LANCASTER
CITY COUNCIL

Promoting City, Coast & Countryside

2017 Air Quality Annual Status Report (ASR) for Lancaster City Council

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

September 2017

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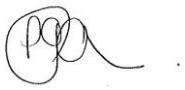
Signature	
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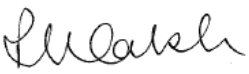
Signature	
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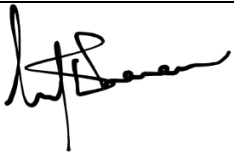
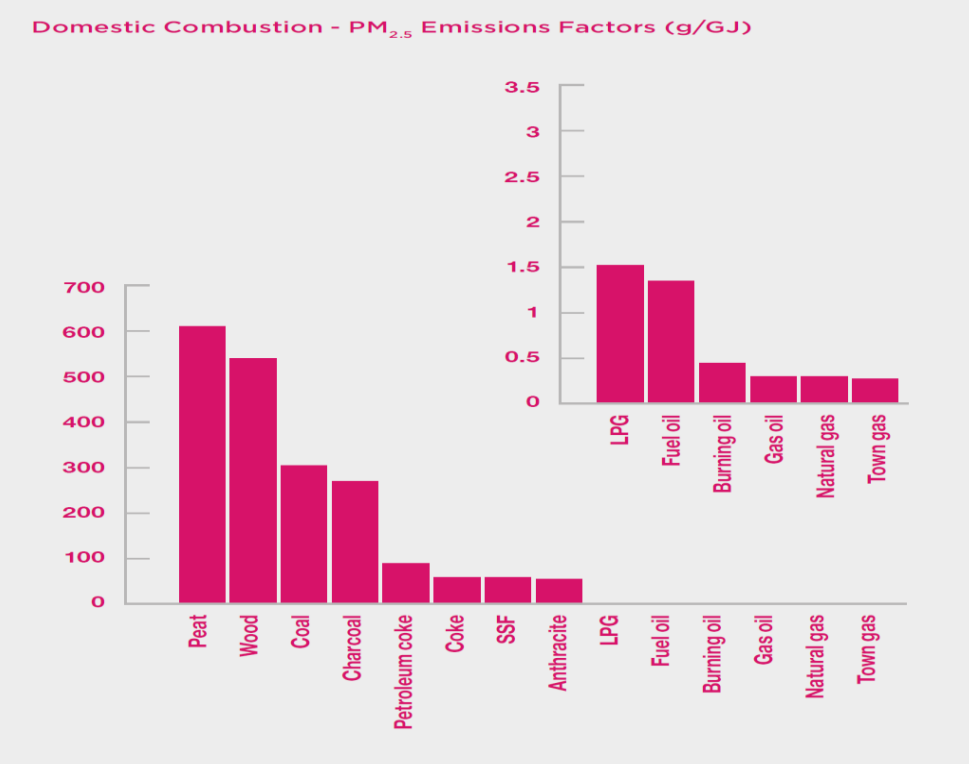
Signature	

Overview of Air Quality in Our Area

Air quality has recently been a regular national news item. Issues with real world vehicle emissions and pollution from diesel vehicles have quite correctly received the attention of the media. One really positive outcome of this attention is that general awareness of air quality issues has increased considerably.

Local air quality is affected greatly by the weather which affects how pollution is changed, dispersed and diluted. It is also affected by what happens in other towns, cities and countries as pollution does not respect local or national boundaries. Consequently reducing pollution in local areas returns county, national and international benefits. Most air pollution is generated locally when we burn fuels either at our homes or businesses or when using vehicles. As a general rule using electricity in our homes is the least polluting fuel, followed by using gas and then oil. Burning solid fuels are the most polluting, particularly burning wood (See Figure A below). For vehicles, usually larger diesel vehicles are the most polluting, followed by petrol and Liquid Petroleum Gas fuelled vehicles. Electric vehicles are the least polluting.

Figure A - Graphs showing the difference in particulate emissions from burning various fuels.



Source : Air Quality - A Briefing for Directors of Public Health , Defra/Public Health England, March 2017 available at: https://www.local.gov.uk/air-quality-briefing-directors-public-health

Currently the main air quality issues in Lancaster are highlighted by the three Air Quality Management Areas. The council monitors air quality in these areas and measurements indicate pollution levels continue to exceed health based Objective levels. The main culprits for these exceedances are road vehicles.

The car industry and the government have both indicated that the future of car travel is likely to be dominated by electric vehicles. Over the next 25 years there is likely to be an increasingly rapid transition to the use of electric vehicles. The transition for larger vehicles (lorries and buses) is more uncertain but never the less, it is likely that air quality improvements arising from the uptake of electric vehicles (and maybe hydrogen fuelled vehicles) will ultimately result in both national and local compliance with current air quality standards. The issue for Lancaster is therefore what happens in the meantime?

Petrol and diesel vehicles currently still dominate vehicle sales in the UK and therefore it is considered that without intervention, air quality around the Lancaster city centre gyratory is unlikely to fully meet compliance with air quality standards within the next 20 years (possibly longer for compliance in all parts of the Lancaster gyratory - see Figure B below).

The council has therefore been working with the county council to focus on the transport related issues in Lancaster and through the Transport Masterplan for Lancaster, will produce a new air quality action plan. The delivery and opening of the M6/Heysham link road (the Bay Gateway) in October 2016 formed the start of this new plan. A year on, the assessment of outcomes is ongoing and a review of needed actions is scheduled to take place next year (2018).

Although the two councils are taking up their roles to deliver better air quality, everyone still has a very important part to play in reducing air pollution. Simple things like walking or a bike ride to work or school will benefit air quality as well as have knock-on benefits for your health and the environment. If you need to travel by car, consider lower emission options, particularly electric vehicles. If you live in an urban, built up area, choose not to use wood or other solid fuel to heat your home or having garden bonfires where garden waste could be composted, collected or taken to a recycling centre. The use of recreational garden wood or solid fuel burning heating appliances (fire bowls, fire pits, chimineas etc…) are also not helpful in reducing pollution as like bonfires, they emit relatively high levels of pollution which are released at low levels where they can easily affect both you and your neighbours. The choices and actions of individuals are key to improving the air we collectively breathe or making it worse.

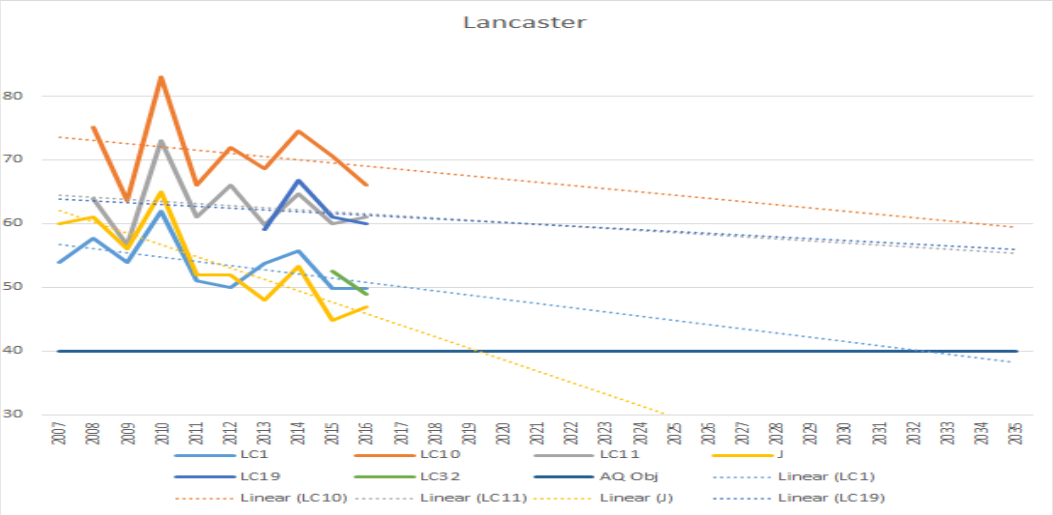
Air quality in Lancaster

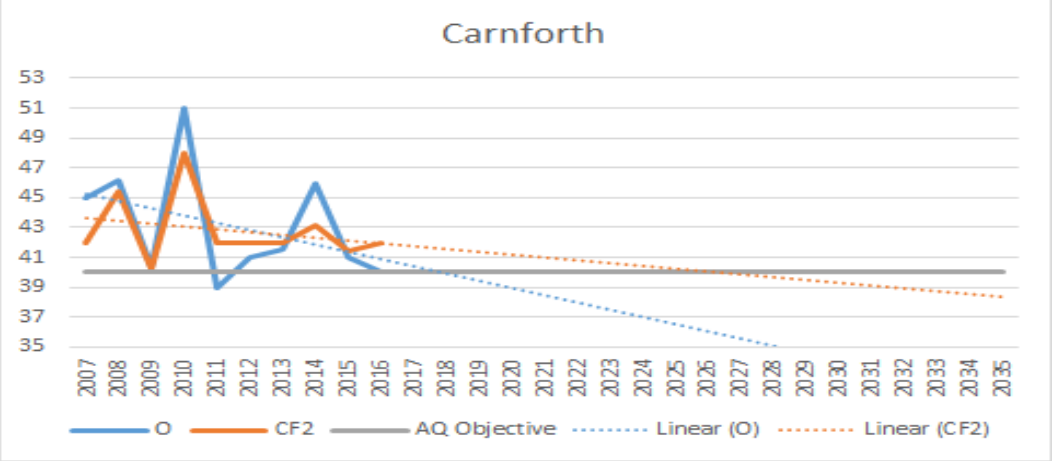
Currently the main air quality issues in Lancaster, as in many parts of the country are linked to emissions from road traffic. These emission continue to cause exceedance of air quality objectives for the pollutant nitrogen dioxide (NO_2) and contribute towards elevated levels of particulate (PM_{10} and $PM_{2.5}$). Exceedance of nitrogen dioxide levels has resulted in designation of three Air Quality Management Areas (AQMA's) located around the gyratory system in Lancaster City and at the main cross road junctions in Carnforth and Galgate (see Table 2.1 below for more information). Monitoring results in 2016 continue to confirm this position although the really good news is that generally speaking levels monitored this and previous years are now showing some indication of gradual improvement (See Figure B below). There is however some way to go before pollution levels meet air quality objectives.

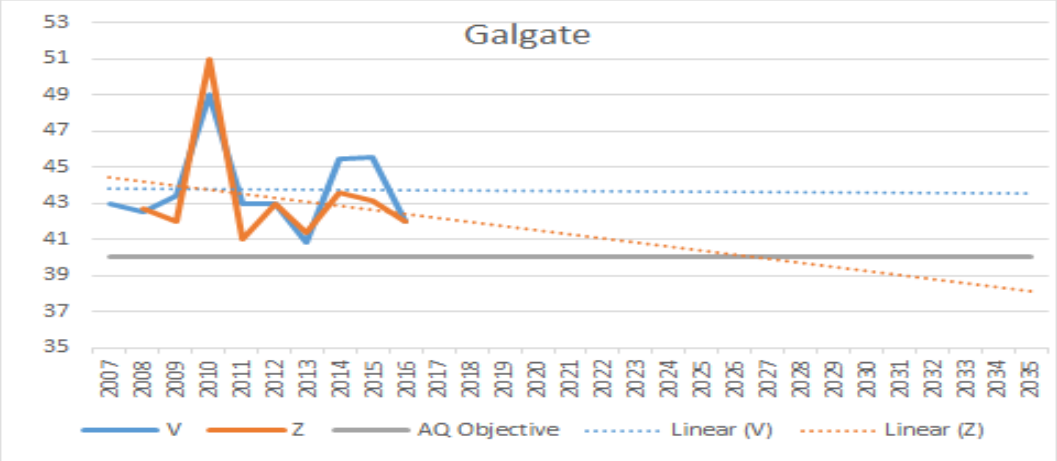
Traffic in Lancaster City

In 2016 nitrogen dioxide levels at Dalton Square and Thurnham Street, Lancaster exceed the objective by around 50% (levels currently monitored are around 60-66ug/m^3.) In China Street indicative levels monitored are between 48-60ug/m^3. The objective level is 40ug/m^3.)

Figure B – Graphs showing indicated declining roadside NO_2 pollution levels in Lancaster, Carnforth, Galgate AQMA's (annual mean NO_2 ug/m^3)







In 2016 the city councils strategic air quality approach to improve air quality (see http://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality/air-quality-reviews-and-assessments) resulted in the production of a new air quality action plan being included as an integral part of the adopted Transport Masterplan for Lancaster. Production of this new plan is due to proceed in 2018 with the knowledge of the impact of the Bay Gateway.

The opening of the Heysham/M6 link road (Bay Gateway) in October 2016 formed the first part of the transport masterplan. As the air quality objectives are based on annual average measurements, the air quality impact of the new road is yet to be assessed and will be reported in the next 2018 air quality annual status report.

Local actions to improve air quality

There are currently three main actions in progress to address air quality issues in Lancaster:

- A Transport Masterplan for Lancaster was adopted in October 2016 (see http://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/highways-and-transport-masterplans.aspx). The process to produce an effective air quality action plan are integral to this plan. Impact assessment as described in the Air Quality Strategy for Lancaster will be written into the plan and undertaken to ensure air quality improvement is a key plan implementation driver and is not lost amongst other competing priorities. The Transport Masterplan will also be supported by new local air quality planning guidance which has been adopted as a Planning Advisory Note (PAN) in September 2017. The guidance aims to set basic air quality mitigation requirements for new development and set a new method of assessment to better account for contributory air quality impact. A Lancashire based guidance template has been produced and was launched through a regional event in October 2016. In Lancaster the intention is to adopt the guidance as a Supplementary Planning Guidance document during 2018 following required consultation. The adoption of the guidance as a PAN is an interim measure and sits alongside the existing PAN on electric vehicle charging requirements. The electric vehicle charging PAN was also updated in

September 2017(see https://www.lancaster.gov.uk/planning/planning-policy/supplementary-planning-documents-spds). As indicated the new air quality guidance is planned to be implemented across the Lancashire County area (each district adopting the guidance) recognising that transport issues are not limited to local boundaries and that standards may be better received if applied regionally. A regional survey carried out in May 2017 indicated that 9 of the 14 local authorities intended to adopt the guidance (see Appendix G).

