77	40.43	34.83	37.85	44.45	56.57	45.06	43	40	
K	347852	461791	53.04	41.83	38.25	45.47	21.79	38.19	31.85	30.73	34.3	38.11	43.82	31.28	37	34	
L	347612	461523	56.08	45.72	35.12	34.95	23.41	37.4	35.34	32.95	33.23	36.54	40.07	37.62	37	34	
O	349906	470624	46.38	40.44	35.12	41.06	22.74	34	34.52	31.22	37.37	37.69	47.49	29.81	36	34	
Q	347665	461447	35.86	36.36	25.13	34.73	14.02	26.44	21.86	16.55	30.02	27.7	46.46	29.05	29	26	
V	348359	455352	49.88	42.57	45.09	26.82	20.81	30.93	36.69	33.27	33.44	34.51	43.02	35.26	36	33	
Z	348345	455273	51.34	38.88	45.67	27.85	19.77	33.54	34.32	32.02	33.95	33.28	39.84	33.36	35	32	
ZA	348351	455381	31.47	31.43	22.88	27.91	13.76	21.83	21.59	19.48	25.99	26.93	40.23	27.66	26	24	
ZB	348386	455471	35.35	33.23	19.72	27,05	12.21	19.9	17.34	15.25	22.06	26.32	35.39	22.56	24	22	
ZC	348375	455391	47.5	42.34	25.99	40.44	16.34	29.26	27.34	22.91	31.1	32.13	46.81	37.43	33	31	

cf1	349871	470525	35.02	30.02	44.28	28.57	21.2	30.7	35.93	33.43	33.02	29.02	39	36.77	33	30	
cf2	349934	470605	45.59	38.64	27.54	20.63	15.03	21.95	25.41	18.17	22.78	27.84	32.76	26.11	27	25	
cf3	349853	470615	37.17	36.61	30.28	25.95	15.01	22.36	23.08	22.72	26.36	28.08	31.98	31.56	28	25	
cf4	349890	470628	42.92	42.79	28.41	40.33	15.83	28.43	30.51	26.59	29.78	35.77	45.52	36.96	34	31	
cf5	349963	470618	45.13	33.93	28.94	40.31	18.37	27.97	28.72	23.44	29.84	32.98	45.52	29.34	32	29	
cf6	350000	470667	35.49	34.52	26.75	40.81	15.42	21.77	26.15	17.27	21.41	28.32	35.37	28.87	28	25	
cf7	349613	470225	33.79	27.48	30.01	19.35	13.5	21.26	21.49	19.82	24.18	18.77	29.61	25.86	24	22	
T1	345631	463693	38.89	36.9	27.64	25.78	13.69	21.23	25.29	21.57	21.84	25.49	29.42	24.36	26	24	
LC15	348199	462361	40.72	37.71	31.95	27.01	14.77	22.25	24.78	22.01	27.14	29.38	36.66	32.4	29	27	
LC18	347784	461565	37.82	31.08	26.54	29.24	13.76	23.47	19.96	16.77	25.95	27.47	39.86	28.61	27	25	
LC19	347502	461841	59.35	53.44	59.57	44.43	28.74	49.46	46.24	49.54	45.02	50.37	50.28	53.67	49	**45**	
LC20	347515	461835	56.84	50.36	40.97	43.34	21.83	37.58	32.08	35.08	40.03	43.76	49.01	43.72	41	38	
LC22	347928	461025	36.63	31.97	23.11	23.96	7.35	15.11		15.67	23.71	26.52	35.74	25.64	24	22	
LC23	347948	460893	42.15	38.66	30.01	25.55	14.6	24.08	21.55	21.32	25.91	29.29	37.4	29.57	28	26	
LC24	347974	460514	41.04	35.18	29.11	19.88	13.37	20.38	20.61	19.56	26.17	23.38	32.07	29.95	26	24	
LC25	348084	459844	34.99	30.18	19.28	19.8	9.49	14.77	14.6	12.15	18.94	23.95	31.43	22.87	21	19	
LC26	347990	459418	45.82	36.87	31.29	25.68	15.73	25.69	24.81	21.71	30	28.56	37.07	29.81	29	27	
LC27	347989	459396	41.13	32.39	27.29	27.5	12.05	23.08	19.43	16.56	25.46	28.87	38.69	29.59	27	25	

