LANCASTER
CITY COUNCIL
Promoting City, Coast & Countryside

2015 Air Quality Annual Status Report (ASR) for Lancaster City Council

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

January 2016

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Overview of Air Quality in Our Area

Clean air is vital for our health and the environment and essential for making sure our town is a welcoming place for all to live and work now and in the future. Everyone has a part to play in improving air quality, starting with the way we behave. Simple things like walking to work or school will benefit air quality as well as have knock-on benefits for your health and the environment. Think before you make a journey and ask yourself if is necessary. Local Authorities and the communities who live within them are key to improving the air we breathe. What we do locally can also benefit regional air quality and help meet air quality limit values and objectives as set out in European and UK law.

The Local Air Quality Management (LAQM) system, as set out in Part IV of the Environment Act 1995, 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 exceedances are considered likely, the local authority must declare an Air Quality Management Area (AQMA) and prepare an Action Plan setting out the measures it intends to put in place in pursuit of the objectives.

Air quality in Lancaster

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. Monitoring results over recent years have continued to confirm this position with no clear indication that pollution levels are declining despite local actions taken to reduce pollution levels and predicted reductions due to expected vehicle emission improvements.

Traffic in Lancaster City

In 2013 Lancaster City Council produced an air quality strategy for Lancaster (available at: http://www.lancaster.gov.uk/environmental-health/environmental-protection/air-quality/air-quality-downloads-links/) to provide a revitalised process towards air quality improvement. This particularly focused on enhanced and more defined working relationships with Lancashire County Council Highways and the County Council Public Health team.

The production of the strategy was also accompanied by steps to provide more detailed knowledge on the sources of pollution and to better understand what level of emission reductions are likely to be required to meet standards. This included setting up a link between the air quality stations in Lancaster and traffic signal management software, the installation of Automatic Number Plate Recognition (ANPR) cameras in Lancaster, undertaking a general traffic composition count (cars, taxis, buses etc..) in Lancaster and building an in-house pollution modelling facility. The installation of ANPR cameras was a Defra grant funded project (£30k award from the Air Quality

Grant Fund). The traffic composition count was undertaken in April 2015 and the remainder are in progress and all planned to be delivered during 2016/17.

Actions to improve air quality

The current air quality position is due to change due to three main actions:

- Firstly, a Transport Masterplan has been drafted by Lancashire County Council (see http://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/highways-and-transport-masterplans.aspx for more information). The City Council has been consulted on the proposals and improvements in air quality are integral to the plan. Impact assessment as described in the Air Quality Strategy for Lancaster will be undertaken to ensure air quality improvement is a key plan implementation driver and is not lost amongst other competing priorities. The Transport Masterplan is also planned to be supported by new local air quality planning guidance. 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 is currently under production with a view to the guidance being adopted locally in 2016/17. As indicated the new 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.

- Secondly the M6/Heysham link road is under construction and is due to open in 2016 (see http://heyshamlink.lancashire.gov.uk/ for more information). The road is predicted to deliver traffic relief to all three of Lancaster's AQMAs. The most significant alleviation is predicted for Carnforth where a decrease in traffic approaching 20% is predicted. It is hoped that the AQMA in Carnforth can be revoked based on improvements delivered by the new road scheme. 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.

M6/Heysham link road under construction

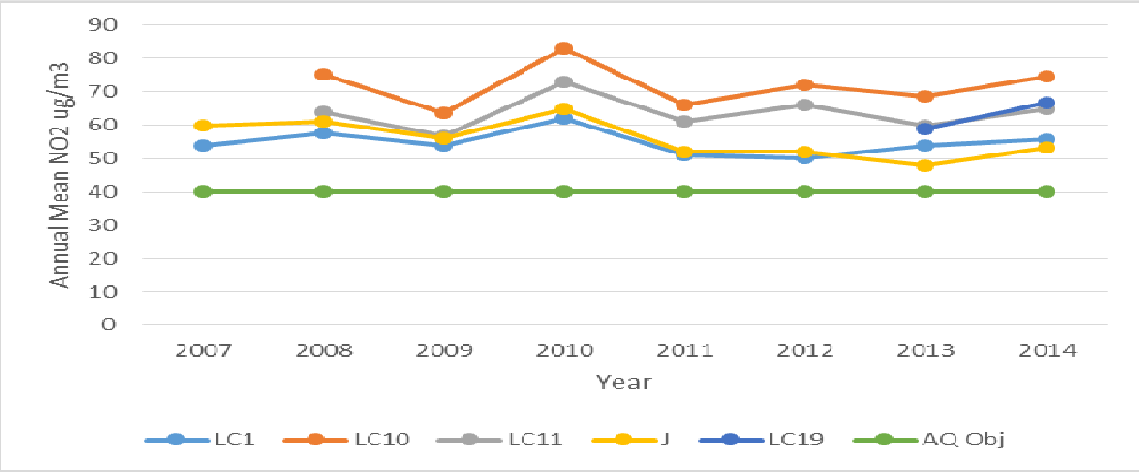
- Finally, grant bids were made in 2015 under the Office of Low Emission Vehicles Cities scheme and Fleets scheme. The bids were aimed at making Lancaster an exemplary place for the use of electric vehicles. Bids were made both in partnership and independently by both the city and county councils. Unfortunately these bids were not successful. However they were followed by a partnership grant bid in November 2015 (involving the County Council, the City Council, Stagecoach and Greenurban Limited) under the Department of

Transport, Clean Bus Technology Fund. This application was successful and a full bid award of £288,180 was granted. This is anticipated to have an impact of reducing nitrogen oxide levels in the Lancaster AQMA by up to 8% and should be delivered in 2016. The Council and its partners intend to make further bids in future years where suitable opportunities arise.

Local Priorities and Challenges for coming year

Air Pollution levels in Lancaster remain above objective levels and monitoring results show no obvious indication of levels declining (see Figure 1 below).

Figure 1 - Pollution levels (nitrogen dioxide) in Lancaster AQMA for highest five monitoring sites 2007-2014



Although actions are in progress to reduce pollution levels (e.g. grant funded bus emission reduction in 2016, travel plans etc..) and the contribution of newer vehicles are anticipated to lead to general improvement, the delivery of a robust and effective transport Masterplan is the key to ensure pollution levels are below health based standards.

The final revision of the transport Masterplan for Lancaster is due by April 2016. However the delivery of the various components of the plan is not imminent and the larger proportion of actions are scheduled to follow a period of assessment (following the opening of the M6/Heysham link road). The elements of the Masterplan also

needs to be formally adopted as the main air quality action plan for Lancaster. Work to deliver the Masterplan/Air Quality Action Plan is therefore in its infancy and will remain a top priority over the coming years.

As already mentioned, 2016 will see the opening of the M6/Heysham link road and the implementation/planning of other measures to provide needed traffic alleviation to the three AQMAs in Lancaster. Air quality monitoring carried out by the City council is ongoing in these three areas and will continue after the road opens to fully assess the anticipated air quality impact of the scheme and linked measures. This information will also inform the Transport Masterplan.

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. It is therefore our intention to discuss this issue to determine what additional action should be taken during 2016.

As many directly affected will be acutely aware, wet weather in November and December 2015 brought flooding to Lancaster. The Cable Street air quality station was affected by the flooding and has required repair. Monitoring in this locations at the end of 2015 and the beginning of 2016 will therefore be affected. The monitoring station will however be up and running smoothly as soon as possible.

Air Quality station at Cable Street, Lancaster

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. 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 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.

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1 Local Air Quality Management

This report provides an overview of air quality in the Lancaster City Council area during 2014. 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 Annex 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. 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 .

