Belfast City Council
Air Quality Progress Report 2017

In fulfillment of Environment (Northern Ireland) Order 2002
Local Air Quality Management

June 2017

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Executive Summary

Belfast City Council has completed this 2017 Air Quality Progress Report in accordance with the provisions of the Environment (Northern Ireland) Order 2002 and the Northern Ireland Local Air Quality Management Policy Guidance document LAQM.PGNI (09).

In undertaking this report, we have completed a review of recent ambient air quality monitoring data across the city in order to identify locations where new or existing exceedences of Air Quality Strategy Objectives and European Commission Limit Values are occurring. The review will also identify locations where ambient air quality has improved and exceedences are no longer occurring.

Belfast City Council has declared four air quality management areas across the city for exceedences of nitrogen dioxide and particulate matter short and longer-term air quality strategy objectives. A review of the monitoring data for these air quality management areas indicates that although there have been some recent improvements in nitrogen dioxide levels across the city, the air quality management areas will need to be maintained for the time being, particularly in the case of the M1 Motorway / A12 Westlink corridor. Both automatic and passive nitrogen dioxide monitoring is undertaken throughout Belfast to continually review the situation. Sustained improvements in particulate matter within the M1 Motorway / A12 Westlink air quality management area resulted in the revocation for this pollutant in September 2015. The area remains as an air quality management area for exceedences of nitrogen dioxide.

Monitored levels of benzene and sulphur dioxide remain well below the objectives and show no reason for concern.

There have been no monitored exceedences of Air Quality Strategy Objectives for any other ambient pollutant in recent years across the city, and no new sources have been identified which would have the potential to change this therefore no other pollutants will be considered in this report.

Several new developments have occurred throughout Belfast since the 2016 Progress Report. These developments were identified during the planning application process and where necessary an air quality assessment was requested. The impact of these developments was then assessed and any necessary development specific mitigation measures were identified.

In December 2015 the council along with relevant partner organisations launched a new Air Quality Action Plan (AQAP) 2015-2020 for the city that draws upon all forms of air quality and transport planning activities, including sustainable transport options as well as engineering solutions. The aim of this AQAP is to improve road vehicle operations and promote and enable a shift onto more sustainable modes of transport to achieve compliance with the NO_2 EU limit value by 2020.

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1 Introduction

1.1 Description of Local Authority Area

Belfast is the capital of Northern Ireland and as such, the city, and its wider metropolitan area, is the largest settlement in the region and the second largest city on the island of Ireland with a population of around 343,445. The city lies at the head of Belfast Lough in the lower reaches of the Lagan Valley and is flanked by the Black Mountain to the west and Castlereagh Hills to the east. The Belfast City Council district area sits at the heart of the growing population of the wider Belfast Metropolitan Urban Area, which comprises also the surrounding district council areas of Castlereagh, Lisburn, North Down, Newtownabbey and Carrickfergus.

In terms of historical air quality issues, Belfast used to experience sustained elevated levels of sulphur dioxide (SO_2) and particulate matter (PM_{10}), associated principally with the widespread use of solid fuel for domestic heating. However, through the introduction of the council's smoke control programme in the late 1960s, the Clean Air (Northern Ireland) Order 1981 and the more recent availability of natural gas to domestic, commercial and industrial sectors, levels of particulate matter and sulphur dioxide have declined substantially over recent years to the extent that we do not experience exceedences of any of the air quality strategy objectives, or indeed European Commission limit values, for either of these pollutants. Accordingly, the number of locations where we monitor these ambient pollutants has been reduced over recent years in accordance with the government's risk and exposure based approach to air quality management.

As levels of sulphur dioxide and particulate matter have declined across the city over recent years, so emissions of nitrogen dioxide, associated principally with road transport, have become more prominent. This is a similar situation to that experienced in many other major cities and conurbations across the United Kingdom. Accordingly, as a result of the first round of the review and assessment process, which was completed in 2004, Belfast City Council opted to declare four air quality management areas across the city. We published our first Air Quality Action Plan for the city in 2006 and it was completed substantially in 2010 with around 90% of planned actions delivered to schedule. A new Air Quality Action Plan has been

published for the city for the period 2015-2020 to address remaining nitrogen dioxide exceedences.

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in the Environment (Northern Ireland) Order 2002, the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 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 exceedences are considered likely, the local authority must then 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.

For Local Authorities in Northern Ireland, Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the LAQM process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in Northern Ireland** are set out in the Air Quality Regulations (Northern Ireland) 2003, Statutory Rules of Northern Ireland 2003, no. 342, and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre µg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 – Air Quality Objectives included in Regulations for the purpose of LAQM in Northern Ireland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	3.25 µg/m^3	Running annual mean	31.12.2010
1,3-butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate matter (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

As part of the review and assessment process, Belfast City Council completed a 2nd and 3rd stage review and assessment of air quality throughout the city in early 2004. This assessment concluded that modelled and monitored exceedences of short and longer-term objectives for both nitrogen dioxide and particulate matter were occurring in the city and would be likely to continue to do so in some locations beyond 2010. Consequently, in August 2004 the council, in consultation with other relevant authorities, declared four Air Quality Management Areas (AQMA), comprising the M1 Motorway and Westlink corridor, Cromac Street to the junction of Short Strand, Woodstock Link and the Albertbridge Road, the Upper Newtownards Road and the Ormeau Road.

The M1-Westlink AQMA was declared on the basis that annual and hourly-mean nitrogen dioxide concentrations would exceed the 2005 Air Quality Strategy objectives. In addition, particulate matter annual and 24-hour mean concentrations were predicted also to exceed relevant objectives in this location. The three other air quality management areas were declared on the grounds that the annual mean nitrogen dioxide objective would be exceeded in these locations during 2005 and beyond. A subsequent source apportionment study, completed for the air quality management areas, indicated that the principal cause of the exceedences was emissions emanating from road transportation.

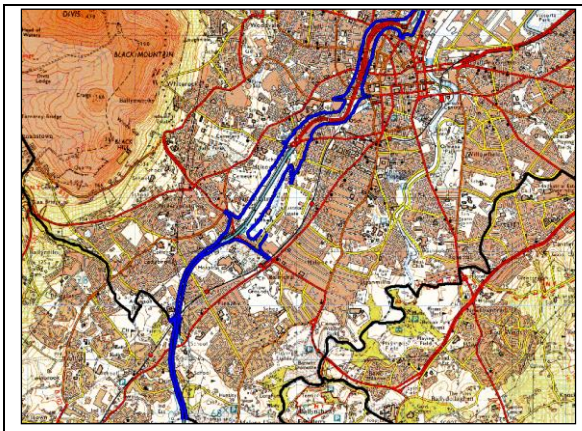
Current air quality management areas are described and depicted in more detail as follows:

1. The M1 / Westlink corridor from the Belfast City boundary at Sir Thomas and Lady Dixon Park to the end of the Westlink at the junction with Great George's Street and York Street including Stockman's Lane and Kennedy Way. This area was declared for predicted exceedences of both the nitrogen dioxide and particulate material annual mean air quality strategy objectives as well as exceedences of the particulate matter 24-hour mean objective and the nitrogen dioxide 1-hour mean objective. The boundary of the air quality management area is denoted in blue and has been set to take account of dispersion modelling uncertainties. This

area was revoked for exceedences of particulate matter in September 2015, however continues to exceed air quality objectives for nitrogen dioxide.