- The M6/Heysham link road (the Bay Gateway) opened in October 2016. Assessment of the impact resulting from traffic changes is underway through ongoing air quality monitoring. The road and associated measures are anticipated to deliver some air quality benefits to all three of Lancaster's AQMAs. The most significant alleviation is predicted for Carnforth where a decrease in traffic approaching 20% was anticipated. Such a change could mean that the AQMA in Carnforth can be revoked. A set condition of the road development is also that further measures are put in place to preserve impact reductions delivered by the new road. These will all form part of the transport masterplan and arising air quality action plan.

The Bay Gateway

- In November 2015 a bid was made to provide improvements to buses to reduce emissions (involving the County Council, the City Council, Stagecoach and Greenurban Limited) under the Department of Transport, Clean Bus Technology Fund 2015. This application was successful and a full bid award of £288,180 was granted. Unfortunately procurement arrangements and contractual requirements have significantly delayed implementation which was originally planned for 2016/17. Delivery is now due to commence in February 2018. This measure is anticipated to have an impact of reducing nitrogen oxide levels in the Lancaster AQMA by up to 8%. Subject to agreement, the Council and its partners intend to make another bid under the recently announced Defra Clean Bus Technology Fund 2017-19 which, if successful, will provide additional pollution benefits in the AQMA's.

There are also a number of other actions that are in progress or are being developed. A full list of actions is contained in Table 2.2 below, however the following are currently priorities:

- An ANPR camera system was installed in Lancaster centre in June 2017. The system will be used to inform and monitor the transport masterplan/air quality action plan for Lancaster. The installation of ANPR cameras was a Defra grant funded project (£30k award from the Air Quality Grant Fund).

- The city council is consulting local taxi operators and drivers with a view to encourage and support the use of electric vehicles as taxis.

- The council is working with a local co-operative to support the provision of charging facilities for electric vehicles (for residents who do not have off street parking at their homes).

- The county council is due to deliver three 'rapid' and eleven 'fast' street charging locations across the Lancaster district by April 2018. A contractor to deliver the infrastructure was appointed in September 2017.

- Subject to availability, agreement and specific requirements the council will apply for grant assistance to deliver air quality improvements e.g. for infrastructure to assist with the uptake of electric vehicles.

Air Quality and County Council Public Health

The Director of Public Health and Wellbeing report 2016 for Lancashire makes clear the need to tackle the wider determinants of health including promoting healthy living environments through for example, increased walking and cycling whilst also making clear the need for sustainable behaviour change including tackling physical activity. It also outlines the need for telecare and harnessing digital technology whilst also joining up services in

neighbourhoods. Combined these actions should reduce the level of road use and therefore ultimately reduce the levels of $PM_{2.5}$ emitted in Lancashire.

Within Lancashire County Council (LCC), Public Health supported by Public Health England is taking a central role internally and with partners in District Councils, the NHS and the University of Lancaster to consider the best options to drive forward initiatives that will support the reduction in $PM_{2.5}$. In brief these incorporate the following actions within the County Council:

Spatial Planning

There is closer working between Public Health and both county and district planning teams to consider how future local plans can mitigate the effect of poor air quality, as well as address wider public health issues, such as improved opportunities for physical activity and access to green and open space. Public Health is also working with the Lancashire Air Quality Officers Group to support the adoption of Air Quality Planning Policy Guidance across the Lancashire sub-region. The guidance has been developed by Lancaster City Council to assist developers to support action through the planning system to improve air quality.

Transport Planning

A significant number of air quality issues are a result of high volumes of traffic. The Strategic Highways Planning team are involved in air quality action planning to aid in the identification of highway measures that can reduce these scenarios and local Highways and Transport Masterplans have been developed in consultation. Work to develop the next Local Transport Plan (LTP4) for Lancashire will get underway during 2017-18 and will consider air quality objectives from the outset.

Better transport planning has the biggest impact on reducing pollution locally specifically: reducing queues at and around junctions therefore removing waiting times, moving congestion away from junctions with high buildings that create canyons at junctions and smoothing the flows of traffic particularly at

motorway junctions. Several AQMAs in the county have helped to shape the County Council's investment decisions (e.g. Heysham/M6 link road).

Transport Schemes

Funding is continually being sought for transport infrastructure projects identified in the Highways and Transport Master Plans. A number of major transport schemes are underway or being planned for with funding being secured from a number of sources including National Productivity Investment Fund, Lancashire Growth Fund and City Deal. Projects include the Broughton Bypass and village improvements, Heysham to M6 link and the East Lancashire Strategic Cycleway Network, amongst others. Public Health is working more closely with Network Management and local authorities to assess the impact of these schemes on air quality.

Network Management

In relation to management of the road network, sign-only 20mph areas have been introduced in many residential areas in Lancashire to reduce accidents and encourage walking and cycling, these will have a small effect on reducing particulate emissions. The impact of sign-only 20's is currently the subject of a national DfT sponsored review and the impact on air quality is one of the elements being considered. The results of the review are expected later this year.

An AQMA layer has been added to the County Council's mapping system enabling transport planners and network management to utilise this information when making decisions about the network. An awareness raising session is also planned for later in 2017-18 for the network management team around how they can practically reduce the burden of poor air quality through their role.

In built up areas with traffic signal junctions, minimisation of start stop of traffic flow is currently achieved by the use of Intelligent Traffic Systems mostly via signal control systems. This software controls signal timings which minimises

overall traffic delay (reducing start and stops) in a road network. The County Council also collects traffic count data to support district air quality modelling.

Active Travel

The national Cycling and Walking Investment Strategy (CWIS) has defined walking and cycling targets to achieve, together with £1.2billion of available funding to support delivery. Local Cycling and Walking Infrastructure Plans (LCWIPs) or delivery plans to implement the national strategy are now being devised in Lancashire with support from Blackpool and Blackburn with Darwen councils and training from the DfT. An overarching Walking and Cycling strategy for Lancashire is also under development, following consultation earlier this year the final strategy is due to be published in October 2017. This will enable us to capitalise on national funding opportunities to reduce car use.

The County Council's Safe and Healthy Travel team work with schools, the community and workplaces to encourage sustainable modes of travel. An annual Sustainable Modes of Travel (SMOT) Strategy is a mandatory requirement for all local authorities, the 2017/18 SMOT is due to be published in August 2017. School travel plans are reviewed as required and can be discussed with Officers from the Safe and Healthy Travel Team during meetings with the school. The DFT backed national scheme for school travel plans called Modeshift STARS is supported by LCC.

Initiatives for schools to encourage walking and cycling include: theatre productions, school gate parking 'A' boards, Walk to School resources, digital board games, local zone route maps, safety promotional literature, high visibility jackets for walking and cycling uses, a bespoke training scheme for balance bikes and ongoing safety based training schemes for walking and cycling (e.g. Right Start, Bikeability and Passport to safer Cycling). These training schemes continue to be offered to all Lancashire primary schools and uptake is excellent. Walking school buses continue to be promoted and we are currently updating our walking bus literature to enable schools to set up a walking bus with parents/carers easily and effectively.

Low Emission Vehicles

Funding has been secured for 150 additional domestic electric vehicle charge points to be installed across the county, an installation provider is currently being procured for delivery by 2018. Bus operators and district councils are supported in applying for funding such as 'cleaner bus grants.'

LCC Fleet

The Fleet and Public Integrated Transport team purchase the cleanest standard (Euro 6) vehicles and vehicles are not kept longer than 10 years. The Highways service has been trialling an electric van, whilst electric is not appropriate for many highways vehicles there is the possibility of replacing a number of diesel vans with electric following review of the trial.

Health Impact Data

Information about the impact of air pollution on health is available on the Lancashire Insights webpages and Public Health has calculated the mortality ranking for Lancashire for PM2.5 using the methodology outlined in the Air Quality Briefing for Directors of Public Health. Initial analysis of cardiovascular disease and respiratory illness prevalence by GP practice and relation to AQMAs has also been carried out, however, there are many contributing factors to these conditions so further work is needed to provide evidence of a direct correlation, further analysis of health data is planned during 2017-18.

Public Awareness

General information with links to the Defra national alert system and advice on what to do when pollution levels are high is being added to the County Council's "Your health and wellbeing" webpages as part of a wider review of provision of information to the public. This is expected to be complete by the end of 2017.

Public Health is working with the Safe and Healthy Travel team to provide information to and engage with schools on the issues of air quality, particularly

those schools close to AQMA areas, linking with existing work and resources to promote walking and cycling and inappropriate parking at school drop-off and pick-up times.

Research

We are supporting research carried out by Lancaster University to trial roadside vegetation strips in Lancaster as a means of reducing $PM_{2.5}$ and NO_2. Previous international research is inconclusive on this. Previous initial research by partners at Lancaster University found a 50-60% reduction in $PM_{2.5}$ in homes of those affected when veg strips were used. This research will add to the growing international evidence base and pave the way for a possible bigger trial across Lancashire.

Local Priorities and Challenges for coming year

Within the three air quality management areas air pollution levels in Lancaster remain above objective levels (see Figure 1 below). Monitoring results do however show some indication of levels decreasing slightly over the past 10 years. The trouble is that the rate of decrease is insufficient to produce compliance with objective standards within the next 20 years or more without new intervention (see Figure 1a below). Pollution levels at locations away from main roads (see Figure 1b below) continued to indicate gradual improvement.

Figure 1 - Pollution levels (nitrogen dioxide) in Lancaster AQMA for highest six monitoring sites 2007-2016

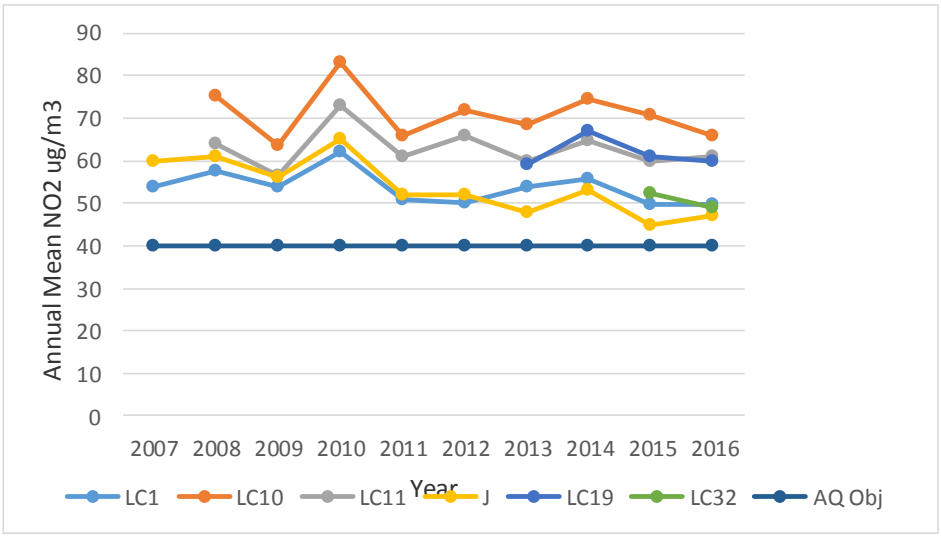


Figure 1a - Pollution levels trends at monitoring sites within the Lancaster AQMA 2008-2035