BLS1	348594	468500	33.14	31.97	24.23	26.48	14.57	22.14	22.86	22.42	24.01	26.27	32.65	27.49	26	24	
H1	341964	463273	30.14	32.34	17.67	24.02	9.48	15.65	15.38	12.25		26.21	33.47	22.79	22	20	
CF8	349568	470044	37.39	39.33	25.32	30.8	13.72	23.47	23.2	21.84	18.06	34.92	38.69	31.84	28	26	
LC28	348517	463243	36.73	37.01	31.69	27.56	14.49	25.99	23.76	21.32	26.8	28.41	38.06	28.87	28	26	
LC29	348527	463270	34.29	34.4	29.81	24.96	12.9	21.49	21.92	19.6	22.49	28.13	33.22	26.54	26	24	
LC30	348511	462226	40.53	31.12	19.83	23.43	12.74	21.09	19.85	15.86	21.3	24.93	35.02	25.36	24	22	
LC31	348114	462071	47.46	41.75	40.62	26.99	18.9	33.37	31.28	31.45	31.11	32.65	33.14	32.93	33	31	
LC32	347511	461744	54.93	50.2	37.11	36.28	23.78	49.08	36.75	32.52	39.56	45.88			41	37	
LC33	348043	462118	45.12	44.39	45.86	54.4	16.03	29.68	28.25	26.82	33.2	34.9	47	42.9	37	34	
M6	349271	460208	29.32	32.55	18.4	26.77	10.54	20.37	20.44	15.4	24.75	24.55	34.76	22.56	23	21	
MC4	345240	463663				31.74	16.04	26.71	24.97	21.45	29.27	30.86	44.99	32.38	29	26	18.2

☒ **National bias adjustment factor used**

☒ **Where considered applicable, data has been distance corrected for relevant exposure in the final column**

Notes:

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

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

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure is carried out using information contained in table A2 above and using the distance correction tool available at https://laqm.defra.gov.uk/tools-monitoring-data/tool-monitoring-data.html

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

Automatic Monitoring Sites

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 (NO_2) and particulate matter (PM_{10}). The Dalton Square site monitors nitrogen dioxide only. The two stations commenced monitoring in 2011 and both currently (2019/20) remain operational.

Equipment at the two sites is (2 No. APNA 370 NO_2 analysers and 1No. particulate monitor). The particulate monitor was changed from a TEOM instrument monitoring PM_{10} to a FIDAS instrument monitoring both PM_{10} 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.

Diffusion Tube Monitoring Sites

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

Figure 5 - Gradko Accreditation Certificate and Schedule (for provision and analysis of NO_2 diffusion tubes used in Lancaster)

United Kingdom Accreditation Service

ACCREDITATION CERTIFICATE

UKAS
UNITED KINGDOM ACCREDITATION SERVICE

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).

Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

UKAS TESTING 2187 **Accredited to ISO/IEC 17025:2005**	**Gradko International Ltd (Trading as Gradko Environmental)** **Issue No:** 019 **Issue date:** 04 September 2015
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	Chemical Tests	Documented In-House Methods
	Ammonia	GLM 8 by Ion Chromatography
	Benzene Toluene Ethyl benzene Xylene	GLM 4 by Thermal Desorption/ FID Gas Chromatography
	Hydrogen chloride Nitrogen dioxide Sulphur dioxide Hydrogen fluoride	GLM 3 by Ion Chromatography
	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

Assessment Manager: LB

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UKAS TESTING 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)	Chemical Tests (cont'd)	
Flexible Scope encompassing Volatile Organic Compounds to in-house validation criteria	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		

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 e-mail:diffusion@gradko.co.uk

Nitrogen Dioxide Diffusion Tubes 20% TEA/Water Inter-comparison 2019

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	09/01/2019	06/02/2019	85.1	85.7	92.0	88	3.8	4	9.5	88.0	90.4	Good	Good
2	06/02/2019	06/03/2019	103.1	103.3	106.6	104	1.9	2	4.8	84.4	94.2	Good	Good
3	06/03/2019	03/04/2019	87.0	86.4	90.8	88	2.3	3	5.7	70.0	93.4	Good	Good
4	03/04/2019	01/05/2019	79.1	72.5	77.5	76	3.5	5	8.6	57.6	96.2	Good	Good
5	01/05/2019	05/06/2019	70.3	77.6	77.1	75	4.0	5	10.1	57.7	79.2	Good	Good
6	05/06/2019	03/07/2019	82.8	90.4	80.7	85	5.1	6	12.6	64.8	84.9	Good	Good
7	03/07/2019	07/08/2019	82.3	77.2	89.8	83	6.4	8	15.8	59.5	93.9	Good	Good
8	07/08/2019	04/09/2019	93.1	87.0	94.9	92	4.1	5	10.3	59.3	82.6	Good	Good
9	04/09/2019	02/10/2019	77.9	76.6	76.6	77	0.8	1	1.9	55.2	97.4	Good	Good
10	02/10/2019	06/11/2019	81.7	92.4	80.5	85	6.6	8	16.3	63.3	97.1	Good	Good
11	06/11/2019	04/12/2019	79.8	83.5	73.3	79	5.2	7	12.9	62.9	97.5	Good	Good
12	04/12/2019	08/01/2020	92.6	84.1	92.0	90	4.7	5	11.8	61.6	97.4	Good	Good
13													
												Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey -->

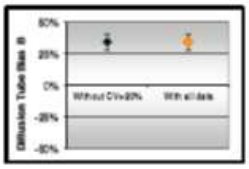
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Marylebone Road