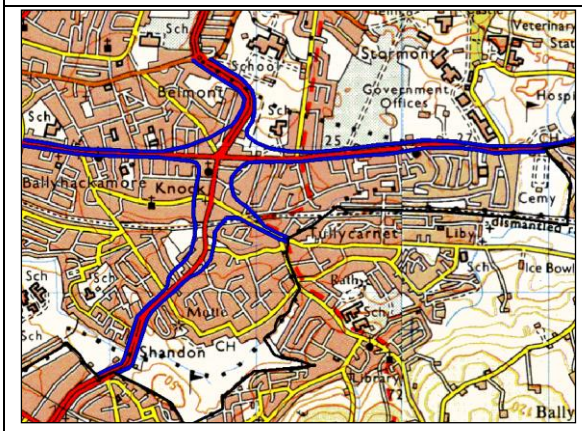
2. Cromac Street to the junction with East Bridge Street and then from East Bridge Street to the junction with the Ravenhill and Albertbridge Roads and Short Strand. This area was declared for predicted exceedences of the nitrogen dioxide annual mean air quality strategy objective.
3. The Upper Newtownards Road from the North Road junction to the Belfast City boundary at the Ulster Hospital incorporating the Knock Road to the City boundary at Laburnum Playing Fields and Hawthornden Way. This area was declared for predicted exceedences of the nitrogen dioxide annual mean air quality strategy objective. The Belfast City Council boundary with Castlereagh Borough council is denoted by the solid black line.
4. The Ormeau Road from the junction with Donegall Pass to the City boundary at Galwally. This area was declared for predicted exceedences of the nitrogen dioxide annual mean air quality strategy objective.

Figure 1.1 – Maps of AQMA Boundaries

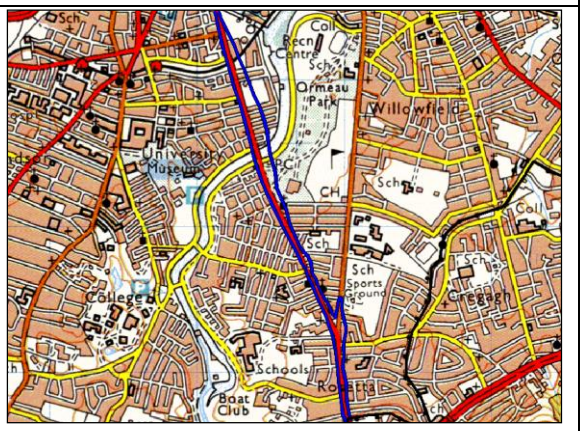


1. M1-Westlink AQMA

2. Cromac Street and Albertbridge Street AQMA



3. Upper Newtownards Road AQMA



4. Ormeau Road AQMA

A further detailed air quality assessment was completed by Belfast City Council in 2010, informed by the outcome of the 2009 Updating and Screening Assessment. Accordingly, the 2010 detailed assessment considered the potential for exceedences of the nitrogen dioxide objectives at a number of further locations across the city including the junction of the Sydenham Bypass with the Lower Newtownards Road, Shaftesbury Square, Donegall Road and Albertbridge Road, and at locations throughout the city centre. Although atmospheric dispersion modelling studies, undertaken as part of the detailed review and assessment process, did suggest exceedences of the nitrogen dioxide annual mean objective at some the of above-mentioned locations, the review and assessment identified also that there was no relevant public exposure at these locations during 2010. As a result, the 2010 Detailed Air Quality Assessment for Belfast City Council concluded that there was no need to declare further air quality management areas or to expand or revoke the existing AQMAs. This view was accepted by government.

Ambient air quality monitored results as presented in previous annual progress and update and assessment reports identified sustained improvements in particulate matter within the M1 Motorway / A12 Westlink air quality management area confirming that it has been in compliance with the objective for a number of years now. This has resulted in the Westlink / M1 AQMA being revoked for particulate matter in September 2015.

The current stage in the Review and Assessment process is to conduct a Progress Report. This report follows LAQM.TG(16) issued by DEFRA and intends to identify any significant changes that have occurred since the previous stage of R&A which may have the potential to affect the localised air quality.

For reference and additional background information, historical Belfast City Council air quality review and assessment reports are listed in the following table, and are available to download from the Department of Agriculture, Environment & Rural Affairs for Northern Ireland 'Northern Ireland Air Quality' website.

Table 1.2 Historical Belfast City Council Air Quality Reports.

Title	Publication date
2016 Progress Report	April 2016
2015 Updating and Screening Assessment	April 2015
2014 Progress Report	April 2014
2013 Progress Report	April 2013
2012 Updating and Screening Assessment	April 2012
2011 Progress Report	April 2011
2010 Detailed Assessment	September 2010
2010 Progress Report	April 2010
2009 Updating and Screening Assessment	April 2009
2008 Progress Report	April 2008
2007 Detailed assessment	April 2007
2007 Progress Report	April 2007

*All Historical Belfast City Council Air Quality Reports are available at: http://www.airqualityni.co.uk/laqm/district-council-reports

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Belfast City Council operate a number of automatic monitoring stations across the city in order to inform its air quality management processes and to provide real time information to the public in relation to pollution levels within our air quality management areas.

Accordingly, to ensure that the data from our sites is both accurate and representative, the monitors at each site are calibrated on a four-weekly basis by the council's Air Quality Officers in accordance with the procedures detailed in the Defra Automatic Urban and Rural Network (AURN) local site operators' manual. In addition, data management, quality assurance and quality control and service and maintenance support are all provided by appointed contractors. The data from our sites is made available to the Department of Agriculture, Environment and Rural Affairs for Northern Ireland and is reported on the 'Northern Ireland Air Quality' website. For consistency, all automatic monitoring data reported in this progress report has been obtained from the 'Northern Ireland Air Quality' website. Automatic data reported in this report relates to the calendar year (i.e. January – December) and data capture levels exceed substantially the Department's 75% data capture threshold for the calculation of annual statistics at all sites. Further information regarding our QA/QC procedures and processes can be obtained in appendix A to this report.

In relation to data correction for our automatic data, this process is generally of principal concern with regard to the treatment of particulate matter monitoring data. The Belfast Centre site uses Filter Dynamics Measurement System (FDMS) equipped Tapered Element Oscillating Microbalances (TEOMs) for particulate matter (PM_{10}) monitoring. Government equivalence tests have determined that this equipment meets the equivalence criteria and on that basis, no correction factor needs to be applied to this monitoring data.

The Stockmans Lane site is equipped with a Beta Attenuation Monitor (BAM) with unheated inlet for monitoring particulate matter. Government technical guidance highlights that a BAM, equipped with an unheated inlet, meets the equivalence criteria for PM_{10} monitoring, provided that the results are corrected for slope. This correction involves dividing measured concentrations by a factor of 1.21. It should be noted that the data presented on the Northern Ireland Air website and in this report have already been corrected to the reference equivalent.

A location map for monitoring sites relative to the Greater Belfast area can be found below in Figure 2.1 and further site details are provided in Table 2.1.