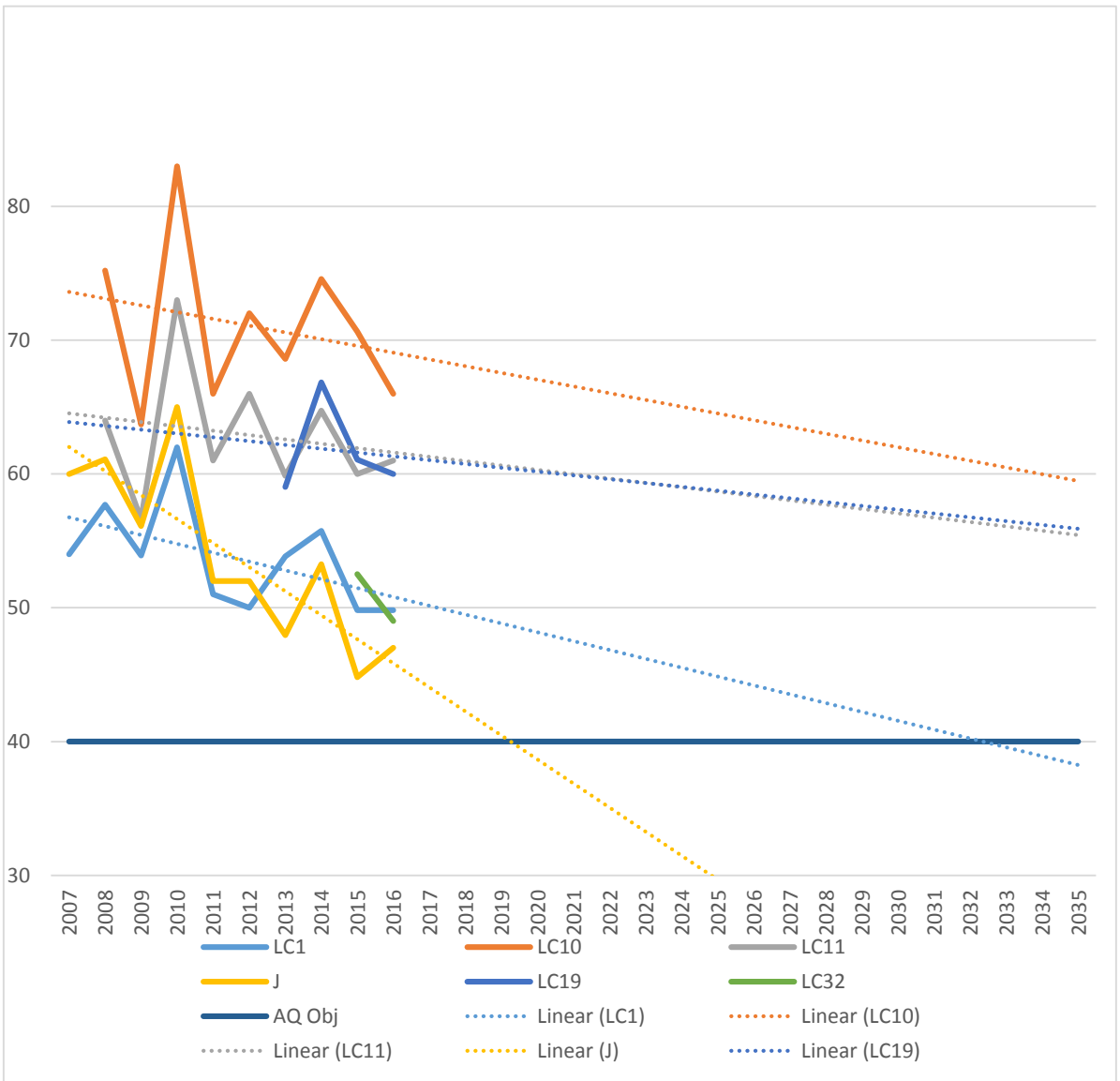
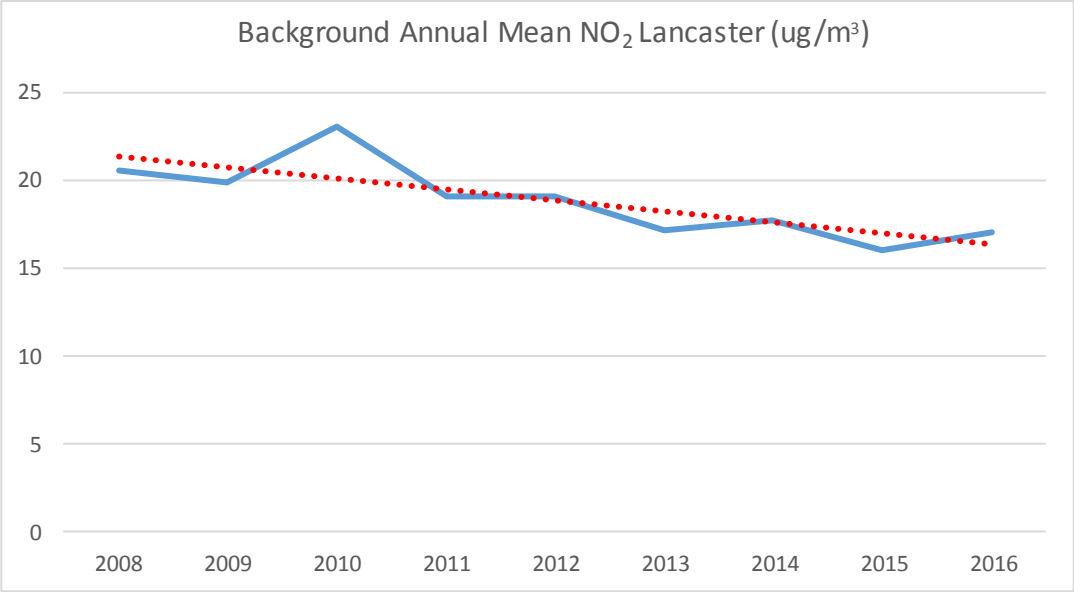


Figure 1b - Pollution levels (nitrogen dioxide) at urban background monitoring site in Lancaster 2008-2016



Although actions are in progress to reduce pollution levels (e.g. grant funded bus emission reduction, travel plans, the Bay Gateway etc..) and the introduction of newer vehicles are anticipated to lead to general improvement, the delivery of a robust and effective transport masterplan is the key to ensure future pollution levels are minimised and below health based standards as soon as possible.

The transport Masterplan for Lancaster was adopted in October 2016. However the delivery of the various scheduled components of the plan are due to proceed during 2018. This delay was considered necessary to allow for consultation on the remit for detailed studies under the masterplan and to allow a traffic assessment settling period following the opening of the Bay Gateway. The plan will ultimately replace the existing air quality action plans for Lancaster and Carnforth and will form the required plan for the Galgate AQMA. Work to deliver the Masterplan/Air Quality Action Plan is therefore still in its infancy and will remain a top priority over the next 2 years.

As already mentioned, 2016 saw the opening of the Bay Gateway which is anticipated to impact positively on the three AQMAs. Air quality monitoring is ongoing in these three areas. The results of monitoring will be reported and considered in the

2018 air quality annual status report. This information through subsequent assessment will also inform the Transport Masterplan development in 2018.

Defra has indicated that local authorities should have a role in reducing $PM_{2.5}$ particulate pollution however the degree of involvement should be determined at a local level in discussion with Public Health. Certain actions are already in progress (see local and county actions above), but the last ASR report indicated that monitoring provision for $PM_{2.5}$ would be reviewed during 2016. This review was undertaken by commissioning Air Quality Consultants Limited to independently review the council's current air quality monitoring provision and to consider the case for additional $PM_{2.5}$ monitoring. The report concluded that existing monitoring provision was adequate and that meaningful improvement (to monitor for $PM_{2.5}$) could only be achieved through considerable investment in new monitoring equipment and resources to operate and maintain it. This was not considered to be feasible within current budgets and the practical benefits and outcomes arising from additional data was considered likely to be insufficient to warrant significant new investment in monitoring at this time.

At a national level, 2016/17 saw increased attention on the impact of wood burning (which is a growing source of local $PM_{2.5}$ emissions). The council updated its web site 2017 to advise of the potential air quality impacts arising from domestic wood burning and ran a short campaign (around national clean air day) to discourage allotment and garden bonfires. The Council is currently working with Defra and other government agencies on approaches to address the increasing impact arising from wood burning. This subject will therefore remain a priority during 2017/18.

Air quality planning guidance for new development has been produced in 2016 in partnership with the Low Emission Partnership (see http://www.lowemissionstrategies.org/) and adopted as guidance in 2017. The introduction of approaches it contains and the transition from planning advice to a supplementary planning document for Lancaster (and Lancashire) will be a priority for the remainder 2017 and throughout 2018.

Particulate monitoring at the Cable Street air quality station has continued to be affected by equipment faults into 2017. Additional expert station overseeing was commissioned at the start of 2017 and new contracts were also agreed with the equipment supplier to improve the data capture at the station. It is hoped that these issues have now been resolved, however data capture for 2017 will be affected.

Air Quality station at Cable Street, Lancaster

Finally amendment of the Lancaster AQMA order to include likely exceedance of the 1 hour objective for NO_2 was approved by Lancaster City Council Cabinet in June 2017. The amended order will shortly be made available on the local authority web site and a copy sent to Defra in accordance with national policy guidance.

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 addressed if current issues are to be resolved. 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 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. Where ever possible the use of technology can remove or reduce polluting emissions and also save you valuable time.*

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) *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.*

4) *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 vehicles 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.

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. 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. Garden bonfires can also similarly add to local pollution. It is therefore very helpful if these more polluting choices can be avoided.

Tell us what you think!

We would be really grateful for people to be involved in future consultation, particularly regarding actions we may take. If you are willing to participate please let us know using the contact details below. In your response please indicate

(i) Whether you would you like to get involved in future air quality pollution consultations? and,
(ii) Whether you would you like to get involved in other Lancaster City Council service consultations?

Please also provide your details below:

Email address : ……..

Contact Telephone Number : …….

Contact Address : ……..

Please note: Your personal details will be kept confidential and held in accordance with the Data Protection Act.

Please email your response comments to :-

environmentalhealth@lancaster.gov.uk

or send by post to:-

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1 Local Air Quality Management

This report provides an overview of air quality in the Lancaster City Council area during 2016. 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 1.1 in Appendix D.

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 the objectives.

A summary of AQMAs declared by Lancaster City Council can be found in Table 2.1 below. Further information related to declared AQMAs, including maps of AQMA boundaries are available online at http://www.lancaster.gov.uk/air-quality/ . A national list of AQMA's is available at: http://uk-air.defra.gov.uk/aqma/list .

Amendment of the Lancaster AQMA to include likely exceedance of the 1 hour objective for NO_2 was approved by Lancaster City Council cabinet in June 2017. The amended order will shortly be made available on the council's web site and a copy of the amended order sent to Defra.

Table 2.1 – Declared Air Quality Management Areas in Lancaster

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
City of Lancaster AQMA	Annual Mean Objective NO_2	Lancaster	Covers gyratory system in Lancaster city centre	Available at:- http://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality
Carnforth AQMA	Annual Mean Objective NO_2	Carnforth	Covers main cross road area in Carnforth	Available at:- http://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality
Galgate AQMA	Annual Mean Objective NO_2	Galgate	Covers main cross road area in Galgate	Action Plan to be delivered as part of Transport Masterplan. See :http://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/highways-and-transport-masterplans.aspx

NB All action plans are planned to be superceded by the plan incorporated in the Transport Masterplan for Lancaster adopted in 2016.

2.2 Progress and Impact of Measures to address Air Quality in the Lancaster City Council area

Lancaster City Council has taken forward a number of measures during the current reporting year of 2016/17 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2 below. More detail on these measures can be found in their respective Action Plans, the Air Quality Strategy for Lancaster, local planning guidance documents and the Transport Master Plan for Lancaster. Key completed/in progress measures are:

- Delivery of Transport Master Plan for Lancaster incorporating the Air Quality Action Plan for the district/AQMA's (adopted October 2016)
- Delivery on charging point provision for electric vehicles for new development (Delivered February 2016))
- Delivery of local/regional air quality planning guidance (adopted as a Planning Advisory Note September 2017)
- Opening of M6/Heysham link road (Bay Gateway) to provide alleviation to the three AQMA's (road opened October 2016)
- Travel planning arrangements in schools and larger new development
- Provision of cycling infrastructure and facilities particularly through the Cycling Demonstration Town programme and Sustainable Transport Fund initiatives
- Planning policy for former TDG site is Carnforth
- Provision of ANPR system in Lancaster (installed June 2017)
- Grant funding to reduce emissions from buses in Lancaster (emission reducing equipment due to be installed to buses in Spring 2018).
- Provision of three 'rapid' and eleven 'fast' electric vehicle charging locations across the district (due April 2018)

Progress on the following measures has been slower than expected due resourcing issues beyond the city council's control. The measures, although delayed, are all likely to be resolved within the period 2017/18:

- Linking air quality stations to traffic management system in Lancaster

- Procurement and delivery of emission reduction technology to buses through the Cleaner Bus Fund grant allocation (equipment was initially due to be installed in 2017).

The key actions and priorities for the coming year are :-

- Assessing the impact of the Heysham/M6 link road (the Bay Gateway) on the three local AQMA's.
- Reduction in bus emissions impacting on roads between Lancaster University and Heysham and particularly the Lancaster AQMA (through DfT Cleaner Bus Technology Grant - to be completed in 2018). A new grant application under the latest rounds of the Cleaner Bus Technology Fund run by Defra is also anticipated in 2018/2019.
- Progressing the adopted Transport Masterplan for Lancaster to develop in detail the elements of the Transport Master Plan for Lancaster.
- Transition of local air quality planning guidance from its current status as a Planning Advice Note to a Supplementary Planning Document. The guidance will provide minimum air quality impact mitigation requirements for traffic generating development. It will also require new assessment/mitigation requirements for larger impacting developments (due November 2018).
- Working with Public Health particularly in relation to electric vehicle infrastructure plans and other prioritised actions (see Appendix E).
- Provision of 'rapid' and 'fast' electric vehicle charging points at street locations (due April 2018)
- Promote and assist where possible with the uptake of electric vehicles by the local taxi fleet (meeting scheduled October 2017 with regional promotional event anticipated late 2017/early 2018).

Longer term actions include the following:-

- Assessment and Implementation of Transport Masterplan for Lancaster and production of final Air Quality action Plan for Lancaster (2016-2024).

Table 2.2 - Progress on Measures to Improve Air Quality – Lancaster District

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	Plan adopted October 2016.Movement Study due to commence Spring 2018	2024	Main plan/action plan to deliver air quality improvements. Masterplan to be adopted as Air Quality Action Plan Plan available at:- http://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/highways-and-transport-masterplans.aspx
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

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
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	To be determined	Plan aims to deliver air quality improvements to lead to general air quality improvement and revocation of the three AQMAs	Plan adopted October 2016	2024 http://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/highways-and-transport-masterplans.aspx
4	Lancaster Parking Strategy	Traffic Management	Emission based parking or permit charges	Lancaster City Council	2015-18	-	-	-	In preparation	2018	More information available at: https://www.lancaster.gov.uk/parking/

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
5	AQ Station traffic management link	Traffic Management	Other	Lancaster City Council and Lancashire County Council	2012/13	2013	-	Assist with traffic management measures in Lancaster AQMA	Works to AQ Stations completed to facilitate link (City Council). Link to management system awaited (County Council).	2018	*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 this financial year. The common database would effectively accept an air quality input from the AQ stations in Lancaster. The government's Digital Market place is now the intended procurement route for the new system.

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
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	Road opened October 2016	October 2016	More information available at: http://heyshamlink.lancashire.gov.uk/ AQ monitoring is ongoing to assess the impact of the new road. Results will be reported in the next 2018 ASR report.
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
8	Promoting home working	Promoting Travel Alternatives	Encourage / Facilitate home-working	Lancaster City Council and Lancashire County Council	-	ongoing	-	-	ongoing	-	-

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
9	Lancashire Commuter Cycle Challenge and other events	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	Lancashire County Council	-	Yearly	-	-	The Lancashire Cycle Challenge ran again during 2016.	-	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
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
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

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
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	-	-	-	-	Ongoing- site updated August 2017. Attention to impact of wood burning.	-	http://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality
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

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
20	Direct Communication/Education	Public Information	Other	Lancaster City Council and Lancashire County Council	-	-	-	-	Short campaign ran in 2017 by city council to discourage allotment and garden bonfires around national clean air day.	-	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

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
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	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	2016	A daytime bus service is operational every 30 mins 6 days a week. Passenger journeys have increased from 384 in the first month to 2,176 in August 2017. 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	-	4129 members registered in Lancashire area (Sept 2017)	-	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	-	-	-	-	-

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
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	-	2011-21	-	-	Development of new plan is currently in progress (2017-19)	2019	Current plan available at: http://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/local-transport-plan.aspx
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	2016/17	-	-	Guidance produced. - Launch Event took place in October 2016 Guidance adopted as a planning advisory note September 2017. Adoption as SPD anticipated Nov 2018.	2017(PAN adoption) and 2018(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.