Precision: 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.75 (0.71 - 0.78)
Bias B	34% (28% - 40%)
Diffusion Tubes Mean:	85 μgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	64 μgm^{-3}
Data Capture for periods used:	92%
Adjusted Tubes Mean:	64 (60 - 66) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.75 (0.71 - 0.78)
Bias B	34% (28% - 40%)
Diffusion Tubes Mean:	85 μgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	64 μgm^{-3}
Data Capture for periods used:	92%
Adjusted Tubes Mean:	64 (60 - 66) μgm^{-3}



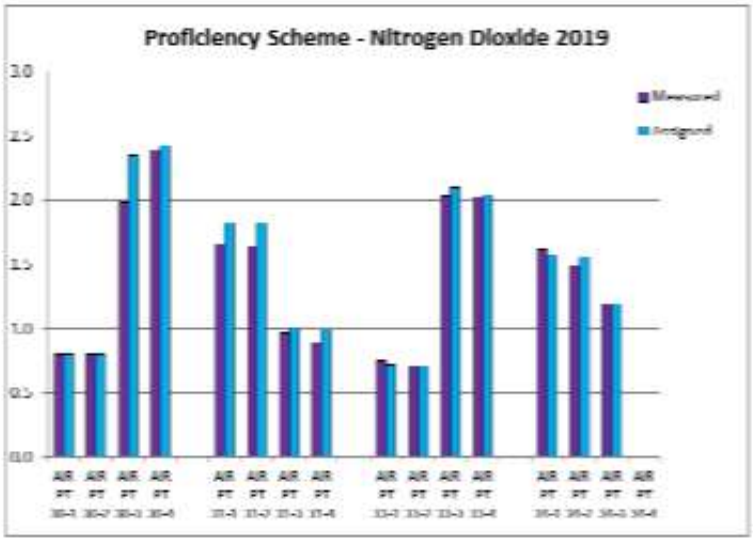
Jaume Targa, for AEA
Version 04 - February 2011

(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 2019

Methods: GLM 7 – CARY 60 Spectrophotometer

AIR PT Proficiency Scheme - Nitrogen Dioxide 2019					
Date	Round	Assigned value	Procedure GLM 7		
			Measured concentration	z-Score	% Bias
Feb-19	AIR PT 30-1	0.8	0.8	0	0.0%
Feb-19	AIR PT 30-2	0.8	0.8	0	0.0%
Feb-19	AIR PT 30-3	2.35	1.98	-2.1	-15.7%
Feb-19	AIR PT 30-4	2.42	2.39	-0.16	-1.2%
May-19	AIR PT 31-1	1.82	1.65	-1.24	-9.3%
May-19	AIR PT 31-2	1.82	1.64	-1.31	-9.9%
May-19	AIR PT 31-3	1.01	0.97	-0.53	-4.0%
May-19	AIR PT 31-4	0.99	0.89	-1.35	-10.1%
Aug-19	AIR PT 33-1	0.72	0.75	0.56	4.2%
Aug-19	AIR PT 33-2	0.71	0.71	0	0.0%
Aug-19	AIR PT 33-3	2.09	2.03	-0.38	-2.9%
Aug-19	AIR PT 33-4	2.04	2.02	-0.13	-1.0%
Oct-19	AIR PT 34-1	1.57	1.61	0.38	2.5%
Oct-19	AIR PT 34-2	1.56	1.49	-0.56	-4.5%
Oct-19	AIR PT 34-3	1.19	1.19	0	0.0%
Oct-19	AIR PT 34-4	Sample wasted not submitted			



March 2020

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Table C.5 Collected NO_2 diffusion tube bias adjustment factors for 2014-2019

Tube/Supplier Analyst	Method	2014	2014	2015	2016	2017	2018	2018	2019	2019
Local Factors		*Cable St*	*Dalton Sq*	*Dalton Sq*	*Dalton Sq*	*Dalton Sq*	*Dalton Sq*	*Cable St*	*Cable St*	*Dalton Sq*
Gradko 2013 - 2018	20% TEA in water	0.936	1.034	1.030	0.97	0.91	1.09	0.89	0.86	0.98
National Factors										
Gradko (national factors) 2013 – 2018 (2018 factor from sheet 09/19)*	20% TEA in water	0.92		0.91	0.92	0.87	0.92		0.91	

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

NB The National Bias Correction factor (0.91 from V09/20/final spreadsheet shown immediately below) was used to bias correct Lancaster diffusion tube results in 2019 (this report). Using the highest local bias factor (Dalton Sq. – 0.98) results in tube results being slightly higher, but all exceedances lying within the AQMAs. The bias correction factor selected in this report (0.91) represents accepted good practice. The National Bias Correction factor will be the default choice of factor for future reports.

National Diffusion Tube Bias Adjustment Spreadsheet snapshot (providing bias adjustment factor used in this report) V09 – 20 - Final

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 09/20

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.