We have still not amended the Lancaster AQMA for likely exceedance of the 1 hour objective for nitrogen dioxide. However it is proposed that amendment is undertaken following new accelerated processes outlined in current proposals out for consultation (see https://www.gov.uk/government/consultations/local-air-quality-management-review-changes-to-guidance-and-reporting). If the option becomes available the Lancaster AQMA order will be amended to include likely exceedance of the 1 hour objective for NO_2 in 2016. Otherwise standard procedure will be adopted to amend the AQMA order. No new AQMA are currently proposed and no AQMA are to be revoked within the district.

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/air-quality/air-quality-downloads-links/
Carnforth AQMA	Annual Mean Objective NO_2	Carnforth	Covers main cross road area in Carnforth	Available at:- http://www.lancaster.gov.uk/air-quality/air-quality-downloads-links/
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

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 2014 in pursuit of improving local air quality. Details of all measures completed, in train 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, and the draft Transport Master Plan for Lancaster. Key completed/in progress measures are:

- Provision of Air Quality Strategy for Lancaster
- Delivery of Transport Master Plan for Lancaster
- Delivery on charging point provision for electric vehicles for new development
- Delivery of local/regional air quality planning guidance
- Construction of M6/Heysham link road to provide alleviation to the three AQMA's
- 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
- Grant funding to reduce emissions from buses in Lancaster.

Progress on the following measures has been slower than expected due resourcing issues. The measures, although delayed, are all likely to be resolved within the period 2016/17:

- Linking air quality stations to traffic management system in Lancaster
- Provision of ANPR system in Lancaster
- Provision of AQAP for Galgate and update of AQAP for Lancaster (link to delivery of Transport Masterplan for Lancaster)

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

- Opening of Heysham M6 link road (which will impact on traffic through the three AQMA). This includes also the opening of Park and Ride bus service between M6 junction/Caton Road and Lancaster City centre.
- 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 2016).
- Adoption of Transport Masterplan for Lancaster (due April 2016).
- Development of emission modelling facility at Lancaster.
- Installation of ANPR traffic monitoring system in Lancaster centre.
- Adoption of local air quality planning guidance. This will provide minimum air quality impact mitigation requirements for new traffic generating development. It will also seek new assessment requirements for larger impacting developments.
- Working with Public Health to better communicate air quality issues, coordinate air quality responses and consider response to address $PM_{2.5}$ pollution
- Working with the County Council to develop in detail the elements of the Transport Master Plan for Lancaster.

Longer term actions include the following:-

- Assessment and Implementation of Transport Masterplan for Lancaster
- Provision of road side electric charging points (grant funding has been obtained to provide 150 roadside charging points across Lancashire. 15 of these are likely to be located within the Lancaster district.). To be delivered 2017/18.

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, Carnfortth Town Centre Improvements, Carnforth Railway Station, Rural commections	Plan aims to deliver air quality improvements to lead to general air quality improvement and revocation of three AQMA	Plan currently draft, Due for adoption April 2016	2024	Main plan/action plan to deliver air quality improvements. Masterplan to be adopted as Air Quality Action Plan Draft 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 three AQMA	Plan currently draft, Due for adoption April 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	Item in current parking strategy but no significant implementation yet. 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)	2017	*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 t.. Unfortunately procurement and budget issues, but the linking with Lancaster's air quality information is still with the scope of goals that the new UTMC will be designed to facilitate. It is currently being planned to have new UTMC system operational during the financial period 2016/17.

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	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 Under Construction	2016	More information available at: http://heyshamlink.lancashire.gov.uk/

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
7	Travel Plans for new development	Promoting Travel Alternatives	Workplace Travel Planning	Lancashire County Council	-	ongoing	-	-	21 Plans at Dec 2014 Further 3 plans produced in 2015 for development references: D1/15/01342/OUT, D1/12/01109 and 13/00217/FUL (See https://planning.lancaster.gov.uk/online-applications/ for further information)	-	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 2015.	-	The following organisations with Sustainable Travel Roadshows : Feb 2015 Lancaster & Morecambe College, April 2015 White Cross Business Park, Oct 2015 Cumbria University These 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 and map - Figure 6 Appendix C

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
	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
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 Parkand ride	Promoting Travel Alternatives	Promote use of rail and inland waterways	-	-	-	-	-	ongoing	-	12 free spaces

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14	Morecambe Rail Station Park and ride	Promoting Travel Alternatives	Promote use of rail and inland waterways	-	-	-	-	-	ongoing	-	100 fee payable spaces but refundable with rail ticket purchase
15	Silverdale Rail Station Park and ride	Promoting Travel Alternatives	Promote use of rail and inland waterways	-	-	-	-	-	ongoing	-	3 free parking spaces
16	Wennington Rail Station Park and ride	Promoting Travel Alternatives	Promote use of rail and inland waterways	-	-	-	-	-	ongoing	-	7 free parking spaces
17	Information via web site	Promoting Travel Alternatives	Other	Lancashire County Council	-	-	-	-	ongoing	-	http://www.traveline-northwest.co.uk/cms/content/lancashire.xhtml http://www3.lancashire.gov.uk/corporate/web/index.asp?siteid=4404&pageid=19915 http://www.lancashire.gov.uk/roads-parking-and-travel/alternative-ways-to-travel.aspx http://www.lancashire.gov.uk/roads-parking-and-travel/public-transport.aspx

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18	Air Quality information	Public Information	via the Internet	Lancaster City Council	-	-	-	-	ongoing	-	http://www.lancaster.gov.uk/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/
20	Direct Communication/Education	Public Information	Other	Lancaster City Council and Lancashire County Council	-	-	-	-	ongoing	-	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.celebratingcycling.org//more_info.asp?current_id=234

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22	M6/Heysham link road conditional complimentary measures	Transport Planning and Infrastructure	Other	Lancashire County Council	Before summer 2016	2016-2026	-	-	Plan in preparation 2015/16	2026	Plan of measures to be submitted to prevent relief offered by new road being erroded. 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	-	-	Construction ongoing	2016	The Park and Ride site at Junction 34 of the M6 motorway must be completed and available for use before the link road is fully opened to vehicular traffic. The Park and Ride site is to be brought into use when available road space is created on Caton Road but not more than 1 month after the link road has been fully opened. Appropriate supportive priority measures for bus services linking the Park and Ride site to Lancaster City Centre must be implemented within 12 months of the link road being fully opened to traffic.
24	Shared Wheels Car Sharing	Alternatives to private vehicle use	Car & lift sharing schemes	Lancashire County Council	-	-	Members registered	-	4660 members registered in Lancashire area	-	See https://sharedwheels.liftshare.com/ for further information

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25	Lancaster Community Car Club	Alternatives to private vehicle use	Car Clubs	Lancaster Community Car Club –Community Interest Company	-	2010	-	-	-	-	See http://www.lancar.org.uk/book-a-car/ for further information
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	-	-	-	2021	Plan available at: http://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/local-transport-plan.aspx

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
28	Local air quality planning guidance	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	Lancaster City Council	2015/16	2016	-	-	Guidance being drafted	2016	Template is being drafted for regional adoption
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	-	Public Heath team at the County council are looking to coordinate roles of stakeholders at County Council to improve air quality
30	Lancaster Air Quality Strategy	Policy Guidance and Development Control	Other policy	Lancaster City Council	-	2015-26	-	-	Approach detailed in Strategy to be adopted in Transport Masterplan for Lancaster	2026	Available at: http://www.lancaster.gov.uk/air-quality/air-quality-downloads-links/

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31	Planning Policy - Lancaster City Council	Policy Guidance and Development Control	Other policy	Lancaster City Council	-	2014	-	-	Policy D37	-	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 to be reviewed in 2016 in light of pending 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 drafted as Planning Advisory Note	Spring 2016	Guidance will be available at: http://www.lancaster.gov.uk/planning/local-plan/local-planning-policy/adopted-documents/supplementary-planning-guidance/

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/air-quality/air-quality-downloads-links/

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	-	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	NOx emissions from buses reduced by over 90%	8% reduction in NOx levels in Lancaster AQMA	£288150 Grant to tackle 17 buses providing most frequent bus services through Lancaster	2016	More information available at: https://www.gov.uk/government/collections/clean-bus-technology-fund

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 2016 if scheme is available See 2014 Progress report for further information. Available at: http://www.lancaster.gov.uk/air-quality/air-quality-downloads-links/
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	-

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 M6/Heysham link 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

It is however proposed (as suggested in guidance) that action in relation to $PM_{2.5}$ monitoring and reduction actions are reviewed with the County Council Public Health Team in 2016 to consider whether any specific additional actions are required.