Figure 2.1 – Location Map of Automatic Monitoring Sites

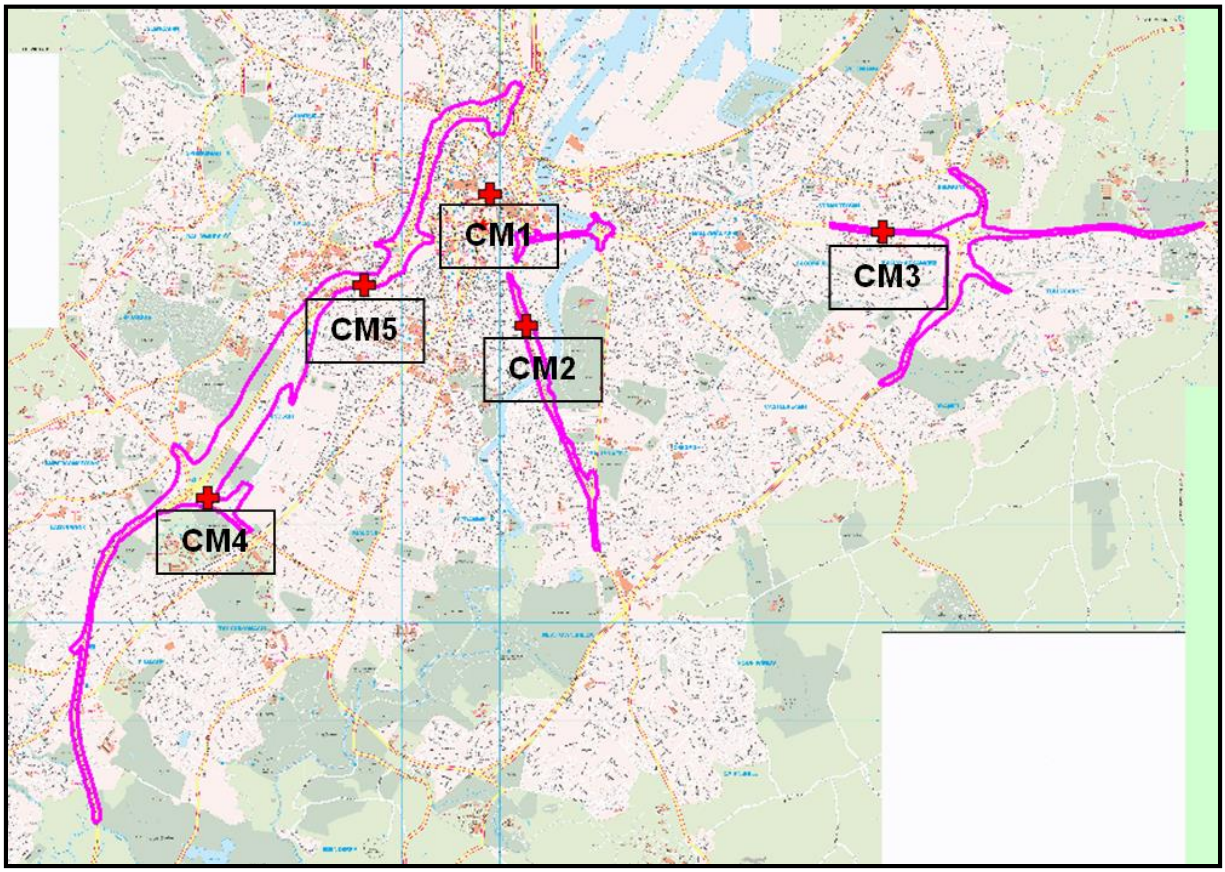


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Table 2.1 – Details of Automatic Monitoring Sites

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?
CM1	Belfast Centre AURN site Lombard Street	Urban Centre	333898	374358	4.0	Nitrogen dioxide, sulphur dioxide, carbon monoxide, ozone and particulate matter (PM_{10} and $PM_{2.5}$)	N	Chemiluminescence, UV Fluorescence, IR Absorption, UV Absorption, TEOM (Tapered Element Oscillating Microbalance) with FDMS (Filter Dynamics Measurement System) Sharp Cut Cyclone for $PM_{2.5}$	Y (monitoring site is located in a city centre pedestrian precinct)	30 m	Y
CM2	Belfast Ormeau Road	Roadside	334272	373012	1.3	Nitrogen dioxide	Y	Chemiluminescence	Y (6 m)	3 m	Y
CM3	Belfast Ballyhackamore	Roadside	337911	373972	1.3	Nitrogen dioxide	Y	Chemiluminescence	Y (7 m)	1.5 m	Y
CM4	Belfast Stockman's Lane	Roadside	331010	371252	3.5	Nitrogen dioxide and Particulate matter (PM_{10})	Y	Chemiluminescence Beta Attenuation Monitor	Y (6 m to façade of housing and 1m to gardens)	2 m	Y
CM5	Belfast Westlink Roden Street	Roadside	332617	373431	2.6	Nitrogen dioxide	Y	Chemiluminescence	Y (20 m)	5 m	Y

2.1.2 Non-Automatic Monitoring Sites

The government's risk and exposure-based approach to air quality management has meant that Belfast City Council's principal focus has been on addressing city-wide ambient nitrogen dioxide levels over recent years. Accordingly, in order to understand how nitrogen dioxide levels are varying across the city and in addition to our automatic analysers, the council uses passive diffusion tubes for monitoring nitrogen dioxide at both background and roadside locations across the city. These locations are detailed in Figure 2.2 and Table 2.2.

Diffusion tubes are comprised of a small clear plastic tube containing a chemical reagent supported on stainless steel grids that absorbs the pollutant directly from the air. In this case, triethanolamine is used to monitor levels of ambient nitrogen dioxide. Belfast City Council's diffusion tubes are exposed for successive four-week periods generally in accordance with the dates recommended by Defra and, as a result, they provide a good general indication of average nitrogen dioxide concentrations, thereby allowing a comparison with the annual mean objective.

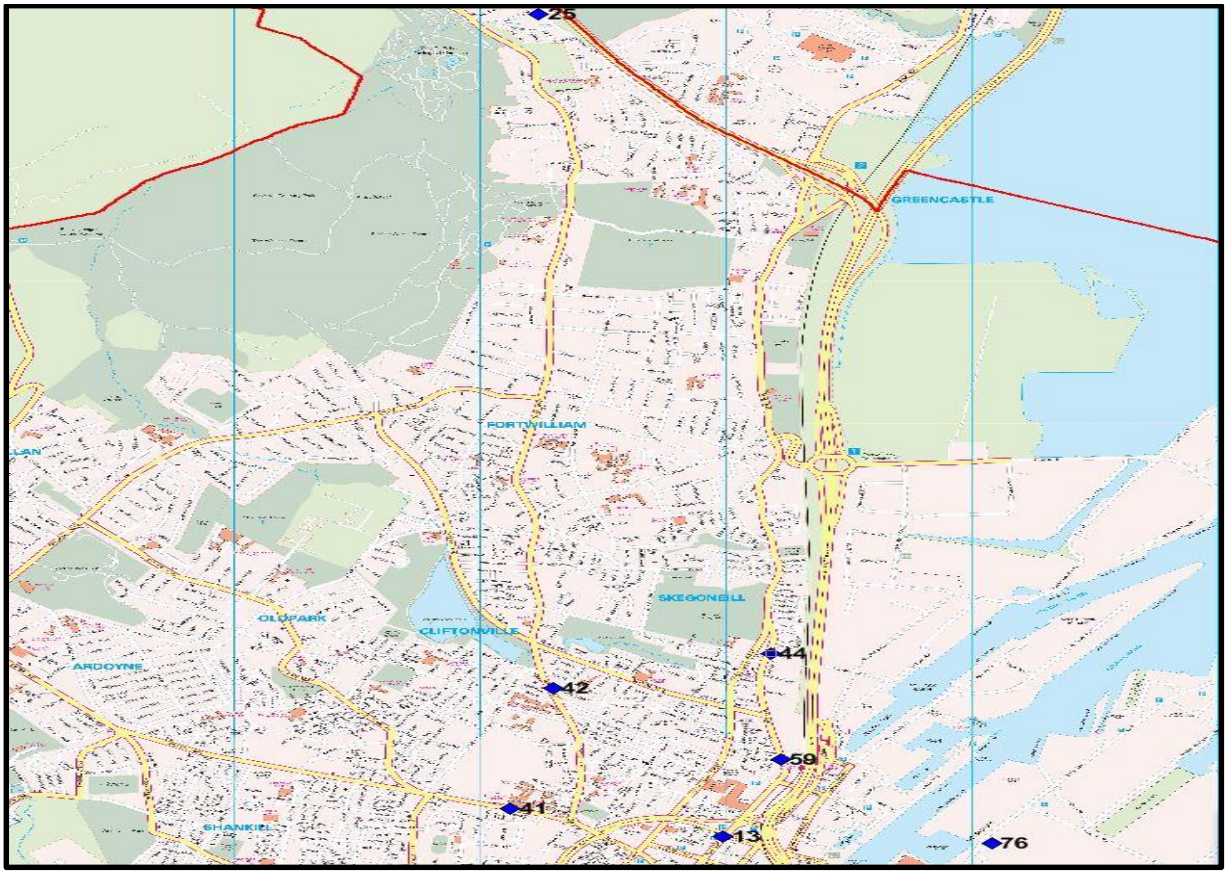
To ensure that experimental error is minimised in the preparation and analysis of its nitrogen dioxide diffusion tubes, Belfast City Council has appointed Gradko to supply, analyse and report data for its diffusion tubes. Gradko employs a 20% triethanolamine solution for monitoring ambient nitrogen dioxide and adheres to the requirements of the government's 'Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users' publication.