This spreadsheet will be updated at the end of March 2021

LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

Step 4:

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[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method	Year[5]	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2019	KS	Marylebone Road Intercomparison	12	85	65	30.1%	G	**0.77**
Gradko	20% TEA in water	2019	R	Borough Council of King's Lynn and West Norfolk	9	27	21	28.4%	G	**0.78**
Gradko	20% TEA in water	2019	R	Lancaster City Council	13	40	34	16.4%	G	**0.86**
Gradko	20% TEA in water	2019	R	Lancaster City Council	12	31	31	1.6%	G	**0.98**
Gradko	20% TEA in Water	2019	R	Monmouthshire County Council	12	33	33	1.3%	G	**0.99**
Gradko	20% TEA in water	2019	R	Dudley MBC	12	33	32	4.5%	G	**0.96**
Gradko	20% TEA in water	2019	R	Dudley MBC	12	44	42	3.3%	G	**0.96**
Gradko	20% TEA in water	2019	UB	Dudley MBC	12	23	19	19.8%	G	**0.83**
Gradko	20% TEA in water	2019	UB	Eastleigh Borough Council	12	24	26	-7.1%	G	**1.08**
Gradko	20% TEA in water	2019	R	Gateshead Council	12	34	27	23.7%	P	**0.81**
Gradko	20% TEA in water	2019	R	Gateshead Council	11	40	44	-10.5%	G	**1.12**
Gradko	20% TEA in water	2019	R	Gateshead Council	10	32	34	-7.2%	G	**1.08**
Gradko	20% TEA in water	2019	R	Gateshead Council	12	30	25	18.1%	G	**0.85**
Gradko	20% TEA in water	2019	R	Thurrock Borough Council	12	29	24	21.6%	G	**0.82**
Gradko	20% TEA in water	2019	R	Brighton & Hove City Council	11	45	46	-1.3%	G	**1.01**
Gradko	20% TEA in water	2019	R	Belfast City Council	12	40	33	21.0%	G	**0.83**
Gradko	20% TEA in water	2019	R	Belfast City Council	12	44	45	-2.2%	G	**1.02**
Gradko	20% TEA in water	2019	R	Belfast City Council	12	28	26	5.4%	G	**0.95**
Gradko	20% TEA in water	2019	UB	Southampton City Council	12	30	28	8.6%	G	**0.92**
Gradko	20% TEA in water	2019	UB	Liverpool City Council	12	20	19	1.7%	G	**0.98**
Gradko	20% TEA in water	2019	R	Ards and North Down Borough Council	12	33	25	31.1%	G	**0.76**
Gradko	20% TEA in water	2019	R	Eastleigh Borough Council	12	25	26	-3.3%	G	**1.03**
Gradko	20% TEA in water	2019	R	Lisburn & Castlereagh City Council	12	28	22	28.3%	G	**0.78**
Gradko	20% TEA in water	2019	UB	Blackpool Council	12	16	13	28.8%	G	**0.78**
Gradko	20% TEA in water	2019		**Overall Factor[3] (31 studies)**				**Use**		**0.91**

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

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

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

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

https://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality/background-to-air-pollution-measurement-and-monitoring

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

https://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality/lancaster-air-quality-management-area-aqma
https://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality/carnforth-air-quality-management-area-aqma
https://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality/galgate-air-quality-management-area-aqma
https://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality/background-to-air-pollution-measurement-and-monitoring

Appendix E – Suggested Air Quality Action Plan Measures arising from public consultation in 2019

List of Suggested District Wide/Area specific actions		Carnforth specific actions		Galgate specific actions		Lancaster specific actions	
Actions	**Number of similar mentions**		**Number of similar mentions**		**Number of similar mentions**		**Number of similar mentions**
Buses							
Free bus service from Park and Ride	1						
Subsidise better bus services	7					better services- taxis where services cancelled- better waiting areas etc..	1
More Bus Services (no bus to Halton on Sunday)	2	More Evening bus services	1				
Same emission limits as cars	1						
Fit devices to reduce emissions	1						
Dark smoke from buses - better maintenance and testing	1						
Bus Idling and Idling enforcement	5						
Electric/Hydrogen/low emission buses	15					Electric/Hydrogen/low emission buses/small electric buses or trams to serve New Quay development	3
No Idling Zones	1						
Green walls and barriers ner bus station	1						

Use Congestion charge to fund better buses	2					Use Congestion charge to fund better buses	1
Bus Lane around Lancaster City Centre	1						
Air Filtration buses (Southampton example)	1						
Reduce number of buses	1						
Lower fares/current monopoly	1						
Remove bus lane on Greyhound Bridge (causing other traffic congestion in Lancaster) and other bus lanes	2					Remove bus lane on Greyhound Bridge (causing other traffic congestion in Lancaster)	1
Create cycle/bus route along Thurnham Street Chapel street Lancaster	1	Create cycle/bus route along Thurnham Street Chapel Street Lancaster	1	Create cycle/bus route along Thurnham Street Chapel street Lancaster	1	Create cycle/bus route along Thurnham Street Chapel street Lancaster	1
Insufficient bus capacity for students	1						
Free Bus passes	1						
Rapid Public Transit corridor from Galgate to Heysham and to connect J34 (tram or bus)	1						
Residential Minibus tranport circular feeder services to rapid transit service	1						
Trains							
More frequent trains between Lancaster and Morecambe	1						
Direct Train service from Carnforth to Kendal	1	Direct Train service from Carnforth to Kendal	1				
Improve West Cumbrian Rail service (more reliable)	1	Improve West Cumbrian Rail service (more reliable)	1				
Taxis							
Ban most polluting vehicles	1						
Electric taxis	2						