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 2014. 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 52 diffusion tube sites during 2014. Table A.2 in Appendix A shows the details of the sites. A number of new sites were introduced in 2015 at Caton Road, St Leonards Gate, and China Street, Lancaster. A small number of sites were also closed (the majority in Torrisholme, Morecambe) as results over a number of years did not indicate exceedance of the annual mean NO_2 objective.

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 “annualisation” and bias. Further details on adjustments are provided in Tables C.1, 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 4 years with the air quality objective of 40µg/m^3.

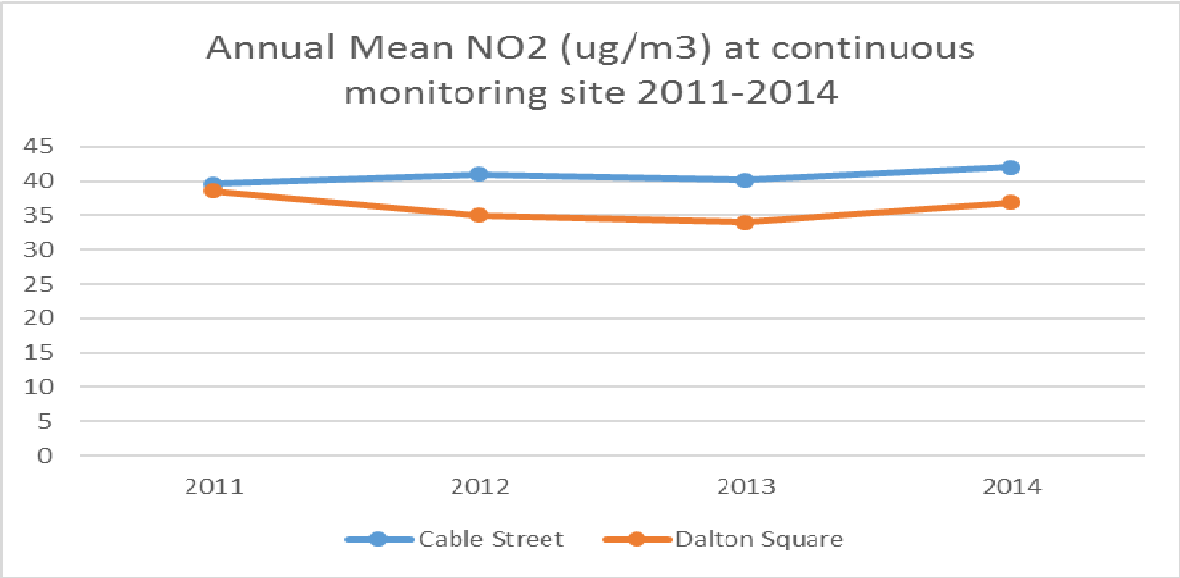
For diffusion tubes, the full 2014 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 4 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 shows no obvious trend with levels remaining relatively consistent of the past 4 years with levels around the annual mean objective level (40ug/m^3) at both Cable Street and Dalton Square sites. There was no

exceedance of the hourly NO_2 objective at either conmtinuous automatic monitoring site. A detailed report 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



Results from diffison tubes in 2014 generally show similar results to previous years with only tubes located within AQMA indicating exceedance of objective levels (annual and hourly exceedances of NO_2 objectives in Lancaster AQMA and annual mean objective exceedances in Galgate and Carnforth AQMA). 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 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).

However there were two noted exceedance exceptions. One newly installed diffusion tube site outside the existing AQMAs (newly istalled in 2014) and another initially installed in 2013 indicated potential exceedance outside designated AQMA (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).

Monitoring has therefore been incresed at Newton Terrace on Caton Road. Two additional tubes have been installed thoughout 2015 and will continue over the next few years to further assess the situation. Two tubes are already installed at Scotforth Road. It should be noted that both location should be beneficially affected by the opening of the M6/Heysham link road in 2016 and therefore levels may decrease after 2016. Also if the lower national bias correction factor (0.92) was applied to the monitoring results only the Caton Road site would still indicate exceedance (41ug/m^3) outside an AQMA. Monitoring will continue in these two locations post link road opening to assess whether AQMA designation is warranted and also the impact of the new road at these locations.

Limited monitoring undertaken along the Main Road at Warton, Lancaster, indicated levels well below the annual mean objective (roadside levels were roughly equivalent to background levels in the centre of Lancaster). Monitoring in this location was therefore discontinued early in 2015.

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 persit to be within the three existing AQMA, although areas at Scotforth Road and Caton Road, Lancaster will be closely monitored over coming years.

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 4 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 4 years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

Conclusion

Theres were no monitored exceedances of PM_{10} objectives although levels monitoired at the Cable Street site in Lancaster were significantly elevated in comparison with background levels. Despite PM_{10} objectives being 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.

Appendices

Appendix A: Tables: Monitoring Details

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 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)