To ensure further that its diffusion tube monitoring data is as accurate as possible, the council co-locates a number of diffusion tubes with a reference method compliant chemiluminescent nitrogen dioxide analyser at the Lombard Street, Newtownards Road and Stockmans Lane monitoring sites. This process allows a bias adjustment factor (with a 95% confidence interval as an estimate of the uncertainty on the bias adjustment factor) to be calculated that can be used to correct the diffusion tube monitoring data. In the case of diffusion tube data presented in this report, the data has been corrected using a bias adjustment derived from the co-location study at the Belfast Centre Lombard Street AURN site. The bias calculation and data scaling was

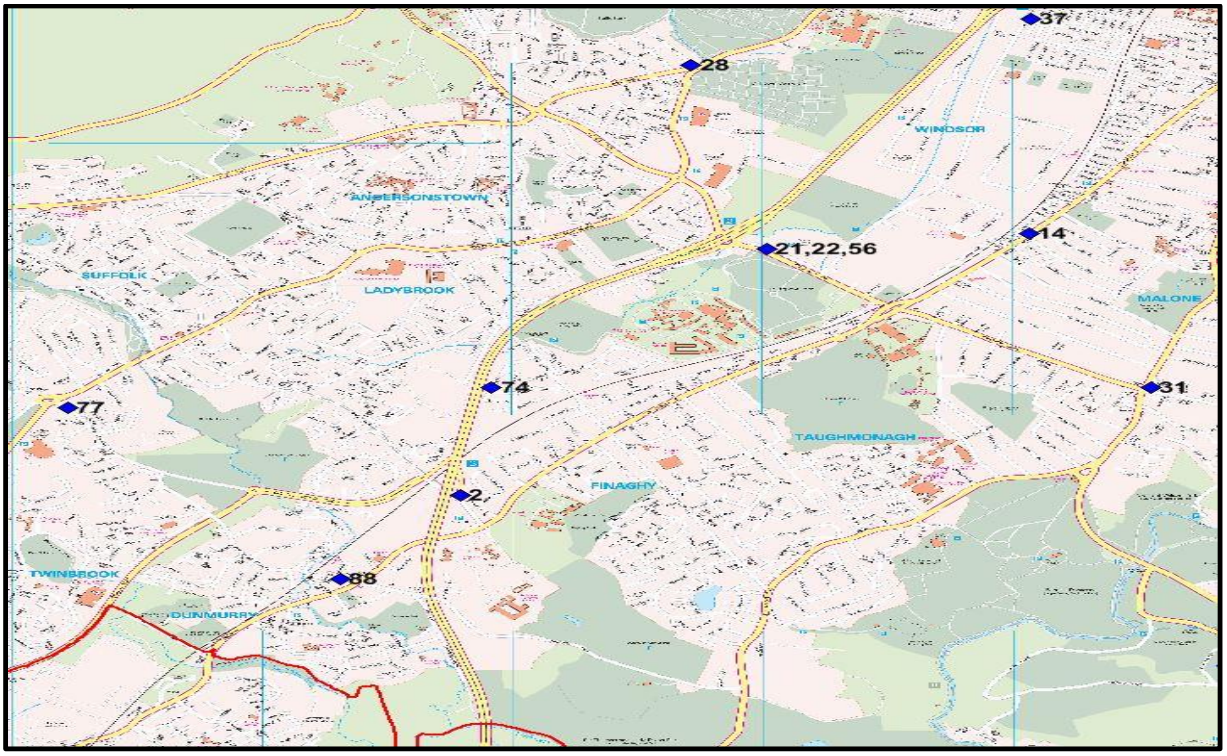
undertaken using Defra's 'Bias Adjustment Factor Calculation' Spreadsheet Version 4. Outputs from the spreadsheet for treatment of Belfast City Council's 2016 data are included in Appendix A to this report. The outputs also show monthly nitrogen dioxide monitoring data for each diffusion tube site for 2016 where available.