Taxi idling/enforcement	1						
Electric Cars/Vans							
Free parking for Evs	1						
Promoting/Incentivising Electric vehicles/lower emission cars	5					Promoting/Incentivising Electric vehicles/lower emission cars - phase out petrol/diesel vehicles	3
More charging infrastructure	8	More charging infrastructure	1	More charging infrastructure	1	In parking lots across the city	3
Charging infrastructure where no off-street parking	3						
All Council Fleets (City and County) EVs	2						
Electric car/emobility plan for Lancaster	1						
Vehicle Transport General							
20mph speed limit in built up areas	1					20mph speed limit applied and enforced in city centre	1
10mph speed limit around city centre	1						
Speed limit in Galgate and Carnforth to deter A6 use (motorway instead)	1	Speed limit in Galgate and Carnforth to deter A6 use (motorway instead)	1	Speed limit in Galgate and Carnforth to deter A6 use (motorway instead)	1		
Technology enforced/policed speed limits							
Strategy to Reduce vehicle numbers particularly in congested areas	11					Proper plan to reduce and manage traffic	3
Deterrents to driving to work	1						
Traffic Light technology to keep traffic moving/improve flow	7	Phasing traffic lights from Market Street (East West traffic) to allow better flow of traffic out of Market Street	2			Traffic Light technology to keep traffic moving/improve flow - lights on King Street/Thurnham Street/Dalton Sq particularly referenced	5
Idling vehicles/enforcement	6					Idling vehicles/enforcement	2

Green or other barriers	13	Green planting or banking-planting at homes along routes	3			Green planting	2
Emissions based Congestion Charge/Low emission Zone	5					Emissions based Congestion Charge	5
Remove /reconfigure/reduce queuing on the Lancaster gyratory	7	Reconfigure roads around crossroads and train station - form one way system on Market Street	3			Remove /reconfigure/reduce queing in the Lancaster gyratory	3
Banning through traffic through Lancaster city centre and Carnforth (including heavy lorries)	3	Banning through traffic through Lancaster city centre and Carnforth (including heavy lorries)	1			licence system to access city centre - essential/residential/disabled access vehicle only - particularly during peak times	3
New Link Road to Scotland Road Carnforth and road link across Lundsfield Quarry	1	To prevent traffic from Iron Works passing through Market Street and accommodate proposed housing development	1				
Carnforth Bypass Road	1	Carnforth Bypass Road					
City Centre Bypass Road	1					City Centre Bypass Road	1
Galgate Bypass Road	1			Galgate Bypass Road	2	Galgate Bypass Road	1
No new roads	2			No new roads	1	No new roads	1
Reduce/banning petrol and particularly diesel vehicle use (particularly in city centre)	3					Reduce/banning petrol and particularly diesel vehicle use (particularly in city centre)	1
Incentives from major employers to discourage vehicle use	1						
Improved public transport links and smart ticketing	2						
More pedestrian /vehicle shared spaces	1						
Council tax relief for those without cars	1						
More council tax for those with more than 1 car	1						

Redirecting Traffic (Moor hospital area)	1					Close Derwent Road, freehold, Ulswater Road or take traffic reduction measures - School traffic particularly an issue	1
Non selective, non denominational, good schools (reduce need to travel to any school)	2						
Better/comfortable/ accessible/cheaper/low emission public transport	9	Better/comfortable/ accessible/cheaper/low emission public transport	1	Better/comfortable/ accessible/cheaper/low emission public transport	1	Better/comfortable/ accessible/cheaper/low emission public transport	3
Redirect traffic away from Morecambe Sea front (tram system?)	1						
Support Car Share Schemes	1					Car Share at Businesses	1
Working with HGV operators	1						
Behaviour Change measures/incentives (supported by infrastructure changes)	2					Public Campaign to influence journey choices	1
Box control outside Queens Hotel Carnforth	1	Box control outside Queens Hotel Carnforth	1				
Study on how to influence individual journey decision making	1					Study on how to influence individual journey decision making	1
Better links between travel alternatives to car (bus ,train, cycle, walking)	1						
reallocate road space (away from cars)	2					reallocate road space	1
Bollards to prevent rat running	1						
Parking (cars and bikes)							
Free parking at park and ride	1						
Free parking for Evs	1						
No staff car park at hospital	1						