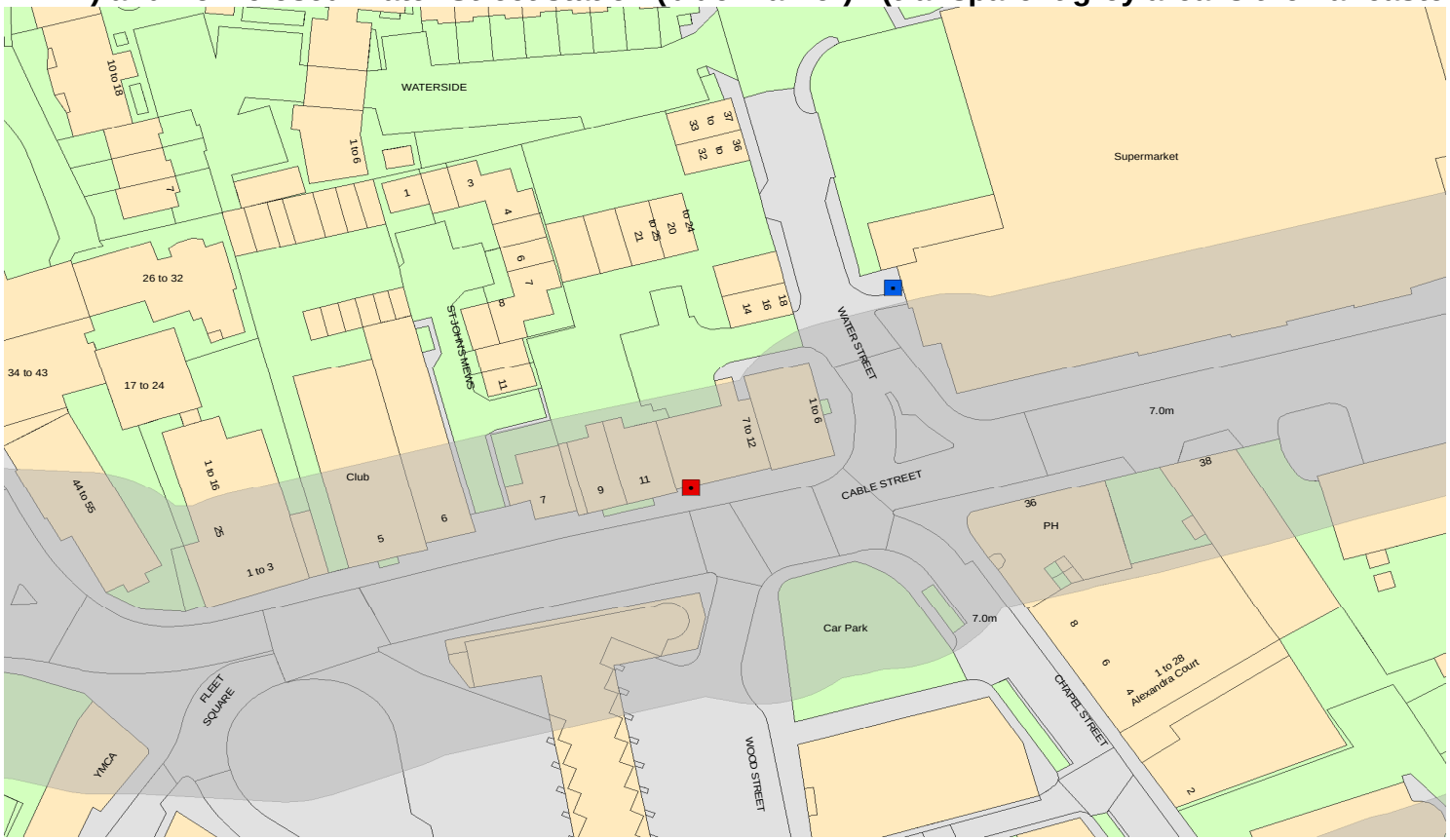


Figure 4 - Map Showing Location (red marker) of Dalton Square Lancaster Air Quality Automatic Monitoring Station (analyser AN2) (transparent grey area is the Lancaster AQMA)

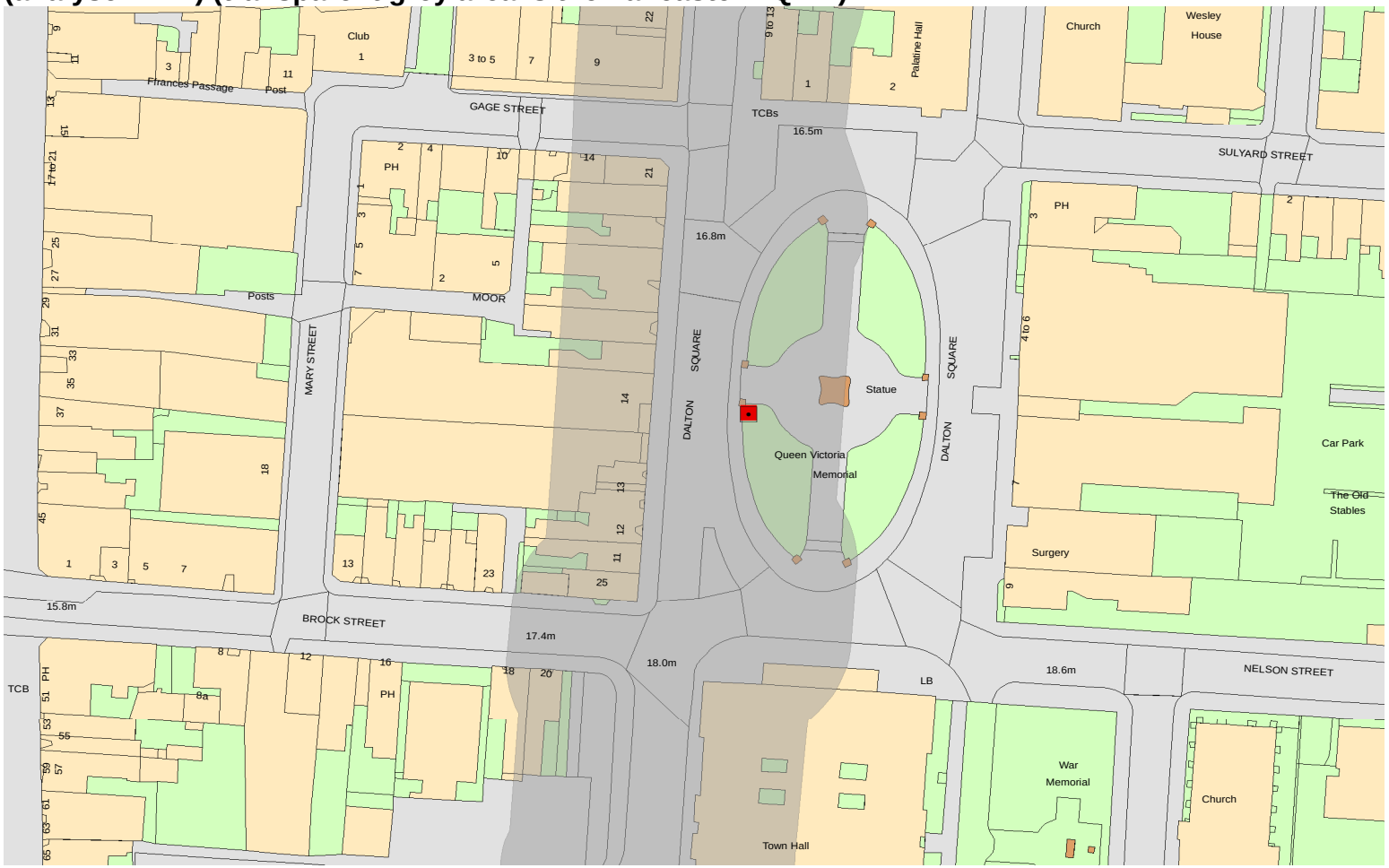


Table A.2 – Details of Non-Automatic Monitoring Sites

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**

(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 2013 % [b]	Annual Mean Concentration µg/m^3				
					2010	2011	2012	2013	2014
AN1 - Cable St	Roadside	Y	-	74.4	-	39.6	**41.0**	**40.2**	**42.0**[c] **(39.7)**[d]
AN2 - Dalton Sq	Roadside	Y	-	96.6	-	38.6	35.0	34.0	36.9

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

NO_2 annual means exceeding 60µg/m^3, 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 (for data capture of 74.4%)

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 2014 %[b]	Number of Exceedences of Hourly Mean (200 µg/m^3)			
					2011	2012[c]	2013	2014[c]
AN1 - Cable St	Roadside	Y	-	74.4	0	0 (109.1ug/m^3)	0	0(119.5ug/m^3)
AN2 - Dalton Sq	Roadside	Y	-	96.6	1	0	0	0

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

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

(b) data capture for the full calendar year (e.g. if monitoring was carried out for 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 2014 %[b]	Annual Mean Concentration µg/m^3 [c]			
					2011	2012	2013	2014
APM1 - Cable Street	Roadside	Y	-	84.5	25.8 (25.7[c])	23.7	27	21.1

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

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

(b) data capture for the full calendar year (e.g. if monitoring was carried out for 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 2013 %[b]	Number of Exceedences of 24-Hour Mean (50 µg/m^3)[c]			
					2011	2012	2013	2014
APM1 - Cable Street	Roadside	Y	-	84.5	19(41.9)[c]	11	20	9(35.2)[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.**