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
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 (see Appendix E)	-	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 Appendix E)
30	Lancaster Air Quality Strategy	Policy Guidance and Development Control	Other policy	Lancaster City Council	-	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)	2018	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 being 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	February 2016	Guidance available at: https://www.lancaster.gov.uk/planning/planning-policy/supplementary-planning-documents-spds

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
33	Planning Policy – Carnforth former TDG site	Policy Guidance and Development Control	Other policy	Lancaster City Council	-	2012	-	-	Policy active	-	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

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 in 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	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	Lancashire County Council with Lancaster City Council and Stagecoach	2015	2016/17	NOx emissions from buses reduced by over 90%	8% reduction in NOx levels in Lancaster AQMA	£288,150 grant to tackle 17 buses providing most frequent bus services through Lancaster. Progress delayed due to procurement and contract issues. Now resolved.	2018 (Implementation due Feb 2018)	More information available at: https://www.gov.uk/government/collections/clean-bus-technology-fund New round grant bid planned for 2017.

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
36	Modernisation of local bus fleet (Carnforth)	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	Lancaster City Council	2010/17	-	-	-	-	-	Following Cleaner Bus Technology Fund success in 2015, further potential bid in 2017 if scheme is available See 2014 Progress report for further information. Available at: http://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality/air-quality-reviews-and-assessments
37	ULEV Cities/Fleet OLEV Grant applications	Vehicle Fleet Efficiency	Other	Lancashire County Council with Lancaster City Council	2015	-	-	-	Grant bids not successful	-	-
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)	-	ongoing	-	Further information at: https://www.lancaster.gov.uk/sustainable-living/climate-change/responding-climate-change/

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
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	2018	Project to be delivered by March 2018. Two rapid chargers and 4 fast chargers are proposed to be installed in Lancaster. One 'rapid' charger and two 'fast' chargers in Morecambe. One 'fast' charger in Carnforth and one in Heysham. Three 'fast' chargers at Lancaster Caton Road Park and Ride.(NB each 'fast' charger will have two outputs)
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)	2020	-
41	Promoting the use of electric vehicles as taxis	Promoting Low Emission Transport	Taxi emission incentives	Lancaster City Council	2017/18	2018/19	-	-		2020	The Council is consulting local operators and drivers regarding the uptake of EV's.

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

Local Authorities are expected under Chapter 7 of Policy Guidance LAQM.PG (16) to work towards reducing emissions and/or concentrations of pollutant $PM_{2.5}$. There is clear evidence that particulate matter ($PM_{2.5}$) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

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

A review of monitoring provision undertaken in 2016 concluded that the provision of additional local monitoring facilities to assess $PM_{2.5}$ levels would not be feasible at this time.

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 the Dalton Square, Lancaster and Cable Street, Lancaster monitoring sites during 2016. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at http://uk-air.defra.gov.uk/ .

Maps showing the location of the automatic monitoring sites are provided in Appendix A. 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 diffusion tube sites during 2016. Table A.2 in Appendix A shows the details of the sites. Two new sites were introduced in 2016 at Caton Road Lancaster (near to junction with Bulk Road) and Newlands Road (near to M6) Lancaster.

Maps showing the location of the monitoring sites are provided at : https://localview.lancaster.gov.uk/LocalViewWeb/Sites/AirQualityMonitors/. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

3.2 Individual pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias. Further details on adjustments are provided in Tables C.4, C.5 and C.6 in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted continuously monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B.

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.

The data as shown in Figure 2 below indicates a declining trend at the Dalton Square automatic monitoring site, with levels monitored at this location being below the Objective. Unfortunately data capture at the Cable Street site has been poor in 2015/16 and therefore current trend results are less reliable at this site. Trend based on the previous 4 years (2011-2014) indicates that levels are increasing at this

location. There was no monitored exceedance of the hourly NO_2 objective at either continuous automatic monitoring site. A more detailed report for the 2016 results from the Dalton Square site is available at http://www.lancaster.gov.uk/air-quality/ .

Figure 2 - Annual Mean NO_2 at the two continuous automatic monitoring sites in Lancaster

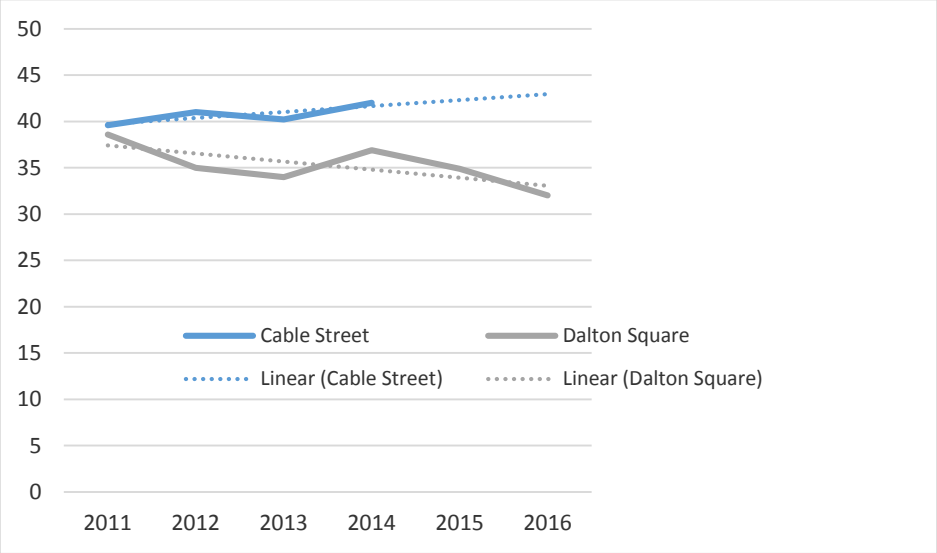


Figure 2a Annual Mean NO_2 at two Objective exceeding monitoring sites located in Galgate Lancaster.

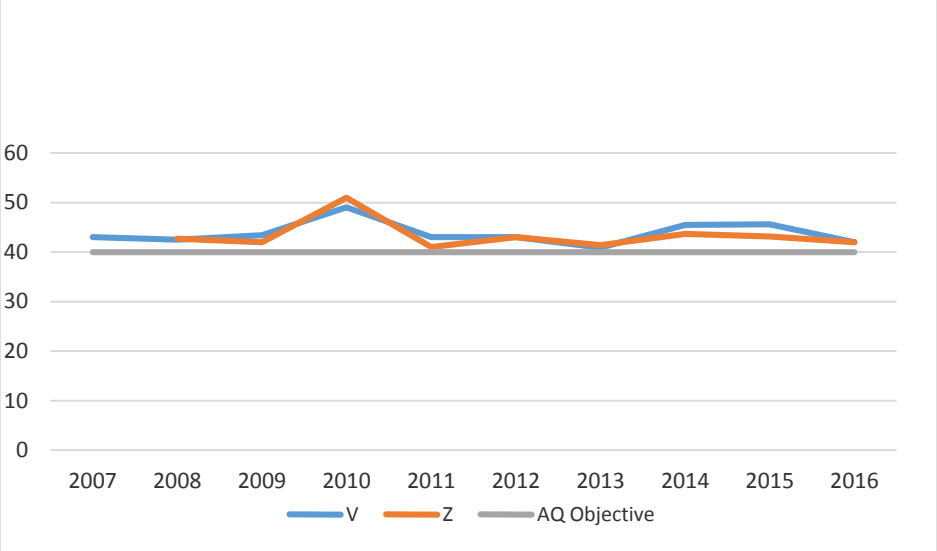


Figure 2b Graph showing trend in Annual Mean NO_2 levels at two Objective exceeding monitoring sites located in Galgate Lancaster.

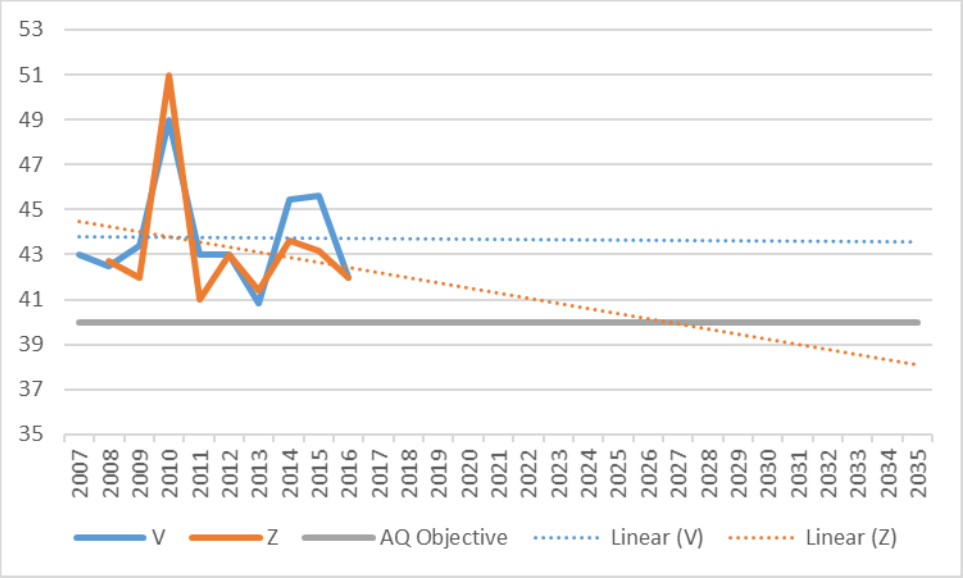


Figure 2c Annual Mean NO_2 at two Objective exceeding monitoring sites located in Carnforth.

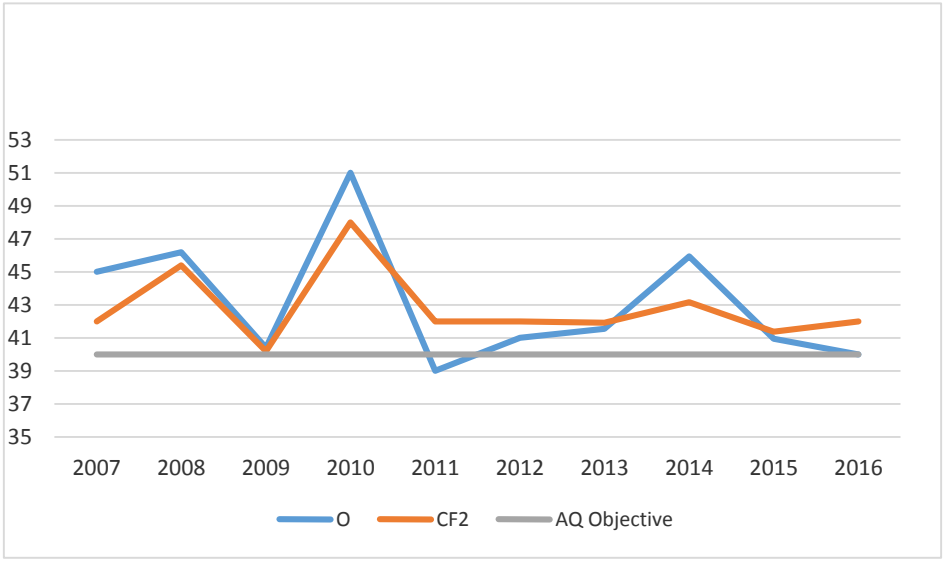
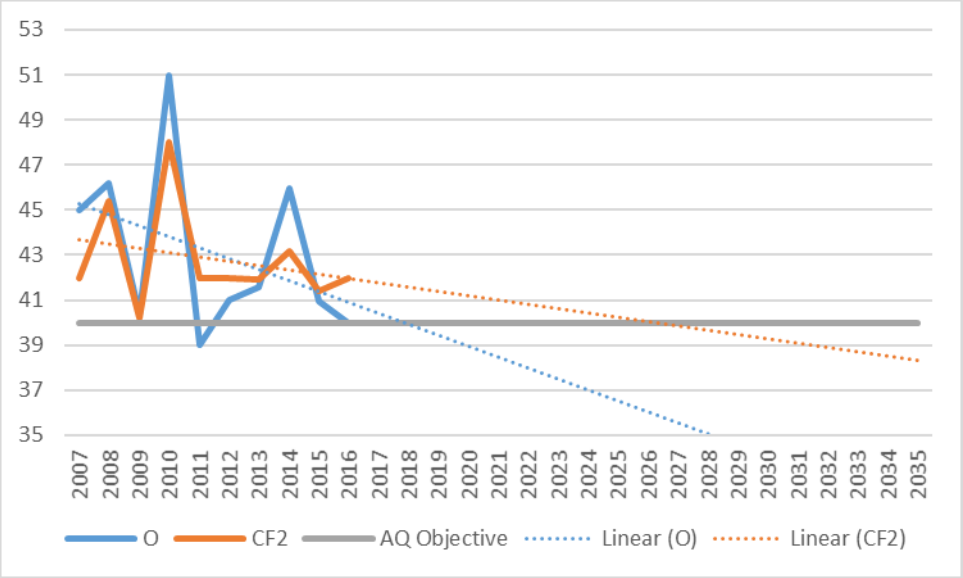


Figure 2d Graph showing trend in Annual Mean NO_2 levels at two Objective exceeding monitoring sites located in Galgate Lancaster.



Results from nitrogen dioxide diffison tubes in 2016 were mixed however more results were slightly down than were up. Perhaps for the first time, a general declining trend can be observed in nitrogen dioxide at monitored roadside locations in the Lancaster district. This therefore now indicates an overall declining position in pollution levels at a majority of locations within the Lancaster district. Only tubes located within AQMAs continue to indicate exceedance of objective levels (annual and hourly exceedances of NO_2 objectives in Lancaster AQMA and annual mean objective exceedances in Galgate and Carnforth AQMAs). Although these site also indicate a decline in levels, the rate of decline indicates that without intervention and it may still be many years before the Objectives are met (See Figures B, 2b and 2d above).

Exceedance of the hourly mean objective was indicated as a number of sites in the Lancaster AQMA (see Figure 1 above) indicated by annual mean NO_2 levels still being above 60ug/m^3 (see http://uk-air.defra.gov.uk/reports/cat18/0806261511_TG_NO2relationship_report_draft1.pdf). All locations monitored are generally indicative of relevant exposure (see table A.2 below for more information).