Good Park and Ride for Lancaster Galgate and Carnforth (or other)	6					Park and Ride near University/Out of town parking/make it free/ priority road space allocation down Caton Road	4
Differential parking charges for lower emission vehicles	1					Differential parking charges for lower emission vehicles	2
Better/more accessible/cheaper parking to prevent trips looking for parking	1						
Park and Cycle sites	1						
Park and Walk sites	1	Park and Walk sites - Warton Rd	1				
More cycle parking	1						
hire ebikes/bikes at Park and Rides	1						
Cycling and Walking							
Increased Walking and Cycling in city centre and Carnforth	3	Increased Walking and Cycling in city centre and Carnforth	1			Increased and connected walking and Cycling in and through the city centre -routes protected/separated by kerb	1
More/better cycle and walking paths and supporting measures	15					Ramped pedestrian/cycle bridge across King street Lancaster - better facilities overall	2
More pedestrianised areas	4					Pedestrianise Dalton Square	
Segregated cycle superhighways/paths	3			Create rout along A6 between Lancaster and Galgate	2	Create rout along A6 between Lancaster and Galgate - traffic free	2
More encouragement to cycle and walk	5						
Safe route between Galgate and Lancaster (inc. segregated cycle superhighways across district)	4					Reduce all cycle lane lines on pointer roundabout and on one way system	1
Bike lifts om steeper hills	1						
Implement County Council vision for walking and cycling	1						
Fully integrated and supported cycling network	1						

Allocate 15% of County Council transport budget to cycling infrastructure	1						
Cycling and walking to school initiatives	3						
support ebike use/emoblilty plan/measures	1					ebikes	1
Use Congestion charge to fund better active travel options	1						
Clampdown on motorists parking on cycle lanes/pedestrian areas	2					particularly between 10am and 4 pm	1
Create cycle/bus route along Thurnham Street Chapel street Lancaster	1						
Provision of cycle hubs with storage and facilities	2					Provision of cycle hubs with storage and facilities e.g. at railway station, park and ride - with repair facilities, charging facilities, storage lockers etc. - suggested at St Nicholas Car Park	2
Remove roadside vehicle parking along one side of A6 (South Lancaster)	1						
Stop closure of Lune Millenium Path and improve route to make more useable	1						
Improve and widen where possible canal towpath cycle route	1	Assist with funding to implement tow path improvements	1				
Put hard surface on Glasson trail cycle route	1						
Progress Cycle Rack at Heysham to link trail near Snatchams	1						
Extend Lune cycle path to Halton , Wray and Wennington	1						
Adopt Bike Bus Scheme/Pedal Me	1	Adopt Bike Bus Scheme/Pedal Me	1				

Cycle to work scheme	1	Cycle to work scheme	1				
Cycling proficiency courses for adults	1						
Bonfires/wood/solid fuel burning							
Nuisance from Bonfires in SCAs	1						
Control Smoke Control Area - increase in woodburning	1						
Clamp down on illegal burning	2	Clamp down on illegal burning	1				
Garden bonfires	1						
Better tip access/better and cheaper waste collection services	1						
Air Quality Monitoring							
$PM_{2.5}$ monitoring	2						
AQ monitoring around schools	1						
More AQ monitoring	2						
Air Quality Improvement Targets	1						
Real time digital displays (AQ info)	1						
Development Control							
new schools associated with new housing development	1						
Stop building new houses/student accommodation/refuse planning applications	2						
Stop building student accommodation in city centre (need to travel to University)	1						
Limit major building works/duration of building works	1						
Intelligent low emission, green new buildings/development	1						

All new development to have solar roof tiles	1						
New Development to facilitate/provide cycle and pedestrian short cut routes	1						
Keep green spaces	2			Keep green spaces	1	Keep green spaces	1
Don't build car dependant new development	1			Don't build car dependant new development	1	Don't build car dependant new development	1
Move dirtier industries out of towns - animal market and Lune Industrial estate to remove HGV trips through Lancaster City Centre	2						
Move Border Aggregates - remove HGV trips/dust Carnforth	1	Move Border Aggregates - remove HGV trips/dust Carnforth	1				
Additional Transport Infrastructure needed to accommodate new development - development allowed without	1						
Stop B&Q site closing - Build new Aldi on Quay - additional trips to White Lund	1					Stop B&Q site closing - Build new Aldi on Quay - additional trips to White Lund	1
EV Charging points on all new development	1						
Use S106 funds to provide EV charging infrastructure	1						
Work with Eden project to deliver solutions	1						
Business park for creative industries to lead change	1						
Neighbourhood Plans	1						
Insulate new houses	1						
Other							

Trams (low pollution transport) - University ,Lancaster and Morecambe	3						
Railway station at University (trains through to Heysham)	1						
Transit system from Eden project to Lancaster	1						
Aerial Tramway Mass Transit System J33 - Eden Project	1						
New Bridge from New Quay Road to link to Bay Gateway	1						
Slogan to make people more aware of their AQ impacts	1						
Carbon emissions based Council Tax	1						
Reduce fossil fuel use	1						
Pioneering Carbon Engineering fuel	1	Pioneering Carbon Engineering fuel	1				
Grow home/local green (food) to reduce transport emissions	1						
Hydro power from Morecambe Bay	1						
Allow Lancaster University to lead /spearhead approach	1						
Wider region(s) greener	1						
Educate and inspire children - listen to children	2						
Increase nuclear power	1						
AQ not an issue - stop wasting money	1						
Don’t fell trees	1			Don’t fell trees	1	Don’t fell trees	1
Ban smoking in city centre	2					Ban smoking/vaping in city centre	2
Ban burger van as smell is foul	1						
Ban cats and dogs (odour from faeces)	1						