Figure 2.2 – Location Maps of Non-Automatic Monitoring Sites

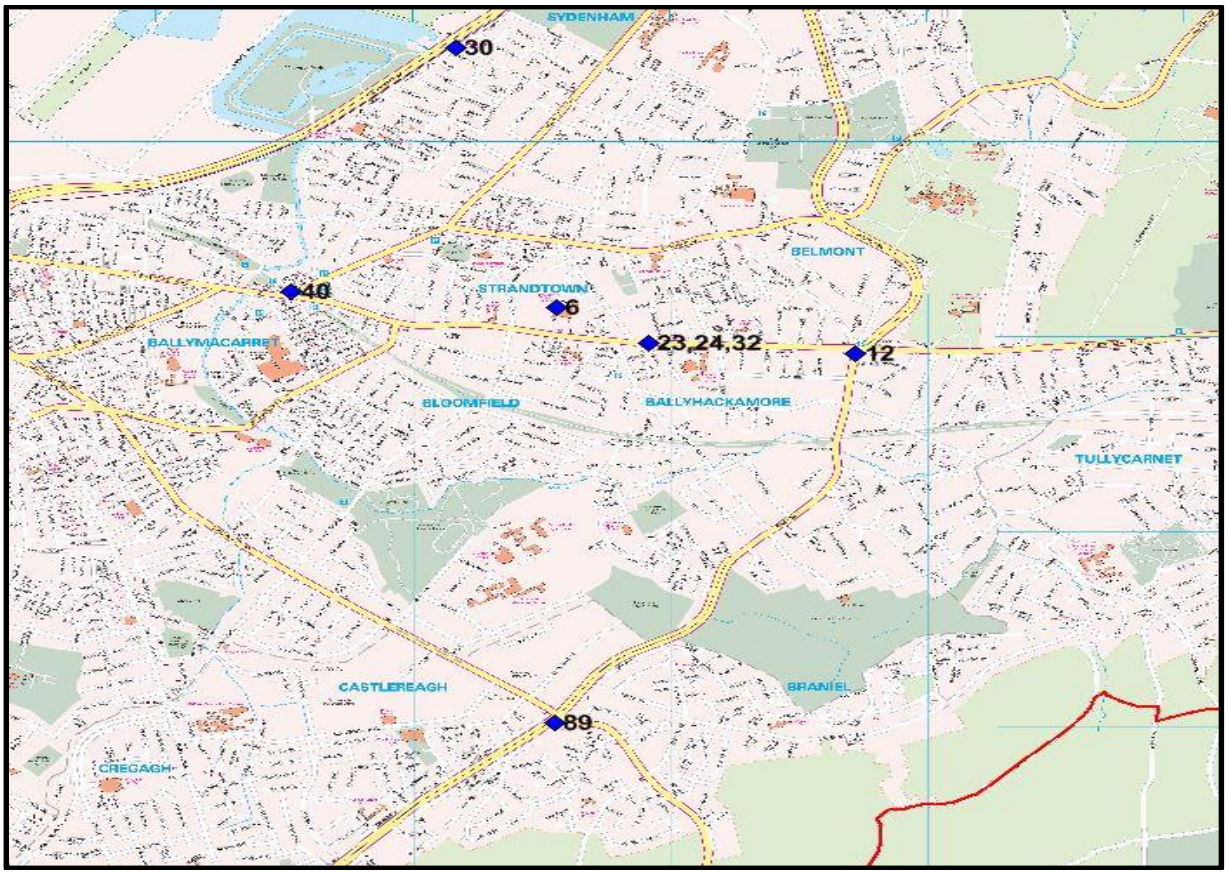
North Belfast



South and West Belfast



East Belfast



Belfast City Centre

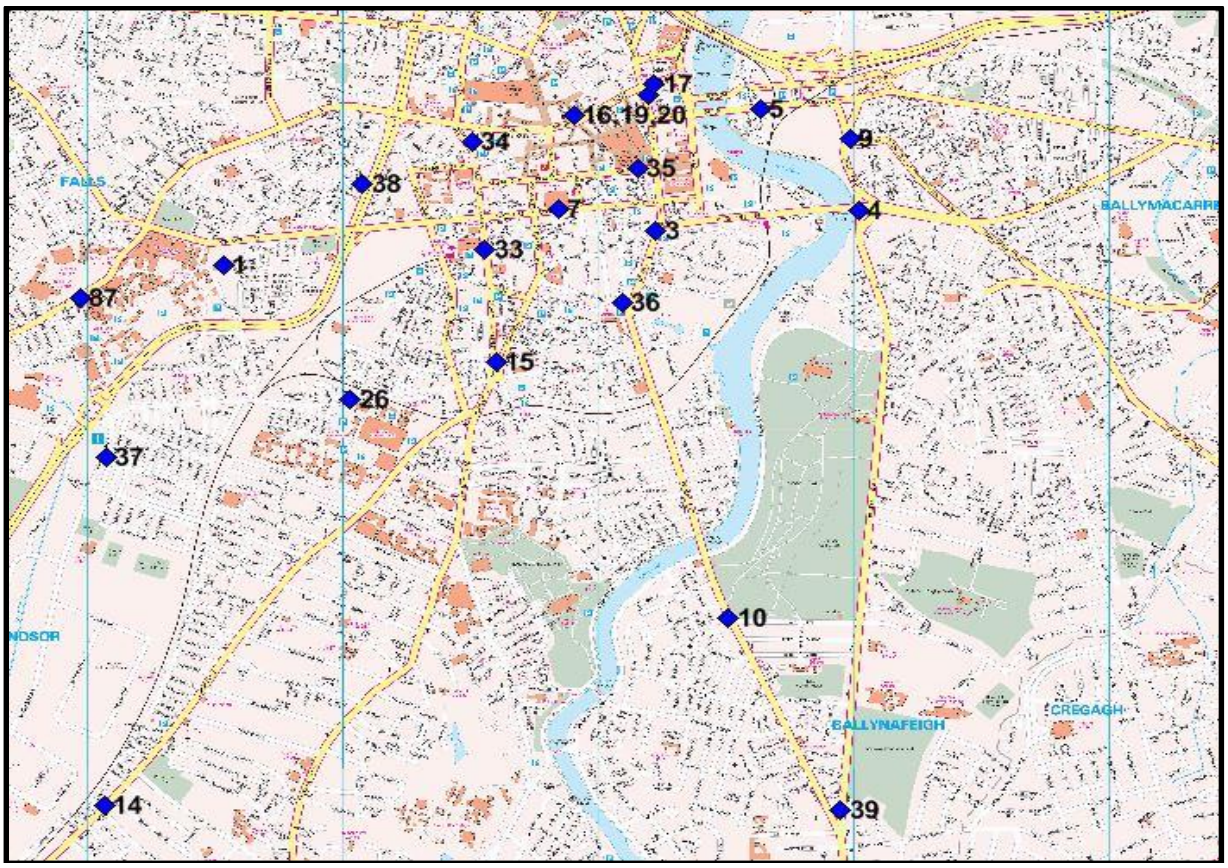


Table 2.2 – Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	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?
1	Royal Victoria Hospital	Urban Background	332522	373708	3.8	NO_2	N	N	>70	>80	N/A
2	Black's Road	Roadside	329782	369522	2.7	NO_2	Y	N	30	2	Y
3	61 Cromac Street	Roadside	334220	373853	3.0	NO_2	Y	N	10	3	Y
4	Ravenhill Road	Roadside	335014	373942	3.0	NO_2	Y	N	45	5	Y
5	Queen's Bridge	Roadside	334630	374385	3.0	NO_2	N	N	13	1	Y
6	North Road	Urban Background	337551	374151	3.0	NO_2	N	N	On School Wall	135	N/A
7	Donegall Square South	Roadside	333837	373950	3.5	NO_2	N	N	N	N/A	Y
9	Short Strand	Roadside	334980	374254	3.2	NO_2	N	N	28	1	Y
10	301 Ormeau Road	Roadside	334503	372176	3.0	NO_2	Y	N	25	7	Y
12	Knock Road	Roadside	338718	373918	2.5	NO_2	Y	N	27	1.5	Y
13	Great George's Street	Kerbside	333981	375102	3.0	NO_2	Y	N	40	0.5	Y
14	Lisburn Road	Roadside	332056	371364	2.7	NO_2	N	N	8	1.5	Y
15	Shaftesbury Square	Kerbside	333594	373283	2.7	NO_2	N	N	N	N/A	Y
16,19,20	Lombard Street	Urban Centre	333898	374358	3.5	NO_2	N	Y	N	N/A	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	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?
17	Albert Clock	Roadside	334212	374489	3.1	NO_2	N	N	3.5	2.5	Y
21,22,56	Stockman's Lane	Roadside	331007	371254	3.0	NO_2	Y	Y	15	2	Y
23,24,32	Ballyhackamore	Roadside	337911	373972	3.0	NO_2	Y	Y	36	1.5	Y
25	Whitewell Road	Roadside	333230	380877	2.7	NO_2	N	N	35	13	Y
26	Donegall Road	Kerbside	333022	373122	2.7	NO_2	N	N	2	1	Y
28	Falls Road and Andersonstown	Roadside	330707	372547	3.0	NO_2	N	N	35	2	Y
30	Station Road	Roadside	337160	375482	2.7	NO_2	N	N	28	2	Y
31	Malone Road	Roadside	332544	370283	3.0	NO_2	N	N	18	2	Y
33	Great Victoria Street	Roadside	333548	373772	3.2	NO_2	N	N	N	N/A	Y
34	College Square East	Roadside	333498	374241	3.0	NO_2	N	N	3	3	Y
35	Chichester Street	Roadside	334147	374123	3.5	NO_2	N	N	3	2	Y
36	Cromac & Ormeau Avenue	Kerbside	334085	373542	2.5	NO_2	Y	N	3	1	Y
37	Glenmachan Street	Roadside	332063	372871	3.0	NO_2	Y	N	12	2	Y
38	Creche on M1/Westlink	Roadside	333069	374055	3.0	NO_2	Y	N	10	1.5	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	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?
39	Ormeau Road (junction with Ravenhill Road)	Roadside	334943	371342	3.0	NO_2	Y	N	10	2	Y
40	Upper Newtownards Road & Hollywood Road	Roadside	336519	374233	3.0	NO_2	N	N	40	7	Y
41	Crumlin Road	Roadside	333116	375292	3.5	NO_2	N	N	10	2	Y
42	228 Antrim Road	Roadside	333288	376143	2.7	NO_2	N	N	18	2	Y
44	Shore Road (Ivan Street end)	Roadside	334174	376384	3.0	NO_2	N	N	2.5	3.5	Y
59	York Street	Roadside	334214	375638	2.7	NO_2	Y	N	5	2	Y
63	Queens Square	Kerbside	334192	374441	2.7	NO_2	N	N	Building Façade	5	Y
74	Ardmore Park	Roadside	329908	370278	2.7	NO_2	N	N	6	1.5	Y
76	Titanic Quarter	Roadside	335073	375049	2.7	NO_2	N	N	3	1.5	Y
77	Poleglass	Roadside	328214	370138	2.7	NO_2	N	N	5	1.5	Y
87	RVH Falls Road	Roadside	331962	373560	2.7	NO_2	N	N	12	2	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide (NO_2)