The two sites located outside AQMA which indicated potential for exceedance of the annual mean objectiive level for NO_2 in 2014 (tube LC28 located at Newton Terrace

on Caton Road, Lancaster indicated at level of 45ug/m^3 and tube LC26 at Scotforth Road, Lancaster indicated a level of 41ug/m^3) showed levels below the 40ug/m^3 objective in 2016*.

It should be noted that both these locations and the AQMAs should be beneficially affected by the opening of the M6/Heysham link road (the Bay Gateway) at the end of 2016 and therefore levels may decrease more significantly during subsequent years. Monitoring is ongoing in all locations locations following the link road opening in October 2016 to assess whether AQMA designation (existing or new) is warranted.The assessed impact and outcomes of the new road in 2017 will be reported in the next air quality annual status report (ASR 2018).

Conclusion

From an assessment of the monitoring results there is no intention to create any new AQMA's or revoke any existing AQMAs at this time within the Lancaster area. The main areas of concern persist to be within the three existing AQMAs. Overall collected results indicate a declining trend in polltion levels at both background and roadside locations. Levels in the three AQMA's indicate that it will still be many years before the Objective levels are met without additional intervention. The impact of the new link road (the Bay Gateway) is yet to be determined and reported.

* Note: The local diffusion tube bias adjustment factor used for 2016 was higher than the national factor and therefore monitoring results are considered to be conservative i.e. if national factor was used results overall would be lower than reported.

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.

Conclusion

The PM_{10} monitor in Lancaster was not operational during 2016 due to a sequence of equipment faults. In line with past results it is anticipated that PM_{10} Objective levels were not exceeded, but this was not confirmed through monitoring in 2016. PM_{10} monitoring in 2017 has improved but has continued to be subject to equipment breakdown and repair. Despite PM_{10} objectives being anticipated to be met, particulate pollution is considered to be a none threshold pollutant and therefore pollutant level reduction is still an important priority for Lancaster City Council.

List of Appendices

Appendix A: Monitoring Results

Appendix B: Full Monthly NO_2 Diffusion Tube Results

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

Appendix D: Summary of Air Quality Objectives in England

Appendix E Lancashire County Council Public Health Air Quality Guidance Note

Appendix F Summary results of survey of Lancashire authorities regarding the adoption of regional air quality planning guidance

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
AN1	Cable Street	Roadside	347684	461963	2.0	NO_2	Y	APNA-370 NO_x analyser	Y(0.4m)	4	Y
APM1	Cable Street	Roadside	347684	461963	2.0	PM_{10}	Y	PM_{10} – TEOM 1400a	Y(0.4m)	4	Y
AN2	Dalton Square	Roadside	347852	461611	2.0	NO_2	Y	APNA-360 NO_x analyser	Y – 0m (Dalton Square is a sitting area)	3.5	N

(1) 0 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.

Figure 3 - Map showing location (red marker) of Cable Street, Lancaster air quality monitoring station (monitors AN1 and APM1) and now closed Water Street station (blue marker) - (transparent grey area is the Lancaster AQMA)

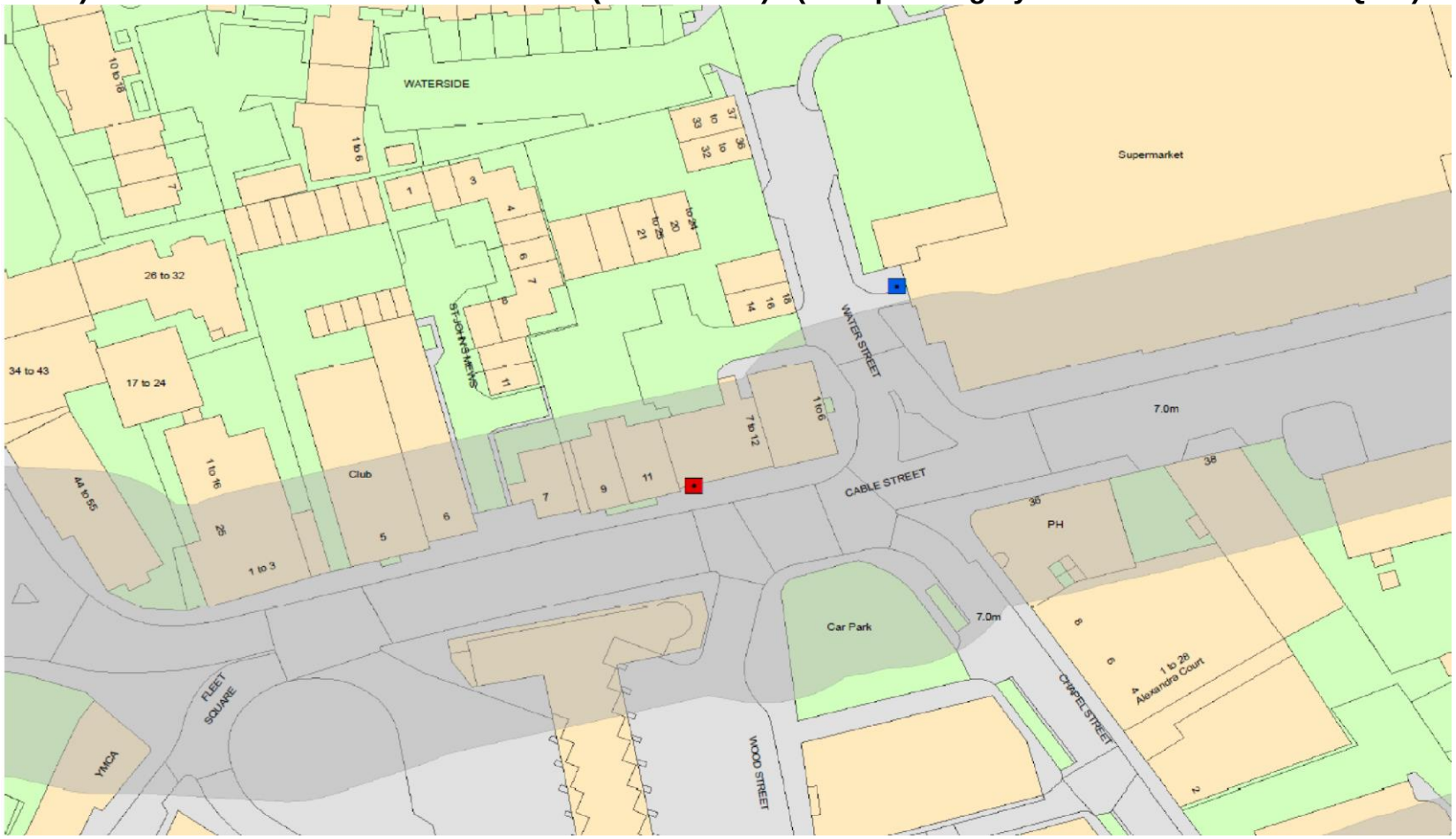


Figure 4 - Map Showing Location (red marker) of Dalton Square Lancaster Air Quality Automatic Monitoring Station (analyser AN2) (transparent grey area is the Lancaster AQMA)

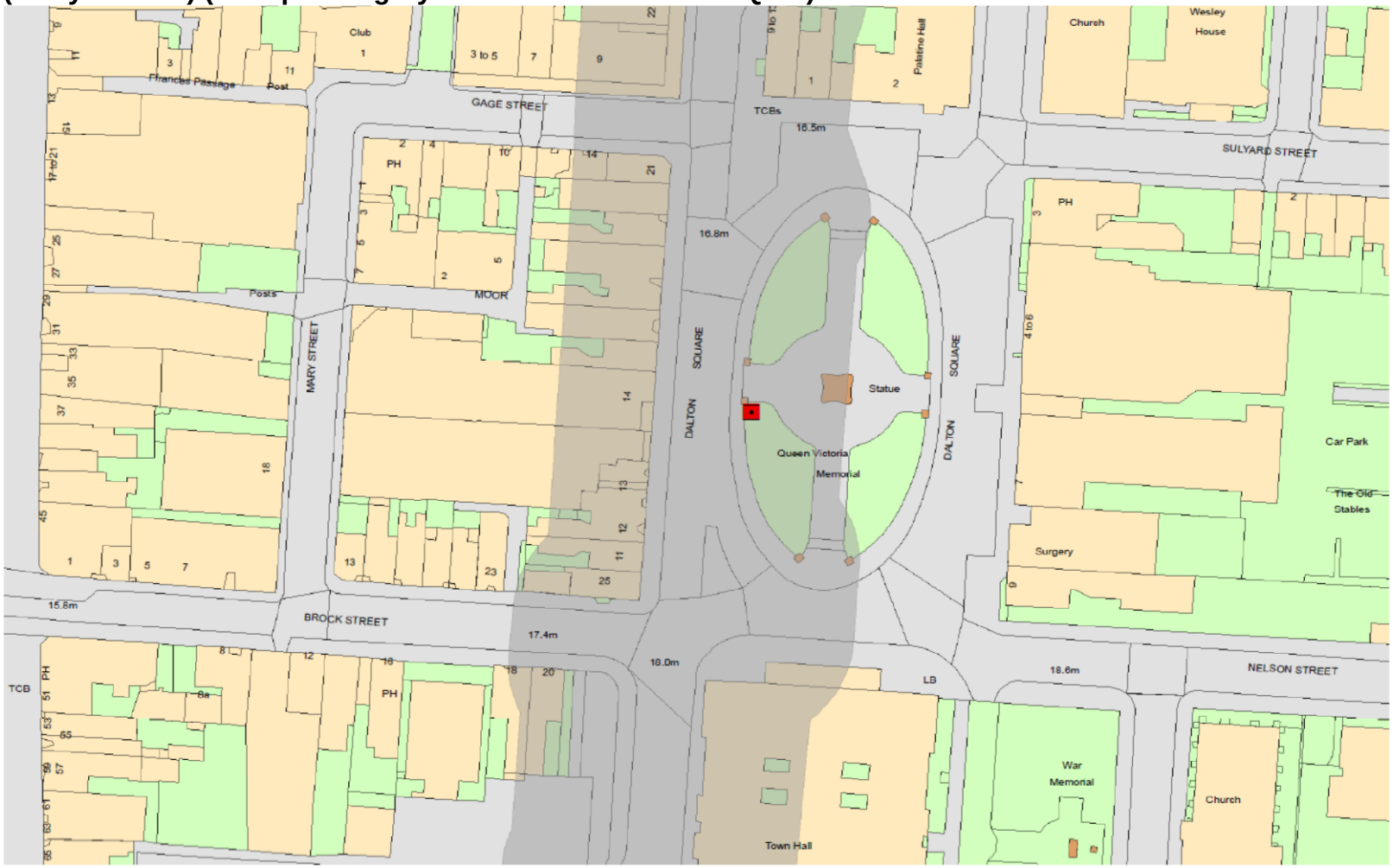


Table A.2 – Details of Non-Automatic Monitoring Sites (sites shown in grey no longer operating)

Site ID	Site Name	Site Type	OS Grid Ref		Site Height (m)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m)	Distance (m) to kerb of nearest road *(N/A if not applicable)*	Worst-case Location (exposure)?
			X	Y						
LC1	Lancaster 1	Roadside	347853	461682	3.5	NO_2	Y	2.5	2.5	Y
LC2	Lancaster 2	Urban Background	347906	461202	*3.5*	NO_2	N	N/A	N/A	N/A
LC3	Lancaster 3	Intermediate	347791	461498	*3*	NO_2	N	N/A	0	N/A
LC4	Lancaster 4	Urban Background	347517	461714	3.5	NO_2	N	N/A	1.5	N/A
LC5	Lancaster 5	Roadside	347847	462448	3	NO_2	Y	0.2	2.5	Y
LC6	Lancaster 6	Roadside	348075	462037	*4*	NO_2	N	0.2	2.7	Y
LC7	Lancaster 7	Roadside	347824	461906	3.5	NO_2	Y	0.2	2.3	Y
LC8	Lancaster 8	Roadside	347792	461858	3.5	NO_2	Y	0.2	1.7	Y
LC9	Lancaster 9	Roadside	347808	461563	3	NO_2	N	0.2	2.7	Y
LC10	Lancaster 10	Roadside	347834	461594	3	NO_2	Y	0.2	3.3	Y
LC11	Lancaster 11	Roadside	347823	461406	3	NO_2	Y	0.2	3.1	Y
LC12	Lancaster 12	Roadside	347619	461508	*3*	NO_2	Y	0.2	1.8	N
LC13	Lancaster 13	Roadside	347582	461593	3	NO_2	Y	0.2	2.4	Y
LC14	Lancaster 14	Roadside	347684	461389	3	NO_2	Y	0.2	2.2	Y
MC1	Morecambe 1	Roadside	345258	463674	*2*	NO_2	N	N/A	2.2	N/A
MC2	Morecambe 2	Urban Background	345237	463483	*3*	NO_2	N	N/A	2.5	N/A
MC3	Morecambe 3	Roadside	343570	464326	*3.5*	NO_2	N	0.2	5.5	Y
A	Lancaster A	Kerbside	347579	462450	3	NO_2	Y	N/A	0.3	Y
B1*	Lancaster B1	Roadside	347852	461610	2	NO_2	Y	N/A	3.3	N
B2*	Lancaster B2	Roadside	347852	461610	2	NO_2	Y	N/A	3.3	N
B3*	Lancaster B3	Roadside	347852	461610	2	NO_2	Y	N/A	3.3	N
B*	Lancaster B	Roadside	*347601*	*462200*	*3*	NO_2	*Y*	0.2	*15*	*N*
C*	Lancaster C	*Urban Centre*	*347715*	*461997*	*3*	NO_2	*N*	*N/A*	*26*	*N*
C1*	Lancaster C1	Roadside	347684	461963	2	NO_2	Y	0.4	3.7	Y
D*	Lancaster D	Urban Centre	347715	461997	*3*	NO_2	N	N/A	26	N