(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 - 2009 to 2014 (sites showing an exceedance of the annual mean objective are shown in bold. 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					
			2009 (Bias Adjustment Factor = 0.841)	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)
LC1	Roadside	Y	**54**	**62**	**51**	**50**	**54**	56
LC2	Urban Background	N	23	27	22	23	-	-
LC4	Urban Background	N	20	23	19	19	17	18
LC5	Roadside	Y	38	**47**	39	39	39	**47**
LC6	Roadside	N	31	39	32	32	32	-
LC7	Roadside	Y	35	**43**	37	37	35	37
LC8	Roadside	Y	35	**45**	35	36	35	37
LC9	Roadside	Y	**44**	**43**	37	**42**	**40**	**41**
LC10	Roadside	Y	**64**	**83**	**66**	**72**	**69**	**75**
LC11	Roadside	Y	**57**	**73**	**61**	**66**	**60**	**65**
LC12	Roadside	Y	**40**	**45**	38	38	-	-
LC13	Roadside	Y	**44**	**48**	**41**	**43**	**42**	**43**
LC14	Roadside	Y	35	**42**	35	35	33	38
MC3	Roadside	N	-	**-**	27	26	24	-
A	Kerbside	Y	**40**	**50**	39	**40**	36	39
B1	Roadside	Y	-	26	35	33	33	36
B2	Roadside	Y	-	26	36	34	33	37
B3	Roadside	Y	-	30	37	35	34	37
C	*Urban Centre*	N	31	33	-	**-**	**-**	-
C1	Roadside	Y	-	-	**40**	**43**	**42**	**44**

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3					
			2009 (Bias Adjustment Factor = 0.841)	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)
D	*Urban Centre*	N	32	34	**-**	**-**	**-**	-
D1	Roadside	Y	-	-	**42**	**42**	**40**	**45**
E	*Urban Centre*	N	31	33	**-**	-	-	-
E1	Roadside	Y	-	-	**41**	**42**	**41**	**46**
G	Roadside	Y	33	39	35	35	-	-
H	Roadside	N	31	**40**	30	33	34	34
I	Roadside	Y	**41**	**48**	**40**	37	38	**42**
J	Roadside	Y	**56**	**65**	**52**	**52**	**48**	**53**
K	Roadside	Y	**43**	**54**	**45**	**43**	**43**	**47**
L	Roadside	Y	**43**	**52**	**42**	**42**	**43**	**48**
M	Roadside	Y	**40**	**45**	38	38	-	-
N	Roadside	Y	**42**	**51**	-	**-**	**-**	-
O	Roadside	Y	**40**	**51**	39	**41**	**42**	**46**
Q	Roadside	Y	33	**45**	36	34	39	**45**
S	Roadside	Y	33	35	30	30	31	-
T	Roadside	Y	28	34	25	25	-	-
U	Roadside	Y	39	**43**	37	36	37	
V	Roadside	Y	**43**	**49**	**43**	**43**	**41**	**45**
W	Roadside	Y	37	**45**	-	-	-	-
X	Roadside	N	28	33	-	**-**	**-**	-
Y	Roadside	Y	38	**46**	36	38	-	-
Z	Roadside	Y	**42**	**51**	**41**	**43**	**41**	**44**
ZA	Roadside	Y	31	36	29	29	29	34
ZB	Roadside	N	28	35	26	28	29	32
ZC	Roadside	Y	37	**50**	37	**40**	39	**44**

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

Results shown in red have data capture less than 75%

Appendix B: Full Monthly Diffusion Tube Results for 2014

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2014

Null Result | suspect | possible suspect | tube gone

NITROGEN DIOXIDE MONTHLY RESULTS 2014 (ug/m^3) – applied bias correction factor 1.034

SITE	GRADKO TUBES												AV	
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Raw	Bias-adjusted
L/C1	63.27	53.35	46.68	63.55		59.35	54.64	40.66	63.64	55.44	56.88	35.64	54	**55.8**
L/C4	21.88	18.12	18.65	13.49	14.09	14.06	12.06	10.59	18.01	17.97	25.50	21.43	17	17.7
L/C5	43.55	33.66	45.50	49.92	49.61	44.03	46.67	40.91	55.46	41.98	54.27	38.78	45	**46.9**
L/C6														
L/C7	35.26	34.67	40.42	38.54	39.39	35.11	39.15	32.53	34.09	26.91	35.15	35.49	36	36.8
L/C8	40.92	33.07	42.64	34.93	41.67	39.78	38.36	28.79	40.20	23.45	34.58	34.25	36	37.3
L/C9	51.56	46.90	44.70	42.98	41.82	37.29	36.03	27.51	40.64	37.51	41.17	32.37	40	**41.4**
L/C10	57.07	79.63	84.77	72.91	77.22	74.56	79.18	64.78	73.67	58.72	68.87	74.01	72	**74.6**
L/C11	54.02	64.16	70.51	70.38	71.97	62.35	66.65	51.34	72.61	58.69	60.08	48.32	63	**64.7**
L/C13	44.76		41.57	43.05	49.28	33.49	43.90	37.50	43.92	43.51	39.76	40.44	42	**43.4**
L/C14	38.15		37.05	37.85	40.36	35.29	33.59	28.00	37.24	37.55	42.49	40.10	37	38.3
M/C 3														
A	34.38	25.36	35.84	37.21	48.21	49.21	43.88	33.90	42.47	34.90	40.86	30.86	38	39.4
B1	42.66	41.70	40.87	33.14	36.13	27.20	28.65	26.16	30.29	35.96	37.10	33.46	34	35.6
B2	43.12	41.37	38.18	33.23	34.57	34.12	31.08	27.27	33.36	36.10	36.79	36.03	35	36.6
B3	42.65	42.19	42.28	34.33	35.86	31.65	32.06	22.88	34.80	38.48	36.85	35.13	36	37.0
C1	40.28	38.87	38.80	43.27	49.26	46.03	44.80	41.29	48.98	37.46	40.21	40.43	42	**43.9**
D1	42.80	40.40	45.81	45.46	51.30	42.70	41.39	39.48	49.85	39.47	48.53	38.73	44	**45.3**