Automatic Monitoring Data

Tables 2.3 and 2.4 summarise recent monitoring data from the council's nitrogen dioxide automatic analysers for 2016 and preceding years from 2012. In all cases, exceedences of the Air Quality Strategy Objectives are highlighted in bold. In addition, trends in annual mean monitoring data for nitrogen dioxide are summarised in Figure 2.3.

Annual mean concentrations at the Belfast Centre AURN site continue to remain below the 40 μ/gm^{-3} annual mean objective for nitrogen dioxide as denoted by the solid red line on the graph.

Belfast Ormeau Road site experienced extensive problems with the air conditioning in 2012 and 2013 which prevented the monitoring equipment working to full capacity. As this had been a reoccurring problem a decision was made towards the end of 2013 to upgrade the site. Taking account of procurement requirements and liaison with NIE this upgrade took a considerable length of time to the point that data capture from this site was so low it was not considered reliable to report the data from this site for 2013 and we would question the reliability of the 2012 data as it does not appear to follow any trend. Following the site upgrade, the annual mean concentration has continued to remain constant at 28 μ/gm^{-3} in 2014, 27 μ/gm^{-3} in 2015 and 28 μ/gm^{-3} in 2016. The council will continue to monitor the Ormeau Road air quality management area until a more definitive understanding of nitrogen dioxide levels and trends emerge.

From the data in Table 2.3, it can be seen that concentrations along the Upper Newtownards Road have remained in the thirties from 2012 and the nitrogen dioxide annual mean objective has now been achieved along the Upper Newtownards Road. Nonetheless, the council will continue to monitor nitrogen dioxide concentrations along the Upper Newtownards Road in order to determine whether this improvement in ambient conditions is sustained.

Despite the completion of significant structural improvements to the M1 Motorway and A12 Westlink corridor, nitrogen dioxide concentrations along Stockmans Lane continue to significantly exceed the 40 µg/m^{-3} annual mean objective for nitrogen dioxide with levels of 50 µg/m^{-3} the last two years. There are a number of residential premises directly adjacent to the carriageway at Stockmans Lane necessitating continuation of the air quality management area for this location.

Concentrations monitored at Westlink Roden Street site have continued to remain below the 40 µg/m^{-3} annual mean objective over the previous five years. The council will continue to monitor the Westlink Corridor/M1 air quality management area until a more definitive understanding of nitrogen dioxide levels and trends emerge.

Historically, modelled and monitored exceedences of the 1-hour mean objective for nitrogen dioxide were encountered only in the vicinity of the M1 Motorway / A12 Westlink corridor. As a result, this is the only air quality management area within Belfast that has been declared on the basis of exceedences of the 1-hour objective. From ambient monitoring data for Stockman's Lane, as summarised in Table 2.4, it can be seen that the number of exceedences of the hourly objective has substantially decreased in the last two years to comply with the objective of 200 µg/m^{-3} not to be exceeded more than 18 times in a year. As there are residential properties located directly adjacent to the carriageway in Stockman's Lane and most of these properties have gardens facing onto the roadway thereby providing for short-term relevant public exposure we will continue to monitor at this location to identify trends.

Table 2.3 – Results of Automatic Monitoring for NO_2: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2015 % [b]	Annual Mean Concentration (µg/m^3)				
					2012* [c]	2013* [c]	2014* [c]	2015 [c]	2016 [c]
Belfast Centre	Urban Centre	N	96	96	29	31	31	29	29
Belfast Ormeau Road	Roadside	Y	97	97	**53**	N/A	28	27	28
Belfast Ballyhackamore	Roadside	Y	99	99	38	37	35	33	35
Belfast Stockman's Lane	Roadside	Y	99	99	N/A	**53**	**56**	**50**	**50**
Belfast Westlink Roden Street	Roadside	Y	99	99	39	38	35	34	39

In bold, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] Means should be "annualised" as in Boxes 7.9 and 7.10 of LAQM.TG16, if valid data capture is less than 75%

* Annual mean concentrations for previous years are optional

Figure 2.3 – Trends in Annual Mean NO_2 Concentrations Measured at Automatic Monitoring Sites