Site ID	Site Name	Site Type	OS Grid Ref		Site Height (m)	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m)	Distance (m) to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
			X	Y						
D1*	Lancaster D1	Roadside	347684	461963	2	NO_2	Y	0.4	3.7	Y
E*	Lancaster E	Urban Centre	347715	461997	*3*	NO_2	N	N/A	26	N
E1*	Lancaster E1	Roadside	347684	461963	2	NO_2	Y	0.4	3.7	Y
F	Lancaster F	Suburban	349600	464222	*2*	NO_2	N	0.2	20	N
G	Lancaster G	Roadside	348199	462353	*3.5*	NO_2	Y	0.2	9.2	N
H	Lancaster H	Roadside	347860	461127	3	NO_2	N	0.2	9	Y
I	Lancaster I	Roadside	347909	462015	3	NO_2	Y	0.2	3.5	Y
J	Lancaster J	Roadside	347852	461909	3	NO_2	Y	0.2	1.9	Y
K	Lancaster K	Roadside	347852	461791	3	NO_2	Y	0.2	4.4	Y
L	Lancaster L	Roadside	347612	461523	2.5	NO_2	Y	0.2	1.5	Y
M	Lancaster M	Roadside	347517	461714	*2.5*	NO_2	Y	0.3	2.4	Y
N	Lancaster N	Roadside	347686	461960	*3*	NO_2	Y	0.2	3.5	Y
O	Carnforth O	Roadside	349906	470624	3	NO_2	Y	0.2	1.4	Y
P	Lancaster P	Roadside	345759	463163	*2.5*	NO_2	N	0.2	22	N
Q	Lancaster Q	Roadside	347665	461447	3	NO_2	Y	0.2	2	Y
R	Lancaster R	Suburban	349694	464299	*2*	NO_2	N	0.2	48	Y
S	Lancaster S	Roadside	349835	470463	*2*	NO_2	Y	0.2	3.9	Y
T	Lancaster T	Roadside	347588	461958	*3*	NO_2	Y	0.2	3	Y
U	Carnforth U	Roadside	349899	470613	*3.0*	NO_2	Y	0.2	2.6	Y
V	Galgate V	Roadside	348359	455352	3.0	NO_2	Y	0.2	1.6	Y
W	Galgate W	Roadside	348372	455381	*3.0*	NO_2	Y	0.2	2.5	Y
X	Galgate X	Roadside	348388	455564	*2.5*	NO_2	N	0.2	5.5	Y
Y	Galgate Y	Roadside	348352	455249	*3.0*	NO_2	Y	0.2	3.0	N
Z	Galgate Z	Roadside	348345	455273	2.5	NO_2	Y	0.2	2.3	Y
ZA	Galgate ZA	Roadside	348351	455381	3.5	NO_2	Y	0.2	1.0	Y
ZB	Galgate ZB	Roadside	348386	455471	2.0	NO_2	N	0.2	2.0	N
ZC	Galgate ZC	Roadside	348375	455391	3.0	NO_2	Y	0.4	2.3	Y
CF1	Carnforth CF1	Roadside	349871	470525	2.0	NO_2	Y	0.2	5.9	N
CF2	Carnforth CF2	Roadside	349934	470605	3.5	NO_2	Y	0.2	2.3	Y

CF3	Carnforth CF3	Roadside	349853	470615	3.5	NO_2	Y	0.2	2.0	N
CF4	Carnforth CF4	Roadside	349890	470628	3.0	NO_2	Y	0.4	2.5	Y
CF5	Carnforth CF5	Roadside	349963	470618	3.0	NO_2	Y	0.2	1.8	Y
CF6	Carnforth CF6	Roadside	350000	470667	3.5	NO_2	Y	0.2	2.6	Y
CF7	Carnforth CF7	Roadside	349613	470225	2.5	NO_2	N	0.2	5.9	N
T1	Torrisholme T1	Roadside	345631	463693	3.5	NO_2	N	0.2	2.4	N
T2	Torrisholme T2	Roadside	345598	463685	*3.5*	NO_2	N	0.2	2.4	N
T3	Torrisholme T3	Roadside	345586	463698	*3.0*	NO_2	N	0.2	4.3	Y
T4	Torrisholme T4	Roadside	345613	463705	*4.0*	NO_2	N	0.2	5.3	Y
T5	Torrisholme T5	Roadside	345642	463715	*3.0*	NO_2	N	0.2	6.7	N
T6	Torrisholme T6	Roadside	345688	463715	*3.0*	NO_2	N	0.2	2.8	Y
T7	Torrisholme T7	Roadside	345522	463676	*3.0*	NO_2	N	0.2	11.1	N
LC15	Lancaster 15	Roadside	348199	462361	5	NO_2	Y	0.2	4.9	Y
LC16	Lancaster 16	Roadside	348269	462222	2	NO_2	N	0	4.6	Y
LC17	Lancaster 17	Roadside	347792	461577	3.5	NO_2	N	0.2	2.3	N
LC18	Lancaster 18	Roadside	347784	461565	3.5	NO_2	N	0.2	2.4	N
LC19	Lancaster 19	Roadside	347502	461841	3	NO_2	Y	0.5	1.6	Y
LC20	Lancaster 20	Roadside	347515	461835	3	NO_2	Y	0.4	1.6	N
LC21	Lancaster 21	Roadside	347627	461895	3	NO_2	N	0.3	1.5	N
LC22	Lancaster 22	Roadside	347928	461025	3	NO_2	N	0.2	7.2	Y
LC23	Lancaster 23	Roadside	347948	460893	3	NO_2	N	0.2	5	Y
LC24	Lancaster 24	Roadside	347974	460514	3	NO_2	N	0.2	2.8	Y
LC25	Lancaster 25	Roadside	348084	459844	3	NO_2	N	0.2	5.3	Y
LC26	Lancaster 26	Roadside	347990	459418	3	NO_2	N	0.2	5.5	Y
LC27	Lancaster 27	Roadside	347989	459396	3	NO_2	N	0.2	6.5	Y
BLS 1	Bolton-le-Sands 1	Roadside	348594	468500	3	NO_2	N	0.2	4	Y
H1	Heysham 1	Roadside	341964	463273	2.5	NO_2	N	0.5	2.5	Y
CF8	Carnforth CF8	Roadside	349568	470044	3	NO_2	N	0.2	4.5	Y
LC28	Lancaster 28	Roadside	348517	463243	2.5	NO_2	N	0.2	6	Y
W1	Warton 1	Roadside	349420	472092	3	NO_2	N	0.2	1.4	Y
W2	Warton 2	Roadside	349843	472218	3	NO_2	N	0.2	1.0	Y
W3	Warton 3	Roadside	349897	472490	3	NO_2	N	0.2	3.7	Y
LC29	Lancaster 29	Roadside	348527	463270	2.5	NO_2	N	0.2	5.3	Y
LC30	Lancaster 30	Roadside	348114	462071	2.5	NO_2	N	0.2	6.5	Y
LC31	Lancaster 31	Roadside	348114	462071	3	NO_2	N	0.4	3	Y
LC32	Lancaster 32	Roadside	347511	461744	3.5	NO_2	Y	0.3	2	N
LC33	Lancaster 33	Roadside	348043	462118	3.5	NO_2	Y	-	2	N
M6	Lancaster M6	Roadside	349271	460208	2	NO_2	Y	0.2	-	Y

(1) * - Monitoring co-located with a continuous analyser

(2) 0 if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(3) N/A if not applicable. - A map showing the location of all diffusion tube monitoring sites (past and present) is available at: : https://localview.lancaster.gov.uk/LocalViewWeb/Sites/AirQualityMonitors/

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %[a]	Valid Data Capture 2016 % [b]	Annual Mean Concentration μg/m³				
					2012	2013	2014	2015	2016
AN1 - Cable St	Roadside	Y	-	21.1	**41.0**	**40.2**	**42.0[c] (39.7)[d]**	**-**	**-**
AN2 - Dalton Sq	Roadside	Y	-	90.7	35.0	34.0	36.9	34.9	32

Notes: Exceedences of the NO_2 annual mean objective of 40μg/m³ are shown in **bold and shaded boxes**.

NO_2 annual means exceeding 60μg/m³, indicating a potential exceedence of the NO_2 1-hour mean objective are shown in **bold and underlined.**

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

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

(c) Means should be "annualised" as in Box 3.2 of TG(09) (http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38), if valid data capture is less than 75%. See Appendix C for details.

(d) Period mean value

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

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %[a]	Valid Data Capture 2016 %[b]	Number of Exceedences of Hourly Mean (200 μg/m³)				
					2012[c]	2013	2014[c]	2015	2016
AN1 - Cable St	Roadside	Y	-	21.1	0 (109.1ug/m³)	0	0 (119.5ug/m³)	-	-
AN2 - Dalton Sq	Roadside	Y	-	90.7	0	0	0	0	0

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

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

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

(c) If the period of valid data is less than 90%, the 99.8th percentile of 1-hour means is provided in brackets.

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

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2016 %[b]	Annual Mean Concentration μg/m^3 [c]				
					2012	2013	2014	2015	2016
APM1 - Cable Street	Roadside	Y	-	2.8	23.7	27	21.1	24.6	-

Notes: Exceedences of the PM_{10} annual mean objective of 40μg/m^3 are shown in **bold and shaded boxes.**

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

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

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

(d) Adjustments to reference method carried out using the Volatile Correction Model (VCM) tool. For 2014 FDMS sites used : Leeds Centre AURN, Salford Eccles AURN and the average of the remaining sites with range. The site specific temperature and pressure were used within the VCM.

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

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2016 %[b]	Number of Exceedences of 24-Hour Mean (50 μg/m^3)[c]				
					2012	2013	2014	2015	2016
APM1 - Cable Street	Roadside	Y	-	2.8	11	20	9(35.2)[c]	9(38.9)[c]	- (16)[c]

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

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

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

(c) If the period of valid data is less than 90%, the 90.4th percentile of 24-hour means is provided in brackets.

Table A.7 Results of Nitrogen Dioxide Diffusion Tubes - 2010 to 2016 (sites showing an exceedance of the annual mean objective are shown in bold and shaded boxes. Sites indicating the potential for exceedance of the 1 hour objective for nitrogen dioxide are shown in bold and underlined)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3						
			2010 (Bias Adjustment Factor = 0.982)	2011 (Bias Adjustment Factor = 0.869)	2012 (Bias Adjustment Factor = 0.926)	2013 (Bias Adjustment Factor = 0.918)	2014 (Bias Adjustment Factor = 1.034)	2015 (Bias Adjustment Factor = 1.030)	2016 (Bias Adjustment Factor = 0.97)
LC1	Roadside	Y	**62**	**51**	**50**	**54**	**56**	**50**	**50**
LC2	Urban Background	N	27	22	23	-	-	-	-
LC4	Urban Background	N	23	19	19	17	18	16	17
LC5	Roadside	Y	**47**	39	39	39	**47**	**42**	**40**
LC6	Roadside	N	39	32	32	32	-	-	-
LC7	Roadside	Y	**43**	37	37	35	37	35	33
LC8	Roadside	Y	**45**	35	36	35	37	34	33
LC9	Roadside	Y	**43**	37	**42**	**40**	**41**	39	39
LC10	Roadside	Y	**83**	**66**	**72**	**69**	**75**	**71**	**66**
LC11	Roadside	Y	**73**	**61**	**66**	**60**	**65**	**60**	**61**
LC12	Roadside	Y	**45**	38	38	-	-	-	-
LC13	Roadside	Y	**48**	**41**	**43**	**42**	**43**	**41**	34
LC14	Roadside	Y	**42**	35	35	33	38	35	32
MC3	Roadside	N	-	27	26	24	-	-	-
A	Kerbside	Y	**50**	39	**40**	36	39	35	36
B1	Roadside	Y	26	35	33	33	36	35	31
B2	Roadside	Y	26	36	34	33	37	36	33
B3	Roadside	Y	30	37	35	34	37	37	33
C	*Urban Centre*	N	33	-	-	-	-	-	-
C1	Roadside	Y	-	**40**	**43**	**42**	**44**	39	**41**
D	*Urban Centre*	N	34	-	-	-	-	-	

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m³						
			2010 (Bias Adjustment Factor = 0.982)	2011 (Bias Adjustment Factor = 0.869)	2012 (Bias Adjustment Factor = 0.926)	2013 (Bias Adjustment Factor = 0.918)	2014 (Bias Adjustment Factor = 1.034)	2015 (Bias Adjustment Factor = 1.030)	2016 (Bias Adjustment Factor = 0.97)
D1	Roadside	Y	-	**42**	**42**	**40**	**45**	**41**	**41**
E	*Urban Centre*	N	33	-	-	-	-	-	
E1	Roadside	Y	-	**41**	**42**	**41**	**46**	**41**	**43**
G	Roadside	Y	39	35	35	-	-	-	-
H	Roadside	N	**40**	30	33	34	34	32	32
I	Roadside	Y	**48**	**40**	37	38	**42**	37	38
J	Roadside	Y	**65**	**52**	**52**	**48**	**53**	**45**	**47**
K	Roadside	Y	**54**	**45**	**43**	**43**	**47**	**42**	**42**
L	Roadside	Y	**52**	**42**	**42**	**43**	**48**	**43**	38
M	Roadside	Y	**45**	38	38	-	-	-	-
N	Roadside	Y	**51**	-	-	-	-	-	-
O	Roadside	Y	**51**	39	**41**	**42**	**46**	**41**	**40**
Q	Roadside	Y	**45**	36	34	39	**45**	39	37
S	Roadside	Y	35	30	30	31	-	-	-
T	Roadside	Y	34	25	25	-	-	-	-
U	Roadside	Y	**43**	37	36	37		-	-
V	Roadside	Y	**49**	**43**	**43**	**41**	**45**	**46**	**42**
W	Roadside	Y	**45**	-	-	-	-	-	
X	Roadside	N	33	-	-	-	-	-	
Y	Roadside	Y	**46**	36	38	-	-	-	
Z	Roadside	Y	**51**	**41**	**43**	**41**	**44**	**43**	**42**
ZA	Roadside	Y	36	29	29	29	34	30	31
ZB	Roadside	N	35	26	28	29	32	27	29
ZC	Roadside	Y	**50**	37	**40**	39	**44**	39	37