E1	43.82	40.99	44.36	52.71	50.63	43.48	45.57	38.22	51.41	40.18	45.44	36.26	44	**45.9**
G														
H	34.19	25.23	35.09	37.49	39.19	35.50	32.00	26.59	39.98	32.47	38.14	23.74	33	34.4
I	46.24		41.95	42.11	51.82	48.64	38.46	33.25	35.95	28.48	40.25	35.04	40	**41.6**
J	52.58	53.49	51.61	51.24	75.65	60.25	59.18	47.30	47.13	29.63	46.38	43.65	52	**53.3**
K	44.76	47.74	56.81	51.63	43.35	48.32	43.16	36.29	46.78	39.15	48.16	37.24	45	**46.8**
L	47.59		50.73	46.47	49.11	54.80	43.39	43.14		45.36	46.24	41.54	47	**48.4**
O	42.14	45.72	45.06	49.03	43.48	51.90	46.67	35.73	53.07	40.26	43.76	36.21	44	**45.9**
Q	42.12	40.21	40.14	39.92	39.37	44.17	40.83	26.19	51.05	38.61	53.60	64.61	43	**44.9**
S														
U														
V	39.86		47.03	44.89	45.20	43.33	42.15	37.89	48.74	42.82	44.68	46.99	44	**45.5**
Y														
Z	41.91	43.46	44.32		48.37		43.83	35.61	43.09	41.87	45.52	34.05	42	**43.6**
ZA	40.67	35.13	33.62	30.45	33.65	31.73	30.22	25.12	33.18	30.12	41.19	29.46	33	34.0
ZB	32.57	32.93	31.79	30.28	32.54	27.58	27.18	21.83	34.62	31.35	35.72	30.00	31	31.7
ZC	46.60	43.18	48.08	42.27	41.82	39.88	38.05	32.56	47.82	40.52	55.01	35.08	43	**44.0**
cf1	30.27	32.04	34.60	38.41	38.83	34.56	34.30	30.39	34.72	33.91	38.70	36.41	35	35.9
cf2	43.05	52.55	48.76	50.85	48.98	41.96	46.28	26.59	34.78	30.49	44.09	32.60	42	**43.2**
cf3	40.52	40.86	33.60	34.12	36.15	30.81	32.78	42.66	48.00	43.18	38.82	43.15	39	**40.0**
cf4	35.33	44.49	45.02	38.48	42.48	35.58	38.54	26.77	41.25	45.25	54.46	34.42	40	**41.5**
cf5	46.12	41.30	42.58	45.16	47.06	46.31	43.87	32.84	48.62	37.89	53.79	34.95	43	**44.9**
cf6	38.68	39.23	35.54	39.02	40.80	35.49	35.18	28.35	38.24	33.92	44.74	31.81	37	38.0
cf7	26.40	36.78	33.04	33.46	37.19	34.00	29.80	25.57	33.55	31.54	36.36	40.64	33	34.3
T1	44.32	38.60	41.49	42.42	43.12	34.58	36.11	30.14	41.87	33.37	38.24	21.14	37	38.4
T2														
T3														
T4														
T5														
T6														
T7														
LC15	46.99	44.56	42.83	41.61	44.68	35.70	35.96	32.08	41.95	43.39	46.31	37.79	41	**42.6**
LC16	24.66	29.53	22.52	22.47	19.69	19.74	18.22	18.22	25.31		29.10	22.92	23	23.7
LC17	37.77	41.72	42.69	36.11	40.61	37.53	35.15	27.21	38.08	39.31	37.21	35.24	37	38.7

LC18	47.52	31.22	33.03	33.49	35.44	32.08	28.20	24.77	32.21	29.61	42.26	30.54	33	34.5
LC19	65.89	81.25	69.48	64.38	72.95	61.10	56.24	57.79	63.69	71.21	63.44	48.29	65	**66.8**
LC20	60.99	56.87	55.23	54.92	52.40	46.51	47.19	44.61	64.38	50.40	59.74	42.39	53	**54.8**
LC21	36.58	55.38	45.31	38.74	33.40	33.64	27.58	25.55	38.04	41.31	46.52	35.08	38	39.4
LC22	32.92	29.21	34.18	28.52	26.40	27.35	24.33	22.83	30.39	30.33	38.48	29.49	30	30.5
LC23	39.42	40.91	38.76	33.86	41.27	35.69	32.35	27.28	38.02	36.33	44.14	39.30	37	38.5
LC24			30.48	31.85	33.98	28.79	29.48	24.52	33.38	32.24		33.07	31	31.9
LC25	32.26	29.96	28.97	23.64	23.89	24.38	19.28	16.30	27.12	27.16	33.13	27.21	26	27.0
LC26	36.89	40.73	39.45	39.43	40.04	41.68	38.73	36.22	42.91	41.34	43.28	39.59	40	**41.4**
LC27	39.18	23.66	32.15	33.62	33.39	33.62	32.02	25.93	39.18	28.89	43.53	38.59	34	34.8
BLS1	37.41	38.17	36.69	34.02	39.99	36.82	35.87	30.48	34.72			29.63	35	36.6
H1	36.02	31.80	30.62	25.65	26.81	22.91	21.87	16.25	30.31	24.15	37.42	23.78	27	28.2
CF8	46.97	38.22	38.11	35.07	40.37	36.98	34.94	25.19	40.06	35.85	44.49	30.00	37	38.5
LC28	40.75	39.96	43.25	44.45	47.51	47.23	45.44	42.60	45.45	43.27	49.35	35.82	44	**45.2**
W1											21.11	17.96	20	20.2
W2											24.47	17.63	21	21.8
W3											27.13	18.16	23	23.4

(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 (2014) 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. Data validation and ratification for the two sites is undertaken annually by Air Quality Consultants Limited.

As data NO_2 capture for the Cable Street site was just below 75%, the monitoring results were annualised using the average factor calculated from Table C.1 below.

Table C.1 Calculation of adjustment to estimate annual mean for Cable Street, Lancaster monitoring site (NO_2) - 'Annualisation'

Long term Site*	Annual Mean NO_2 2014 ug/m^3	Period Mean NO_2 2014 ug/m^3	Ratio (Am/Pm)
Marton Blackpool	16.2	15.0	1.080
Wigan Centre	21.8	20.7	1.053
Warrington	19.8	18.8	1.053
Liverpool Speke	24.7	24.4	1.012
Glazebury	13.5	12.4	1.089
		Average	1.057

*All Long term background monitoring sites with data capture above 90%

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

21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

UKAS TESTING

2187

Accredited to ISO/IEC 17025:2005

Gradko International Ltd (Trading as Gradko Environmental)

Issue No: 018 **Issue date:** 07 April 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

UKAS TESTING 2187 Accredited to ISO/IEC 17025:2005	**Schedule of Accreditation** issued by **United Kingdom Accreditation Service** 21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK **Gradko International Ltd** **(Trading as Gradko Environmental)** **Issue No:** 018 **Issue date:** 07 April 2015
Testing performed at main address only	

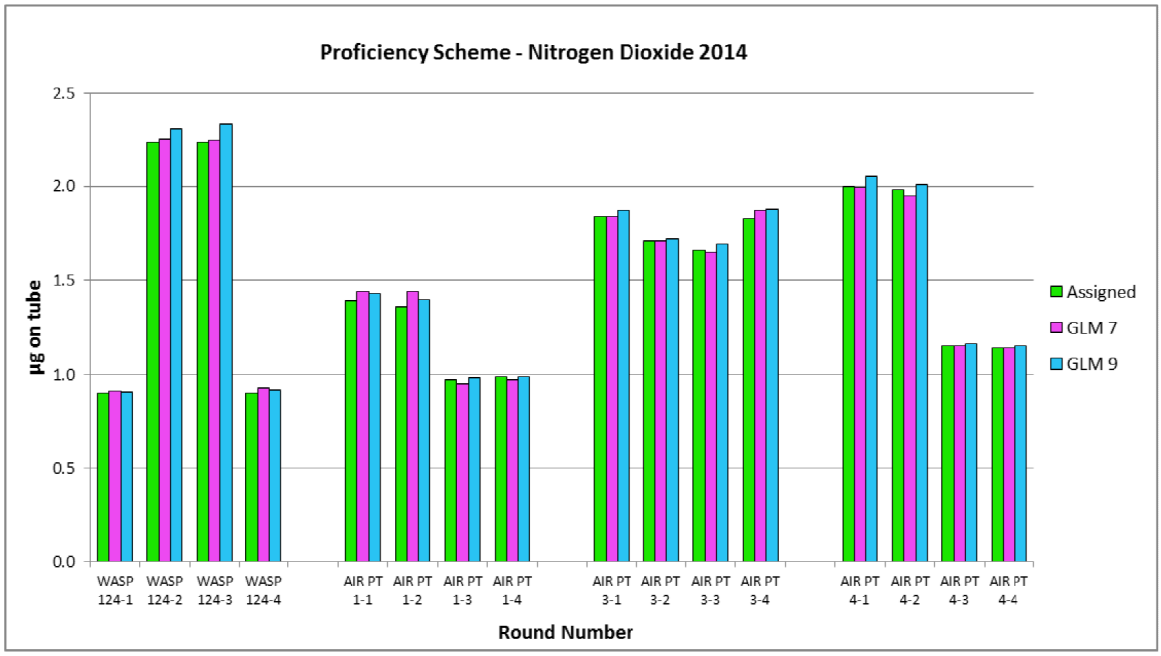
Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
ATMOSPHERIC POLLUTANTS Collected on diffusion (sorbent) tubes and monitors (cont'd)	Chemical Tests (cont'd)	
Flexible Scope encompassing Volatile Organic Compounds to in-house validation criteria	Volatile Organic Compounds including: Benzene 1,3-Butadiene 1,1-Dichloroethane, 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 2014