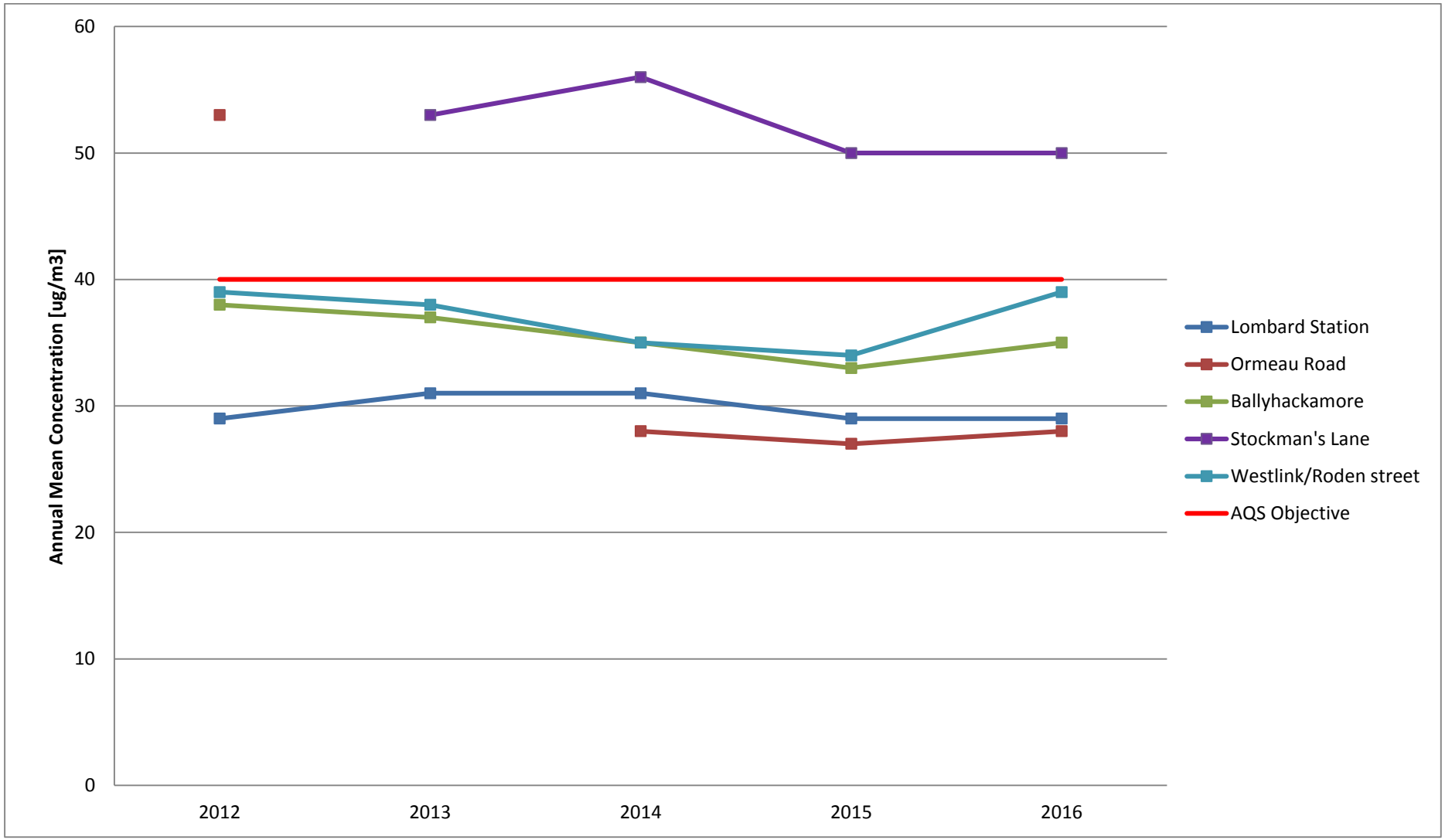


Table 2.4 – Results of Automatic Monitoring for NO_2: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2015 % [b]	Number of Hourly Means > 200µg/m^3				
					2012* [c]	2013* [c]	2014* [c]	2015 [c]	2016 [c]
Belfast Centre	Urban Centre	N	93	93	5	2	0	0	1
Belfast Ormeau Road	Roadside	Y	99	99	3	N/A	0(98)	0	2
Belfast Ballyhackamore	Roadside	Y	92	92	3	0	2	0	1
Belfast Stockman's Lane	Roadside	Y	99	99	**32**(227)	13	14	7	10
Belfast Westlink Roden Street	Roadside	Y	99	99	13	2	0	2	1

In bold, exceedence of the NO_2 hourly mean AQS objective (200µg/m^3 – not to be exceeded more than 18 times per year)

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] If the data capture for full calendar year is less than 90%, include the 99.8th percentile of hourly means in brackets

* Number of exceedences for previous years is optional

Diffusion Tube Monitoring Data

In order to obtain a better understanding of how levels of nitrogen dioxide are varying across the city over time and to investigate those locations where previous rounds of the review and assessment process have highlighted areas of concern, Belfast City council has placed 39 diffusion tubes at relevant locations across the city. Data from these tubes for 2016 has been summarised in Table 2.5 alongside historical data where it is available in Table 2.6.

In terms of the outcome of the 2016 nitrogen dioxide diffusion tube monitoring, it is noted that the concentrations have generally remained similar to last year at most locations. Annual mean exceedences during 2016 occurred at Knock Road, Great George's Street, York Street and Stockmans Lane all of which are located within an existing air quality management area and have been the subject of mitigation measures for some time. Nevertheless, Defra NO2 distance calculation have been provided for the above locations to calculate concentrations at relevant receptors (Appendix B).

Exceedences also occurred at a Short Strand and Chichester Street monitoring locations which are not currently declared as air quality management areas. Further assessment using the Defra NO_2 distance calculator was undertaken to confirm if these excedeences apply to relevant receptors. The calculated results as provided in Appendix B predicted that concentrations were below the objective in relation to relevant receptors at both locations. It is therefore not considered practical to undertake a detailed assessment on these locations.

Table 2.5 – Results of NO_2 Diffusion Tubes 2016

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2016 (Number of Months or %) [a]	2016 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.89[b]
1	Royal Victoria Hospital	Urban Background	N	N	100%	22
2	Black's Road	Roadside	Y	N	100%	40
3	61 Cromac Street	Roadside	Y	N	100%	37
4	Ravenhill Road	Roadside	Y	N	92%	31
5	Queen's Bridge	Roadside	N	N	100%	30
6	North Road	Urban Background	N	N	83%	17
7	Donegall Square South	Roadside	N	N	100%	33
9	Short Strand	Roadside	N	N	100%	**44**
10	301 Ormeau Road	Roadside	Y	N	92%	32
12	Knock Road	Roadside	Y	N	100%	**41**
13	Great George's Street	Kerbside	Y	N	100%	**50**
14	Lisburn Road	Roadside	N	N	100%	28
15	Shaftesbury Square	Kerbside	N	N	100%	34
16,19,20	Lombard Street	Urban Centre	N	Y	100%	28
17	Albert Clock	Roadside	N	N	100%	38
21,22,56	Stockman's Lane	Roadside	Y	Y	100%	**49**
23,24,32	Ballyhackamore	Roadside	Y	Y	92%	36

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2016 (Number of Months or %) [a]	2016 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.89[b]
25	Whitewell Road	Roadside	N	N	100%	23
26	Donegall Road	Kerbside	N	N	83%	33
28	Falls Road and Andersonstown	Roadside	N	N	92%	29
30	Station Road	Roadside	N	N	92%	26
31	Malone Road	Roadside	N	N	83%	36
33	Great Victoria Street	Roadside	N	N	100%	39
34	College Square East	Roadside	N	N	92%	32
35	Chichester Street	Roadside	N	N	100%	**44**
36	Cromac & Ormeau Avenue	Kerbside	Y	N	83%	33
37	Glenmachan Street	Roadside	Y	N	83%	39
38	Creche on M1/Westlink	Roadside	Y	N	100%	34
39	Ormeau Road (junction with Ravenhill Road)	Roadside	Y	N	75%	32
40	Upper Newtownards Road & Holywood Road	Roadside	N	N	**67%**	27
41	Crumlin Road	Roadside	N	N	83%	32
42	228 Antrim Road	Roadside	N	N	92%	36

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2016 (Number of Months or %) [a]	2016 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.89[b]
44	Shore Road (Ivan Street end)	Roadside	N	N	100%	30
59	York Street	Roadside	Y	N	75%	**41**
63	Queens Square	Kerbside	N	N	100%	36
74	Ardmore Park	Roadside	N	N	92%	36
76	Titanic Quarter	Roadside	N	N	**58%**	26
77	Poleglass	Roadside	N	N	100%	26
87	RVH Falls Road	Roadside	N	N	**50%**	31

In bold, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3

Underlined, annual mean > 60µg/m^3, indicating a potential exceedence of the NO_2 hourly mean AQS objective

[a] Means should be "annualised" as in Boxes 7.9 and 7.10 of LAQM.TG16, if full calendar year data capture is less than 75%

[b] If an exceedence is measured at a monitoring site not representative of public exposure, NO_2 concentration at the nearest relevant exposure should be estimated based on the "NO_2 fall-off with distance" calculator (http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html), and results should be discussed in a specific section. The procedure is also explained in paragraphs 7.77 to 7.79 of LAQM.TG16.