CF1	Roadside	Y	38	29	32	32	36	34	33
CF2	Roadside	Y	**48**	**42**	**42**	**42**	**43**	**41**	**42**
CF3	Roadside	Y	**40**	34	31	31	40	38	30
CF4	Roadside	Y	**46**	36	34	38	**42**	39	36
CF5	Roadside	Y	**40**	32	33	39	**45**	39	39
CF6	Roadside	Y	39	33	30	32	38	36	35
CF7	Roadside	N	36	30	30	30	34	33	30
T1	Roadside	N	**41**	37	37	33	38	34	32
T2	Roadside	N	**41**	35	34	-	-	-	-
T3	Roadside	N	37	29	30	28	-	-	-
T4	Roadside	N	31	26	26	-	-	-	-
T5	Roadside	N	32	27	26	-	-	-	-
T6	Roadside	N	-	29	28	24	-	-	-
T7	Roadside	N	-	23	24	27	-	-	-
LC15	Roadside	Y	-	-	-	35	**43**	38	35
LC16	Roadside	N	-	-	-	20	24	27	-
LC17	Roadside	N	-	-	-	30	39	36	34
LC18	Roadside	N	-	-	-	35	35	32	30
LC19	Roadside	Y	-	-	-	**59**	**67**	**61**	**60**
LC20	Roadside	Y	-	-	-	**45**	**55**	45	48
LC21	Roadside	N				-	39	33	33
LC22	Roadside	N	-	-	-	28	31	27	28
LC23	Roadside	N	-	-	-	31	39	35	35
LC24	Roadside	N	-	-	-	30	32	33	32
LC25	Roadside	N	-	-	-	29	27	24	24
LC26	Roadside	N	-	-	-	36	**41**	38	36
LC27	Roadside	N	-	-	-	29	35	31	31
BLS 1	Roadside	N	-	-	-	31	37	34	32
H1	Roadside	N	-	-	-	24	28	25	25
CF8	Roadside	N	-	-	-	33	38	36	33
LC28	Roadside	N	-	-	-	-	**45**	39	36
W1	Roadside	N	-	-	-	-	20	18	-
W2	Roadside	N	-	-	-	-	22	16	-
W3	Roadside	N	-	-	-	-	23	21	-
LC29	Roadside	N	-	-	-	-	-	38	35
LC30	Roadside	N	-	-	-	-	-	32	31
LC31	Roadside	N	-	-	-	-	-	36	33

LC32	Roadside	Y	-	-	-	-	-	**53**	**49**

Results shown in red have data capture less than 75%

Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO_2 Monthly Diffusion Tube Results – 2016 ug/m^3

Null Result | suspect | possible suspect | tube gone

SITE	GRADKO TUBES												AV	AV
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Raw	Bias Corrected
L/C1	46.47	62.32	53.14	43.02	55.19	53.51	36.03	42.39	46.32	62.28	57.25	62.65	52	50
L/C4	22.02	23.74	17.65	12.46	12.90	12.32	9.73	9.78	14.07	18.55	25.12	25.81	17	17
L/C5	37.45	49.53	41.51	38.14	42.64	47.44	28.60	35.57	31.43	53.99	42.45	42.71	41	40
L/C6														0
L/C7	28.12	43.61	35.56	33.16	29.13	38.35	28.88	27.32	28.55	37.74	41.23	37.49	34	33
L/C8	30.37	36.34	33.68	30.62	31.77	38.72	21.74	26.66	28.67	47.94	39.18	36.90	34	33
L/C9	41.65	42.17	37.39	33.36	34.62	42.64	29.51	33.86	33.83	62.63	48.39		40	39
L/C10	50.81	77.90	80.19	66.38	64.28	78.04	67.62	58.60	61.27	45.73	85.57	78.61	68	66
L/C11	51.31	73.78	56.06	57.09	55.80	68.85	65.15	55.87	50.34	68.53	83.77	63.88	63	61
L/C13	33.04	39.47	33.49	37.85	26.20	30.12	34.38	35.84	34.42	38.30	40.92	41.08	35	34
L/C14	31.27	42.07	33.13	29.41	28.32	32.90	24.84	26.20	27.31	37.04	48.08	40.82	33	32
M/C 3														0
A	33.57	41.89	35.86	30.67	35.87	46.47	34.93	35.40	31.28	42.67	36.76	34.28	37	36
B1	29.29	42.46	36.16	31.37	28.61	29.95	28.30	26.46	28.95	27.73	37.94	39.43	32	31
B2	33.93	44.38	35.87	33.76	29.47	31.23	30.33	26.03	27.15	29.21	37.17	45.27	34	33
B3	35.26	42.60	32.94	34.09	30.82	33.29		28.32	29.03	29.15	36.76	41.38	34	33
C1	33.23	50.76	49.08	38.40	42.02	46.07	30.04	33.09	32.40	56.62	52.42	42.90	42	41
D1	30.87	47.94	47.27	39.86	42.41	45.16	31.01	35.15	31.99	53.26	50.72	46.27	42	41
E1	37.29	48.88	46.33	45.09	45.18	60.39	32.02	37.23	31.69	54.81	56.19	37.93	44	43
G														0

H	30.50	40.30	33.89	28.46	31.45	34.86	19.21	24.97	25.78	46.67	41.47	39.42	33	32
I	36.72	47.16	36.96	40.21	36.56	41.38	28.49	30.31	32.62	48.85	43.58	42.70	39	38
J	36.76	63.54	45.24	33.66	42.79	50.23	38.05	42.95	39.17	61.03	62.12	60.59	48	47
K	34.41	53.02	55.32	43.79	43.96	49.78	32.70	35.60	37.77	53.83	45.66	38.00	44	42
L	34.10	50.89	35.73	31.29	35.45	40.13	37.47	38.52	33.36		48.31	48.75	39	38
O	31.79	46.35	45.21	45.08	46.95	47.38	36.56	37.81	34.48	39.83	45.94	42.72	42	40
Q	39.31	46.09	38.45	36.78	37.49	39.40	20.34	26.09	29.50	45.18	51.04	50.45	38	37
S														0
U														0
V	37.68	49.18	42.25	45.27	39.99	44.74	40.26	38.67	43.32	42.30	54.19	47.75	44	42
Y														0
Z		53.69	43.34	43.23	41.57	44.72	41.81	38.85	34.34	41.99	51.23	44.43	44	42
ZA	29.64	38.60	32.21		28.11	29.63	23.61	24.87	26.94	38.05	37.58	41.84	32	31
ZB	27.88	39.45	31.81	30.85	28.21	27.44	18.25	15.51	25.72	42.15	36.55	36.51	30	29
ZC	34.85	47.43	42.65	31.49	35.74	35.15	25.42	31.85	33.29	49.82	47.94	47.72	39	37
cf1	33.36	37.35	33.09	31.34	32.39	35.82	32.32			30.10	38.02	32.48	34	33
cf2	43.25	46.72	50.17	44.60	45.46	43.41	44.19	42.62	36.46	35.77	42.73	39.80	43	42
cf3	25.37	37.57	32.80	32.42	30.88	29.82	28.43	27.55	27.52	28.87		41.12	31	30
cf4	38.82	41.59	34.86	40.13	40.71	39.23	31.01	33.85	30.02	34.28	41.55	43.87	37	36
cf5	33.90	43.13	41.19	37.03	41.15	46.99	30.57	36.25	34.19	48.00	48.10	45.27	40	39
cf6	36.82	37.77	37.09	33.59	36.64	35.69	29.78	30.94	33.13	43.91	41.30	39.53	36	35
cf7	27.47	37.20	33.60	32.59	31.84	28.34	28.78	25.76	26.65	28.78	39.29	32.27	31	30
T1	37.16	38.93	33.89	31.01	32.24	32.21	33.55	27.44	34.07	33.95	35.64	30.35	33	32
T2														0
T3														0
T4														0
T5														0
T6														0
T7														0

LC15	36.81	46.73	37.38	32.89	33.40	34.68	31.13	30.35	31.24	35.27	41.87	42.25	36	35
LC16														0
LC17	32.13	44.18		29.52	37.73	35.27	29.4	29.67	28.27	37.3	41.4	43.70	35	34
LC18	29.59	38.86	31.98	26.74	28.42	31.26	18.95	22.73			42.5	36	31	30
LC19	55.05	58.35	56.72		56.21	73.62	68.4	56.72	59.11	51.1	78.4	65.17	62	60
LC20		54.95		45.43	48.30	51.01	41.6	40.89	36.49	51.34	57.8	63.7	49	48
LC21	31.08	37.97	31.33	30.49		31.14		26.10		36.7	44.8		34	33
LC22	29.32	34.83	31.05	28.52	23.02	27.81	19.2	19.41	23.83	28.77	41.4	38.3	29	28
LC23	34.42	42.50	38.70	30.63	31.84	37.67	29.9	29.03	31.69	34.8	47.8	46.72	36	35
LC24	25.61	37.61	35.54	33.31	27.87	31.49	29.1	27.01	28.90	30.6	42.69	44.5	33	32
LC25	27.16	32.09	25.23	19.01	20.78	23.35	15.6	17.30	20.90	26	39.50	35.10	25	24
LC26	36.51	37.74	37.85	34.63		38.77	30.90	31.14	30.83	35.76	48.4	47.3	37	36
LC27	37.19	34.10	32.20	27.80	28.83	30.60	23.1	22.18	24.51	33.3	45.6	42.7	32	31
BLS1	31.78	33.64	32.18	30.56	34.47	32.46		29.45	27.45	33.7	38.1	36.71	33	32
H1	28.22	31.05	28.76	23.61	22.36	22.51	14.3	15.49	20.37	30.3	38	37.66	26	25
CF8	37.09	36.86	35.13	27.15	31.67	34.12	26.5	26.75	33.85	38.9	40.1	38.36	34	33
LC28	37.09	44.68	46.53	38.56	33.00	44.68	32.90	28.97	29.47	34.4	43	34.4	37	36
W1														0
W2														0
W3														0
LC29	40.37	41.52	39.17	39.32	37.20	38.95	32.30	28.90	27.82	33.7	38.90	33.1	36	35
LC30	33.99	38.25	35.71	29.58	32.06	36.54	23.9	21.62	26.24	35.2	35.40	32.1	32	31
LC31	39.36	36.51	33.28	33.75			30.5	28.02	28.55	32.00	44.9	36.5	34	33
LC32	55.38	50.53	51.26	53.54	43.20	54.11	42	44.3	40.81	48.5	61.7	64.8	51	49

(1) See Appendix C for details on bias adjustment

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 (2016) remain operational.

Equipment at the two sites is (2 No. APNA 360/370 NO_2 analysers and 1No. TEOM PM_{10} particulate monitor) are maintained and serviced by Horiba Instruments Limited, 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.

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

Page 1 of 2

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		

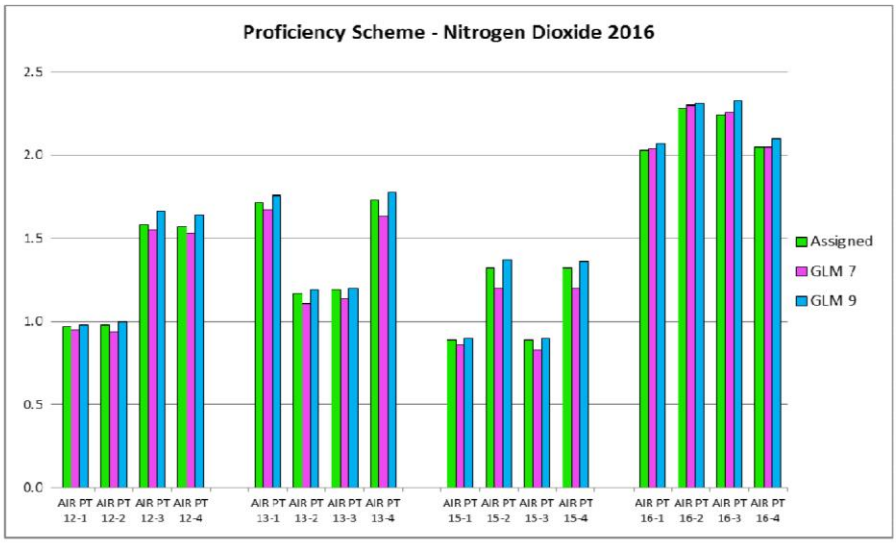
Table C.2 - Gradko NO_2 proficiency scheme results 2015

gradko environmental
(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 2016

Methods: GLM 7 – Camspec M550 Spectrophotometer, GLM 9 – QuAAtro Continuous Flow analyser

AIR PT Proficiency Scheme - Nitrogen Dioxide 2016								
			Camspec M550 - GLM 7			QuAAtro - GLM 9		
Date	Round	Assigned value	Measured concentration	z-Score	% Bias	Measured concentration	z-Score	% Bias
Feb-16	AIR PT 12-1	0.97	0.95	-0.28	-2.1%	0.98	0.14	1.0%
Feb-16	AIR PT 12-2	0.98	0.94	-0.54	-4.1%	1.00	0.27	2.0%
Feb-16	AIR PT 12-3	1.58	1.55	-0.25	-1.9%	1.66	0.67	5.1%
Feb-16	AIR PT 12-4	1.57	1.53	-0.34	-2.5%	1.64	0.60	4.5%
May-16	AIR PT 13-1	1.72	1.67	-0.39	-2.9%	1.76	0.31	2.3%
May-16	AIR PT 13-2	1.17	1.11	-0.68	-5.1%	1.19	0.23	1.7%
May-16	AIR PT 13-3	1.19	1.14	-0.56	-4.2%	1.2	0.11	0.8%
May-16	AIR PT 13-4	1.73	1.63	-0.74	-5.8%	1.78	0.37	2.9%
Aug-16	AIR PT 15-1	0.89	0.86	-0.45	-3.4%	0.90	0.15	1.1%
Aug-16	AIR PT 15-2	1.32	1.20	-1.16	-9.1%	1.37	0.48	3.8%
Aug-16	AIR PT 15-3	0.89	0.83	-0.90	-6.7%	0.90	0.15	1.1%
Aug-16	AIR PT 15-4	1.32	1.20	-1.21	-9.1%	1.36	0.40	3.0%
Oct-16	AIR PT 16-1	2.03	2.04	0.07	0.5%	2.07	0.26	2.0%
Oct-16	AIR PT 16-2	2.28	2.3	0.12	0.9%	2.31	0.18	1.3%
Oct-16	AIR PT 16-3	2.24	2.26	0.12	0.9%	2.33	0.54	4.0%
Oct-16	AIR PT 16-4	2.05	2.05	0.0	0.0%	2.1	0.31	2.4%