Sustainable Drainage System initiatives	1						
BT kiosks in city centre (green activities)	1						
Tunnel from University, Lancaster, to Morecambe	1						
Down Grade A6 corridor	1					Down Grade A6 corridor	1
Park opposite railway station at Carnforth	1	Park opposite railway station at Carnforth	1				
Passenger Hover craft travel around Morecambe Bay	1						
No taxes on people entering city centre - wider plan to reduce	1					No taxes on people entering city centre - wider plan to reduce	1
Better control of quarry dust/linked transport	1	Better control of quarry dust/linked transport	1				
Actions should not redirect traffic to M6	1						
Take back control of highways from County Council	1						
Greening can increase pollen air pollution	1						
Provide Masks	3						
Stay indoors	1						
Insulate houses	1						
Hierarchy (Pedestrian, Cycles, Buses, Taxis, Private Vehicles for selecting measures	1						
Become national exemplar/world leader to achieve local buy in	1						

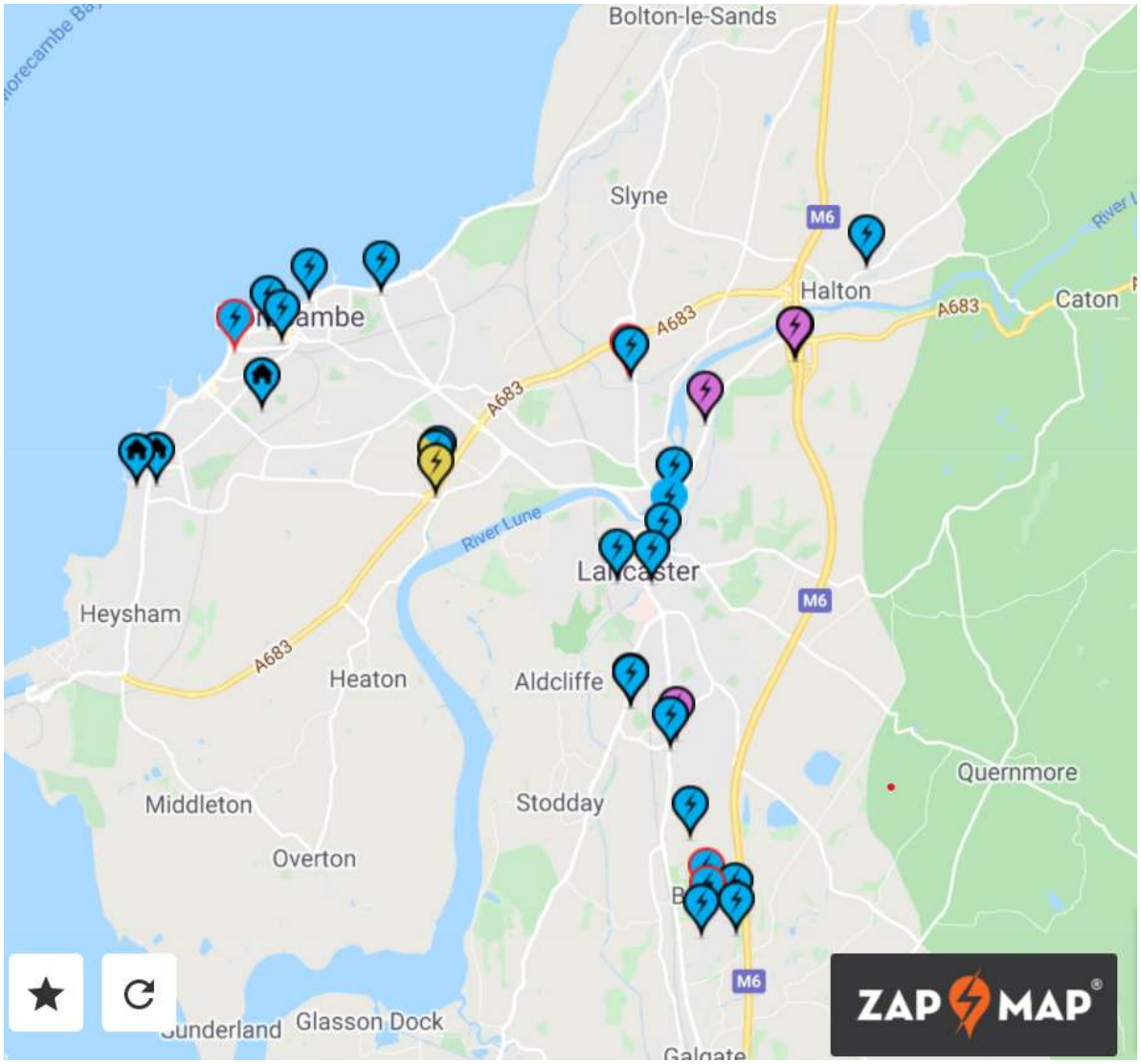
Appendix F: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[6]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[6] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