Nitrogen Dioxide Proficiency Scheme 2014

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

Proficiency Scheme - Nitrogen Dioxide 2014								
Date	Round	Assigned value	Camspec M550 - GLM 7			QuAAtro - GLM 9		
			Measured concentration	z-Score	% Bias	Measured concentration	z-Score	% Bias
Feb-14	WASP 124-1	0.90	0.91	0.14	1.2%	0.91	0.06	0.6%
Feb-14	WASP 124-2	2.24	2.25	0.09	0.5%	2.31	0.41	2.9%
Feb-14	WASP 124-3	2.24	2.25	0.07	0.4%	2.33	0.58	4.2%
Feb-14	WASP 124-4	0.90	0.93	0.46	2.9%	0.92	0.32	1.9%
May-14	AIR PT 1-1	1.39	1.44	0.48	3.6%	1.43	0.38	2.9%
May-14	AIR PT 1-2	1.36	1.44	0.78	5.9%	1.40	0.39	2.9%
May-14	AIR PT 1-3	0.97	0.95	-0.27	-2.1%	0.98	0.14	1.0%
May-14	AIR PT 1-4	0.99	0.97	-0.27	-2.0%	0.99	0.0	0.0%
Aug-14	AIR PT 3-1	1.84	1.84	0.0	0.0%	1.87	0.22	1.6%
Aug-14	AIR PT 3-2	1.71	1.71	0.0	0.0%	1.72	0.08	0.6%
Aug-14	AIR PT 3-3	1.66	1.65	-0.08	-0.6%	1.69	0.24	1.8%
Aug-14	AIR PT 3-4	1.83	1.87	0.29	2.2%	1.88	0.36	2.7%
Nov-14	AIR PT 4-1	2	1.99	-0.07	-0.5%	2.05	0.33	2.5%
Nov-14	AIR PT 4-2	1.98	1.95	-0.2	-1.5%	2.01	0.2	1.5%
Nov-14	AIR PT 4-3	1.15	1.15	0	0.0%	1.16	0.12	0.9%
Nov-14	AIR PT 4-4	1.14	1.14	0	0.0%	1.15	0.12	0.9%



Gradko International Ltd. St. Martins House, 77 Wales Street, Winchester, Hampshire SO23 0RH
tel.: 01962 860331 e-mail:diffusion@gradko.com

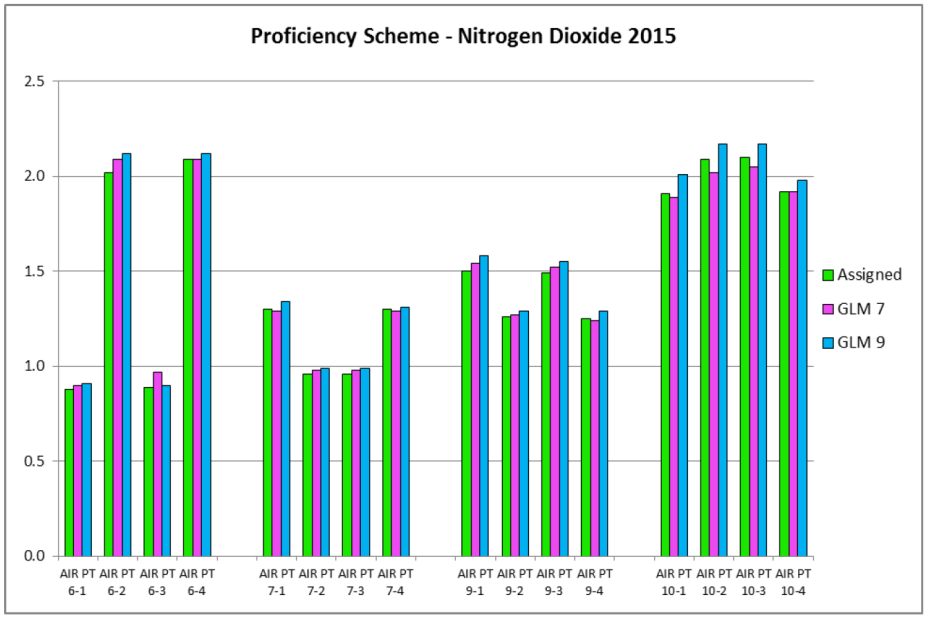
Table C,3 - Gradko NO_2 proficiency scheme results 2015

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 2015

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

Date	Round	Assigned value	Camspec M550 - GLM 7			QuAAtro - GLM 9		
			Measured concentration	z-Score	% Bias	Measured concentration	z-Score	% Bias
Feb-15	AIR PT 6-1	0.88	0.90	0.28	2.3%	0.91	0.41	3.4%
Feb-15	AIR PT 6-2	2.02	2.09	0.46	3.5%	2.12	0.66	5.0%
Feb-15	AIR PT 6-3	0.89	0.97	-0.30	-2.2%	0.90	0.15	1.1%
Feb-15	AIR PT 6-4	2.09	2.09	0.00	0.0%	2.12	0.19	1.4%
May-15	AIR PT 7-1	1.30	1.29	-0.10	-0.8%	1.34	0.41	3.1%
May-15	AIR PT 7-2	0.96	0.98	0.28	2.1%	0.99	0.42	3.1%
May-15	AIR PT 7-3	0.96	0.98	0.28	2.1%	0.99	0.42	3.1%
May-15	AIR PT 7-4	1.30	1.29	-0.10	-0.8%	1.31	0.10	0.8%
Aug-15	AIR PT 9-1	1.50	1.54	0.4	2.7%	1.58	0.71	5.3%
Aug-15	AIR PT 9-2	1.26	1.27	0.1	0.8%	1.29	0.32	2.4%
Aug-15	AIR PT 9-3	1.49	1.52	0.27	2.0%	1.55	0.54	4.0%
Aug-15	AIR PT 9-4	1.25	1.24	-0.11	-0.8%	1.29	0.43	3.2%
Nov-15	AIR PT 10-1	1.91	1.89	-0.14	-1.0%	2.01	0.7	5.2%
Nov-15	AIR PT 10-2	2.09	2.02	-0.45	-3.3%	2.17	0.51	3.8%
Nov-15	AIR PT 10-3	2.10	2.05	-0.32	-2.4%	2.17	0.44	3.3%
Nov-15	AIR PT 10-4	1.92	1.92	0.0	0.0%	1.98	0.42	3.1%