February 2017

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Tables C.3 and C.4 Data submitted for national diffusion tube bias correction database

Diffusion Tube Collocation Data Questionnaire For Local Authorities

Please Read the "Notes" sheet and then fill in the white boxes of this questionnaire
Should you require assistance, email nick.martin@npl.co.uk or phone 020 8943 7088

	Date form filled in	Name of Local Authority	Your name	Phone number	Contact email
Your Details	15/06/2017	Lancaster City Council	Paul Cartmell	01524 582728	pcartmell@lancaster.gov.uk

	Distance from kerb (m)	Site type (e.g. roadside, background). Definitions of site types are given on the "Notes" sheet	Distance from diffusion tube(s) to continuous analyser inlet (m) (this should be less than 1m from the analyser inlet)	Location (site name or a brief description)	Grid Reference of Site (if available)
Site Details	**3.3**	Roadisde	0.15	Dalton Square	347852, 461611

	Prepared by	Analysed by	Example results sheet attached? (please attach a results sheet provided by the analysis laboratory)	Preparation method (e.g. 50% TEA in acetone; 50% TEA in water)	How are diffusion tubes deployed? (e.g. with a clip, spacer, shelter box, just tape)
Diffusion Tube Details	Gradko International Ltd.	Gradko International Ltd.		20% TEA in water	clip inside head/inlet cage

	Analyser type	QA/QC (e.g. local or network)
Continuous Analyser Details	Horiba APNA-370 chemiluminescence	Local

Data from the Automatic Analyser (Matching Individual Diffusion Tube Periods)

Period	Start Date (dd/mm/yy)	End Date (dd/mm/yy)	% Data Capture	Ratified / Provisional	NOx (if available) (ug/m^3)	Nitrogen Dioxide (ug/m^3)
1	07/01/2016	04/02/2016	99.9	Ratified	86.9	40.7
2	04/02/2016	01/03/2016	99.8	Ratified	96.1	44.7
3	01/03/2016	30/03/2016	99.9	Ratified	76.6	40.4
4	30/03/2016	27/04/2016	99.9	Ratified	63.2	33.8
5	27/04/2016	25/05/2016	99.9	Ratified	52	29.5
6	25/05/2016	30/06/2016	7.9	Ratified	60.5	25.9
7	30/06/2016	28/07/2016	99.9	Ratified	51.7	22.7
8	28/07/2016	24/08/2016	99.8	Ratified	43.4	20
9	24/08/2016	29/09/2016	97.8	Ratified	60.5	27.5
10	29/09/2016	25/10/2016	99.8	Ratified	53.1	24.5
11	25/10/2016	29/11/2016	99.9	Ratified	100.8	36.9
12	29/11/2016	05/01/2017	99.9	Ratified	93.2	35.7
13						

Please express NOx as NO_2 (e.g. ppb x 1.913) or alternatively note the approach / units here:

When you are identifying the automatic monitoring periods that match your diffusion tube exposure periods, please be as precise as possible. It is not, however, necessary to match start times to the exact hour that you put out your tubes.

Individual Period (monthly) Mean Nitrogen Dioxide Data from the Diffusion Tubes (ug/m^3)

Period		Tube 1	Tube 2 (if available)	Tube 3 (if available)	Tube 4 (if available)
1		29.29	33.93	35.26	
2		42.46	44.38	42.60	
3		36.16	35.87	32.94	
4		31.37	33.76	34.09	
5		28.61	29.47	30.82	
6		29.95	31.23	33.29	
7		28.30	30.33		
8		26.46	26.03	28.32	
9		28.95	27.15	29.03	
10		27.73	29.21	29.15	
11		37.94	37.17	36.76	
12		39.43	45.27	41.38	
13					

	Are the concentrations stated in ug/m^3?	Did the diffusion tube supply or analysis method change during the monitoring period? When, from what, to what?	Were there any significant problems with the continuous analyser during the monitoring period?	Are there any other relevant issues with your data?
Other Information	Yes	No	No	No

Please Return Completed Questionnaires to: nick.martin@npl.co.uk
This questionaire is now maintained and distributed by the National Physical Laboratory on behalf of Defra and the DAs

Table C.5 Collected NO_2 diffusion tube bias adjustment factors for 2012-2016

Tube/Supplier Analyst	Method	2012	2012	2013	2013	2014	2014	2015	2016
Local Factors		*Cable St*	*Dalton Sq*	*Cable St*	*Dalton Sq*	*Cable St*	*Dalton Sq*	*Dalton Sq*	*Dalton Sq*
Gradko 2012 - 2016	20% TEA in water	0.907	0.973	0.907	0.941	0.936	1.034	1.030	0.97
National Factors									
Gradko (national factors) 2012 – 2016 (2016 factor from sheet 06/17)*	20% TEA in water	0.97		0.95		0.92		0.91	0.92

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

NB Dalton Square Bias Correction factor was used to bias correct Lancaster diffusion tube results in 2016 (this report). This was used in isolation as results indicated an unidentified analyser fault (normally an average of the two local sites has been previously used). Using the national bias factor results in tube results being slightly lower, but would not affect exceedances other that reported in Section 3.2.1 above. The bias correction factor selected in this report represents the highest factor scenario.

Appendix D: Summary of Air Quality Objectives in England

Table 1.1

Pollutant	Air Quality Objective[1]	
	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

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

Appendix E – Lancashire County Council Public Health Air Quality Guidance Note (April 2016).

Air Quality

- **Leadership**

Tackling air pollution is a priority for Central Government, the primary driver is the effect on the health of the population. Defra has recently reviewed the UK approach to air quality and published updated guidance to all Local Authorities in dealing with LAQM issues. (Local Air Quality Management Policy Guidance, 2016). It encourages Directors of Public Health to prioritise action on air quality in their local area to help reduce the health burden from air pollution.

The Director of Public Health and Wellbeing report 2016 for Lancashire makes clear the need to tackle the wider determinants of health including promoting healthy living environments.

- **What good looks like / aspirations on air quality for Lancashire…**

- There are no new AQMAs in Lancashire and there is a reduction in the number of declared areas exceeding EU thresholds.

- The prevalence and severity of health conditions affected by poor air quality is reduced. This includes cardiovascular disease, lung cancer, respiratory disease, asthma and stroke.

- Communities are aware of the impact of poor air quality on their own health and are empowered to change behaviour to reduce emissions and reduce their own exposure.

The current picture:
The Committee on the Medical Effects of Air Pollution (COMEAP) estimated the mortality burden of human-made particulate pollution in the UK in 2008 as an effect equivalent to approximately 29,000 deaths, a loss of 340,000 years of life and average loss of 6 months of life expectancy from birth.

DEFRA has made an initial estimate of the effects of Nitrogen Dioxide (NO_2) on mortality to be equivalent to 23,500 deaths in the UK annually.

It is noted that this figure will include some overlap with the impact quantified against exposure to PM2.5. It is difficult to reliably estimate the combined health burden of multiple pollutants from the same source but a report by the Royal College of Physicians (RCP) in February this year presents a combined

estimate of effect of around 40,000 deaths annually with an associated annual social cost of £22.6 billion.

In Lancashire 4.3% of all (adult) deaths can be attributed to particulate, PM2.5, air pollution (Public Health Outcomes Framework). This is slightly lower than the England figure (5%) – but varies across Lancashire from 3.66% in Wyre to 4.56% in Chorley. Further work is needed to estimate deaths attributable to Nitrogen Dioxide in Lancashire.

There are18 declared Air Quality Management Areas (AQMAs) in Lancashire in 8 districts. Chorley, Fylde and Hyndburn currently have none and Duke Bar in Burnley is being closely monitored due to exceedances of EU legal levels this past year.

The main sources of harmful air pollution in Lancashire are caused by traffic which emits both PM2.5 and Nitrogen Oxides/Dioxide (NO_x/NO_2).

- ## Taking Action

Action to address poor air quality is already under way. The district councils have responsibilities around monitoring air quality and reporting on the action being taken to improve areas of poor quality. They link to County Council services to deliver solutions across a number of service areas including; strategic and transport planning, development management, network management, new traffic schemes, sustainable and active travel, fleet management and public transport. Additionality district councils take action through their own service delivery; planning, taxi licensing and through their wider environmental health responsibilities.

To support this work Public Health will:

- Provide leadership on the impact of poor air quality on health, including lobbying of elected members and decision makers.
- Provide information and intelligence on the health impacts of air quality.
- Coordinate LCCs support to District Air Quality Officers who lead on Local Air Quality Management.
- Have an overview of LCC action (by all services) and district action on Air Quality.
- Review evidence and best practice on air quality actions to advise / input to LCC services and districts as required.
- Work with other LCC services & partners to identify and take forward potential county- wide projects to help support action on improving air

quality, including planning and submitting grant bids as agreed by partners.

- Raise awareness of health impacts and action with leaders, decision makers, officers and externally with businesses and the public.

- Input to local planning policy, transport plans, masterplans, etc. and consultations on planning applications regarding air quality issues.

From an initial review of existing action a number of gaps have been identified where Lancashire could do more, this is in line with recommendations included in recent air quality guidance (DEFRA, Local Air Quality Management Policy Guidance, 2016 draft NICE guidance Air pollution: outdoor air quality and health). Some of these gaps include business travel planning, driver training, public awareness campaigns, and trialling innovative mitigation actions such as green walls. There is also more that could be done to add to existing action taking place in a particular district by rolling out county-wide, for example taking forward planning guidance being developed in Lancaster across the county.

*****DRAFT *** Air Quality Priority Actions for Public Health and in partnership with others.**

What	Who
Coordinate LCCs support to district air quality officers who lead on LAQM locally, including: • Ensuring services are involved in developing and delivering district specific actions as needed. • Sign off of annual reports by the heads of main departments involved in air quality activity e.g. planning, transport and public health.	Public Health to co-ordinate with LCC services and district councils
Provide local up to date information on the health impacts of poor air quality on the population to enable prioritisation and targeting of future work. Including: • Deaths attributable to PM2.5 and NO_2 • Understanding, differentiating & communicating the impact for those living alongside main road/in AQMAs, urban locations and those living in rural locations • Prevalence of diseases where poor air quality is a contributory factor etc. • emission sources	Public Health working with PH Intelligence & PHE
Consider feasibility of identifying and agreeing areas 'at risk' of becoming AQMAs to introduce early action and to consider during planning process.	Public Health with district councils

Review evidence and best practice on air quality actions to inform future priority actions. This includes: • public awareness / behaviour change campaigns • cleaner vehicles, including electric vehicles • mitigating planting schemes / green walls • intelligent transport systems to provide real time information • clean air zones • driver behaviour change training	Public Health with support from PHE and district councils
Investigate and review the impact of non-traffic related emissions e.g. from wood burners, and what evidence there is for action.	Public Health with support from PHE and district councils
Input to the development of LTP4 and review of waste and minerals plan from an air quality perspective.	Public Health working with Strategic Planning
Review current policy and guidance and consider producing a Public Health 'Advisory Note' or other planning guidance on air quality if needed (roll out of Lancaster guidance?)	Public Health in liaison with county & district planners
Respond to consultations on planning applications, local plan and masterplan consultations to ensure air quality impacts and mitigating actions are considered	Public Health in liaison with county & district planners
Internal awareness session to be developed for LCC planners, Highways Developer Support & Network Management Officers	Public Health to co-ordinate
Public Awareness / behaviour change campaign – To be developed as key messages are agreed. Need to consider: • Short term episodes – email / text alerts to vulnerable residents?? • General awareness on long-term impact • Different audiences: - schools – information & education resources (work with safer travel team) - businesses, - general public • Different pollutant sources e.g. cars, vans, biomass etc.	LCC Public Health with district councils
Work with other LCC services & partners to identify and take forward potential county- wide projects to help support action on improving air quality, including planning and submitting grant bids as agreed by partners. Initial suggestions:	

Co-ordinate development of an electric vehicle charging / cleaner vehicles strategy and delivery plan for Lancashire.	LCC (PH / Highways ?) with district councils
Co-ordinate plans to submit a possible bid for ultra-low emission vehicle (ULEV) if funding becomes available. (It is anticipated that funding might become available during 2017)	LCC (PH / Highways ?) with district councils
Investigate the potential of green screens / planting schemes at significant locations, such as schools.	Public Health with district councils & Lancaster Uni.
Investigate feasibility of introducing workplace parking Levy	Public Health with district councils

Appendix F – Summary results of survey of Lancashire authorities regarding the adoption of regional air quality planning guidance

Local Authority	Option 3 (Full Guidance as SPD)	Option 2 (Standard measures + Mass Emission Assessment + Concentration Assessment)	Option 1 (Standard Measures + Concentration Assessment)	Planning Advisory Note (as either option 1 or 2)	Other
*Hyndburn	No decision yet	No decision yet	No decision yet	No decision yet	-
Ribble Valley	No	No	No	No	Own SPD Guidance
Burnley	Yes	-	-	-	-
Pendle	No	-	-	Yes (2)	-
Wyre	No	Yes(?)	Yes(?)	Yes (1or2) Interim	-
West Lancs	No	No	No	No	Own SPD Guidance
Lancaster	Yes	-	-	Yes(2) Interim	-
Blackburn	Yes	-	-	Yes(2) Interim	-
Blackpool	Yes	-	-	Yes(2) Interim	-
Preston	Yes	-	-	Yes(2) Interim	As Central Lancashire Guidance
*Chorley	Yes	-	-	Yes(2) Interim	
South Ribble	Yes	-	-	Yes(2) Interim	
Rossendale					
Fylde	No decision yet	No decision yet	No decision yet	No decision yet	-
South Lakeland	No	No	No	No	?

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ANPR	Automatic Number Plate Recognition
ASR	Air quality Annual Status Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
OLEV	Office for Low Emission Vehicles
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
ULEV	Ultra Low Emission Vehicle

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http://www.environment-agency.gov.uk

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

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