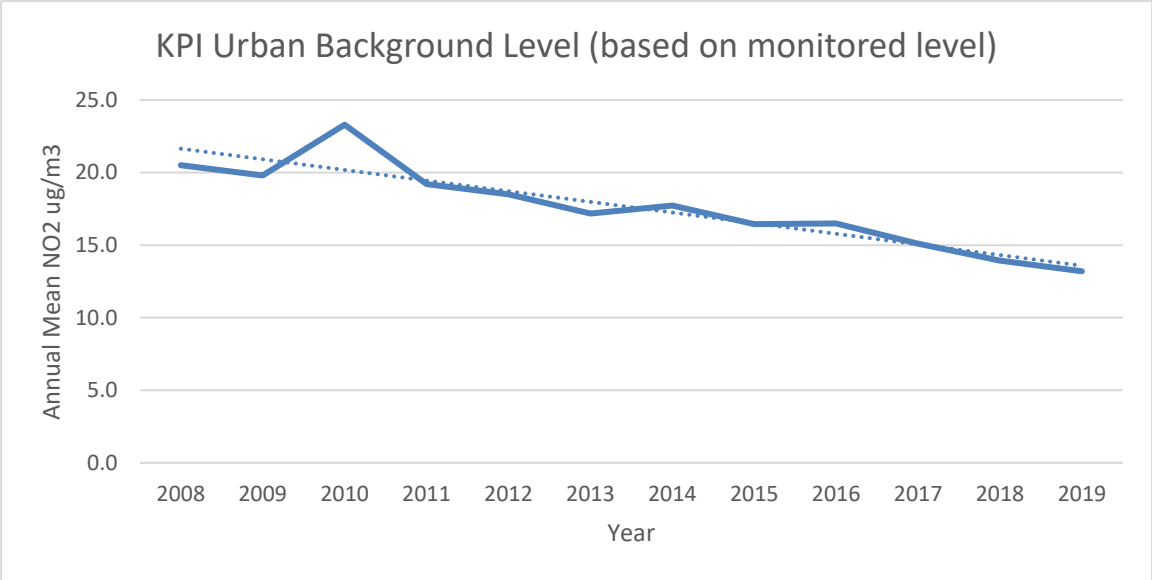
Appendix G: Map showing location of public electric vehicle chargepoints in the Lancaster District



Appendix H: Lancaster District Air Quality Key Performance Indicators (KPIs)

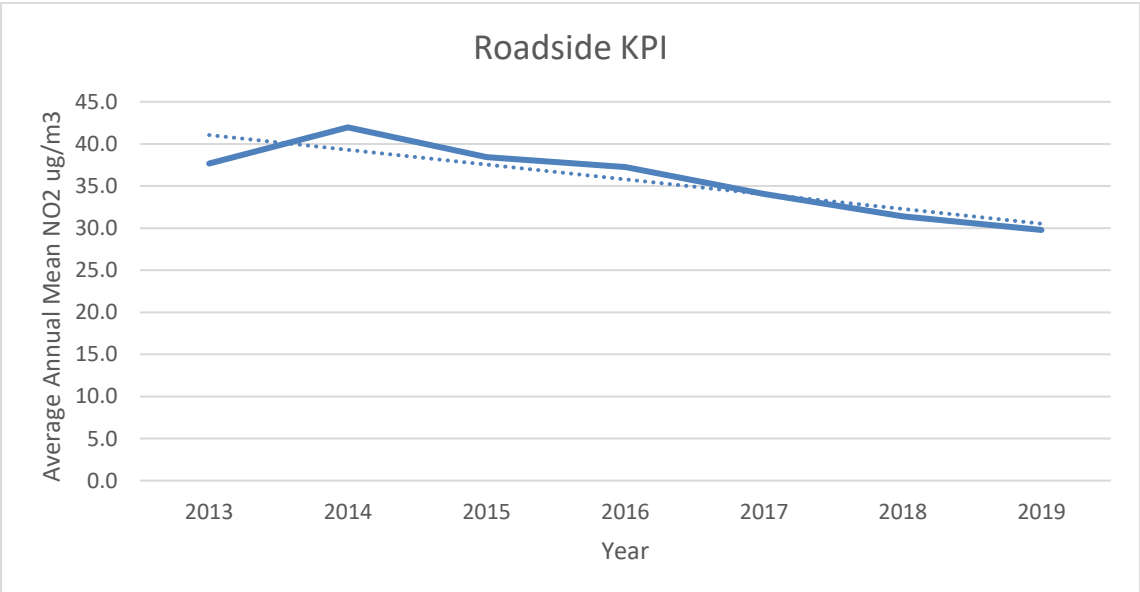
1. Key Performance Indicator for background air quality is based on local monitoring site LC4

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
20.5	19.8	23.3	19.2	18.5	17.2	17.7	16.4	16.5	15.1	13.9	13.2



2. Key Performance Indicator Roadside Air Quality

2013	2014	2015	2016	2017	2018	2019
37.6	42.0	38.4	37.2	34.1	31.4	29.8



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	Air quality 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 (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

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* Access to the Council's air quality reports is provided on the Council's website (link provided above).