December 2015

Tables C.4 and C5 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	1st May 2015	Lancaster City Council	Suzanne Hodgson	0117 974 1086	suzannehodgson@aqconsultants.co.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	08/01/2014	07/02/2014	100	Ratified	80.59090104	39.05330124
2	07/02/2014	05/03/2014	100	Ratified	76.71354342	35.90078301
3	05/03/2014	02/04/2014	100	Ratified	80.08633937	38.0776736
4	02/04/2014	30/04/2014	100	Ratified	65.89952756	35.39369393
5	30/04/2014	29/05/2014	96.83908046	Ratified	65.06497408	35.71116598
6	29/05/2014	02/07/2014	100	Ratified	58.09315734	27.56200007
7	02/07/2014	30/07/2014	100	Ratified	56.46663055	25.4538083
8	30/07/2014	28/08/2014	62.35632184	Ratified	52.46369802	23.64592747
9	28/08/2014	30/09/2014	98.23232323	Ratified	75.4284143	34.71760154
10	30/09/2014	29/10/2014	100	Ratified	86.49625299	40.39197493
11	29/10/2014	02/12/2014	99.87745098	Ratified	106.1753618	46.76489993
12	02/12/2014	06/01/2015	100	Ratified	121.5154001	54.44724405
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		42.66	43.12	42.65	
2		41.7	41.37	42.19	
3		40.87	38.18	42.28	
4		33.14	33.23	34.33	
5		36.13	34.57	35.86	
6		27.2	34.12	31.65	
7		28.65	31.08	32.06	
8		26.16	27.27	22.88	
9		30.29	33.36	34.8	
10		35.96	36.1	38.48	
11		37.1	36.79	36.85	
12		33.46	36.03	35.13	
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

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	1st May 2015	Lancaster City Council	Suzanne Hodgson	0117 974 1086	suzannehodgson@aqconsultants.co.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	**3.7**	Roadisde	0.15	Cable Street	347685, 461963

	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

Continuous Analyser Details	Analyser type	QA/QC (e.g. local or network)
	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	08/01/2014	07/02/2014	100	Ratified	100.144911	36.25512097
2	07/02/2014	05/03/2014	99.67948718	Ratified	81.86299859	33.5043966
3	05/03/2014	02/04/2014	100	Ratified	116.3051389	43.62723516
4	02/04/2014	30/04/2014	100	Ratified	102.883658	44.01711949
5	30/04/2014	29/05/2014	96.83908046	Ratified	104.4819147	41.01054879
6	29/05/2014	02/07/2014	100	Ratified	124.7971755	40.7849208
7	02/07/2014	30/07/2014	100	Ratified	107.6420137	38.22311745
8	30/07/2014	28/08/2014	100	Ratified	95.99201741	30.64149826
9	28/08/2014	30/09/2014	14.52020202	Ratified	131.2685947	25.54592456
10	30/09/2014	29/10/2014	0	Ratified		
11	29/10/2014	02/12/2014	19.24019608	Ratified	274.7225072	60.42787232
12	02/12/2014	06/01/2015	63.69047619	Ratified	179.0867717	54.3559352
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		40.3	42.8	43.8	
2		38.9	40.4	41.0	
3		38.8	45.8	44.4	
4		43.3	45.5	52.7	
5		49.3	51.3	50.6	
6		46.0	42.7	43.5	
7		44.8	41.4	45.6	
8		41.3	39.5	38.2	
9		49.0	49.9	51.4	
10		37.5	39.5	40.2	
11		40.2	48.5	45.4	
12		40.4	38.7	36.3	
13					

Other Information	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?
	Yes	No	Yes (in the last quarter)	

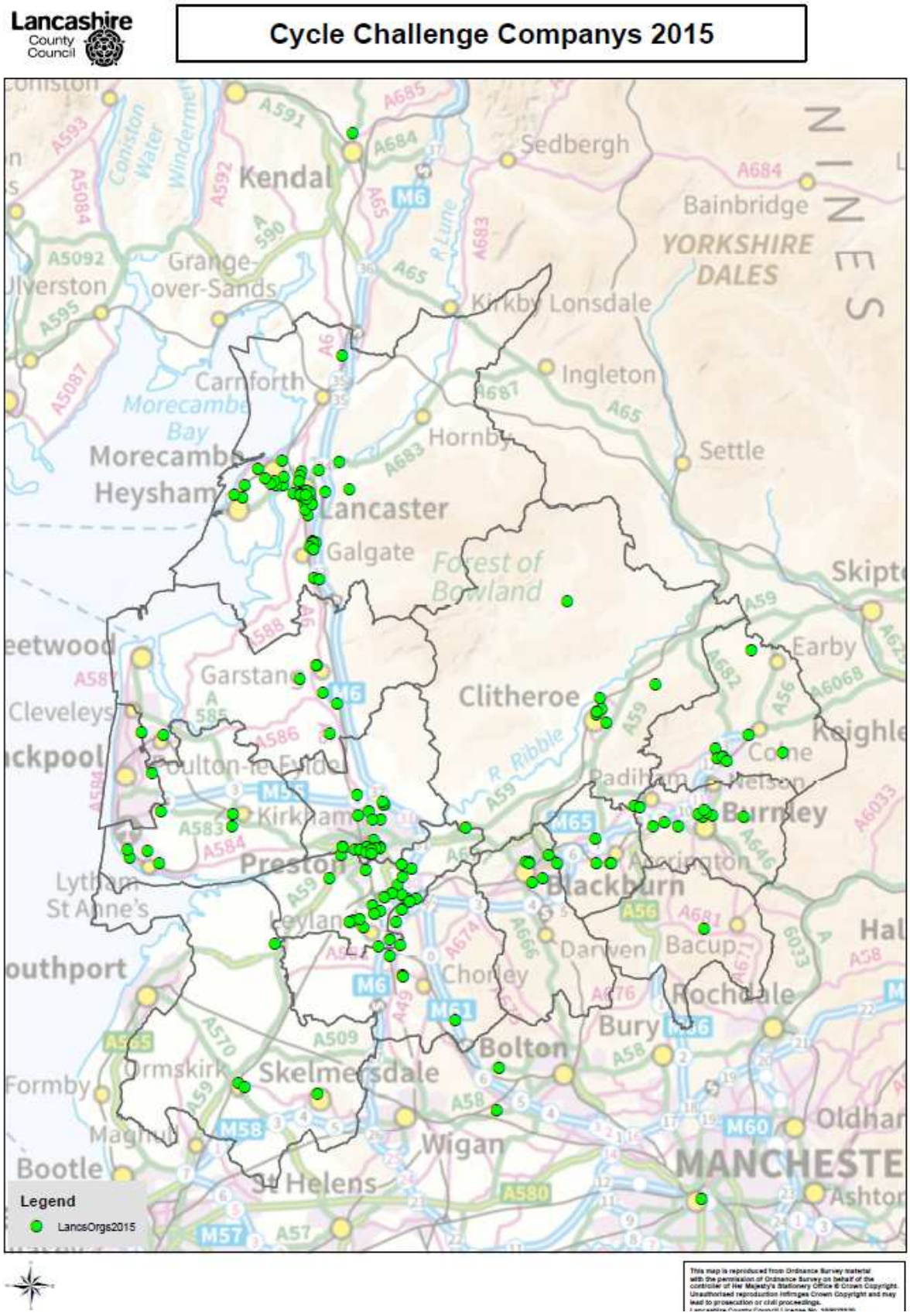
Table C.6 Collected NO2 diffusion tube bias adjustment factors for 2011-2014

Tube/Supplier Analyst	**Method**	**2011**	**2011**	**2012**	**2012**	**2013**	**2013**	**2014**	**2014**
Local Factors		*Cable St*	*Dalton Sq*	*Cable St*	*Dalton Sq*	*Cable St*	*Dalton Sq*	*Cable St*	*Dalton Sq*
Gradko 2011 - 2014	20% TEA in water	0.844	0.929	0.907	0.973	0.907	0.941	0.936	1.034
National Factors									
Gradko (national factors) 2011 – 2014 (from sheet V09_15-Final)*	20% TEA in water	0.90		0.97		0.95		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 2014. This was used in isolation as data capture for the Cable Street site was below 75% for 2014 (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 represents the highest factor scenario.

Figure 6 – Map showing locations of companies participating in the Cycle Challenge Scheme



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).

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.lancaster.gov.uk/environmental-health/environmental-protection/air-quality/air-pollution-measurement-monitoring/

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