Table 2.6 – Results of NO_2 Diffusion Tubes (2012 to 2016)

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]				
			2012 (Bias Adjustment Factor = 0.85)	2013 (Bias Adjustment Factor = 0.94)	2014 (Bias Adjustment Factor = 0.95)	2015 (Bias Adjustment Factor = 0.96)	2016 (Bias Adjustment Factor = 0.89)
1	Royal Victoria Hospital	N	22	24	23	22	22
2	Black's Road	Y	40	**43**	**42**	**43**	40
3	61 Cromac Street	Y	36	**45**	**42**	39	37
4	Ravenhill Road	Y	29	32	30	33	31
5	Queen's Bridge	N	30	33	34	31	30
6	North Road	N	16	17	15	16	17
7	Donegall Square South	N	35	38	38	34	33
9	Short Strand	N	**43**	**47**	**47**	**45**	**44**
10	301 Ormeau Road	Y	31	35	35	34	32
12	Knock Road	Y	40	**46**	**47**	**42**	**41**
13	Great George's Street	Y	**48**	**52**	**50**	**47**	**50**
14	Lisburn Road	N	27	28	30	27	28
15	Shaftesbury Square	N	34	38	38	34	34
16,19,20	Lombard Street	N	29	31	32	29	28
17	Albert Clock	N	39	**47**	**47**	**42**	38

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]				
			2012 (Bias Adjustment Factor = 0.85)	2013 (Bias Adjustment Factor = 0.94)	2014 (Bias Adjustment Factor = 0.95)	2015 (Bias Adjustment Factor = 0.96)	2016 (Bias Adjustment Factor = 0.89)
21,22,56	Stockman's Lane	Y	**59**	**55**	**55**	**49**	**49**
23,24,32	Ballyhackamore	Y	37	37	35	34	36
25	Whitewell Road	N	19	23	33	25	23
26	Donegall Road	N	35	39	36	33	33
28	Falls Road and Andersonstown	N	29	31	29	27	29
30	Station Road	N	24	23	24	25	26
31	Malone Road	N	39	**44**	**45**	39	36
33	Great Victoria Street	N	39	**42**	**42**	40	39
34	College Square East	N	33	39	40	33	32
35	Chichester Street	N	**47**	**46**	**49**	**43**	**44**
36	Cromac & Ormeau Avenue	Y	32	33	36	34	33
37	Glenmachan Street	Y	-	40	**43**	40	39
38	Creche on M1/Westlink	Y	31	34	35	30	34
39	Ormeau Road (junction with Ravenhill Road)	Y	25	29	30	31	32

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]				
			2012 (Bias Adjustment Factor = 0.85)	2013 (Bias Adjustment Factor = 0.94)	2014 (Bias Adjustment Factor = 0.95)	2015 (Bias Adjustment Factor = 0.96)	2016 (Bias Adjustment Factor = 0.89)
40	Upper Newtownards Road & Hollywood Road	N	27	29	29	28	27
41	Crumlin Road	N	32	34	34	30	32
42	228 Antrim Road	N	34	37	**41**	37	36
44	Shore Road (Ivan Street end)	N	30	33	34	30	30
59	York Street	Y	**41**	**47**	**48**	39	**41**
63	Queens Square	N	37	**41**	40	38	36
74	Ardmore Park	N	-	-	-	35	36
76	Titanic Quarter	N	-	-	-	-	26
77	Poleglass	N	-	-	-	-	26
87	RVH Falls Road	N	-	-	-	-	31

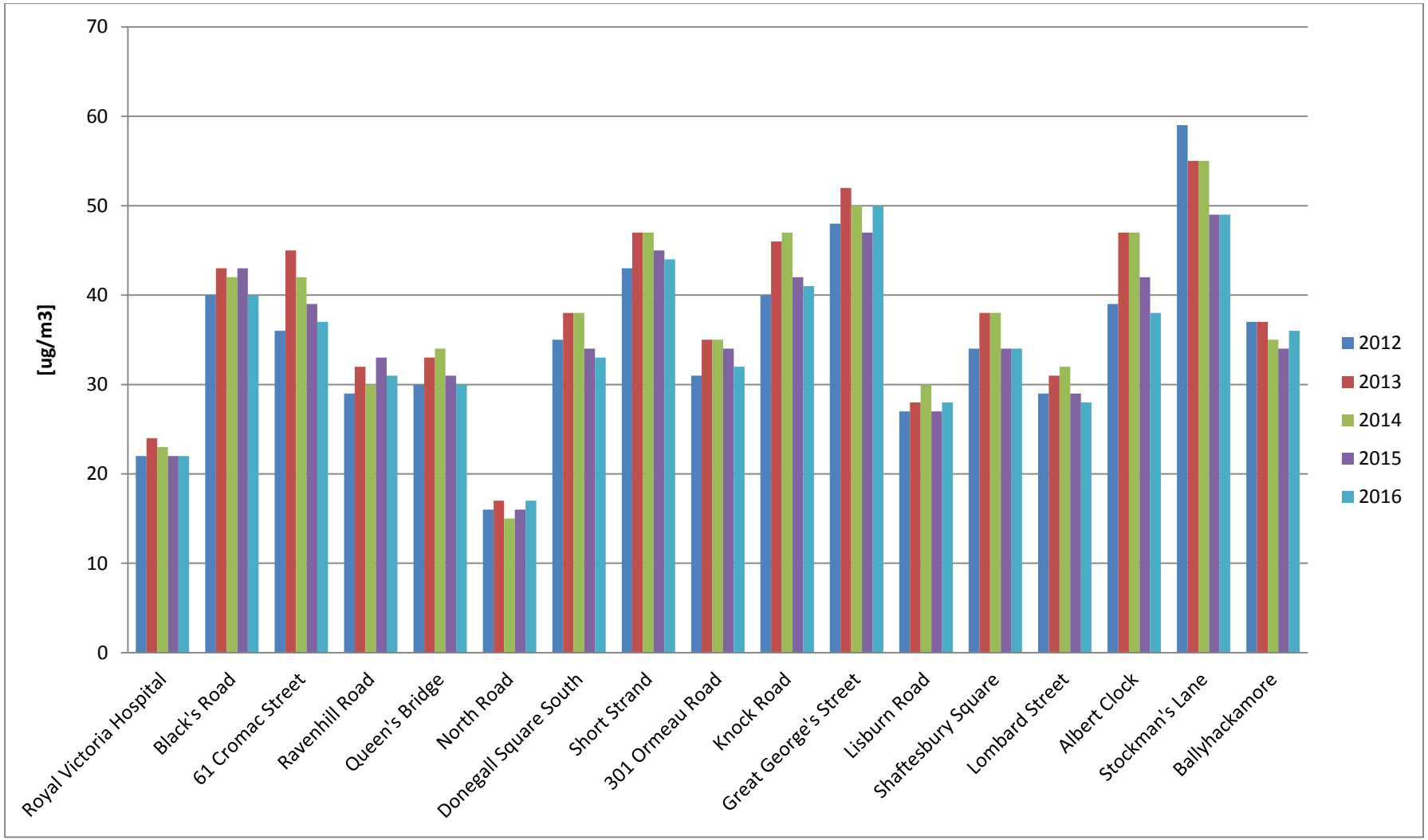
In bold, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3

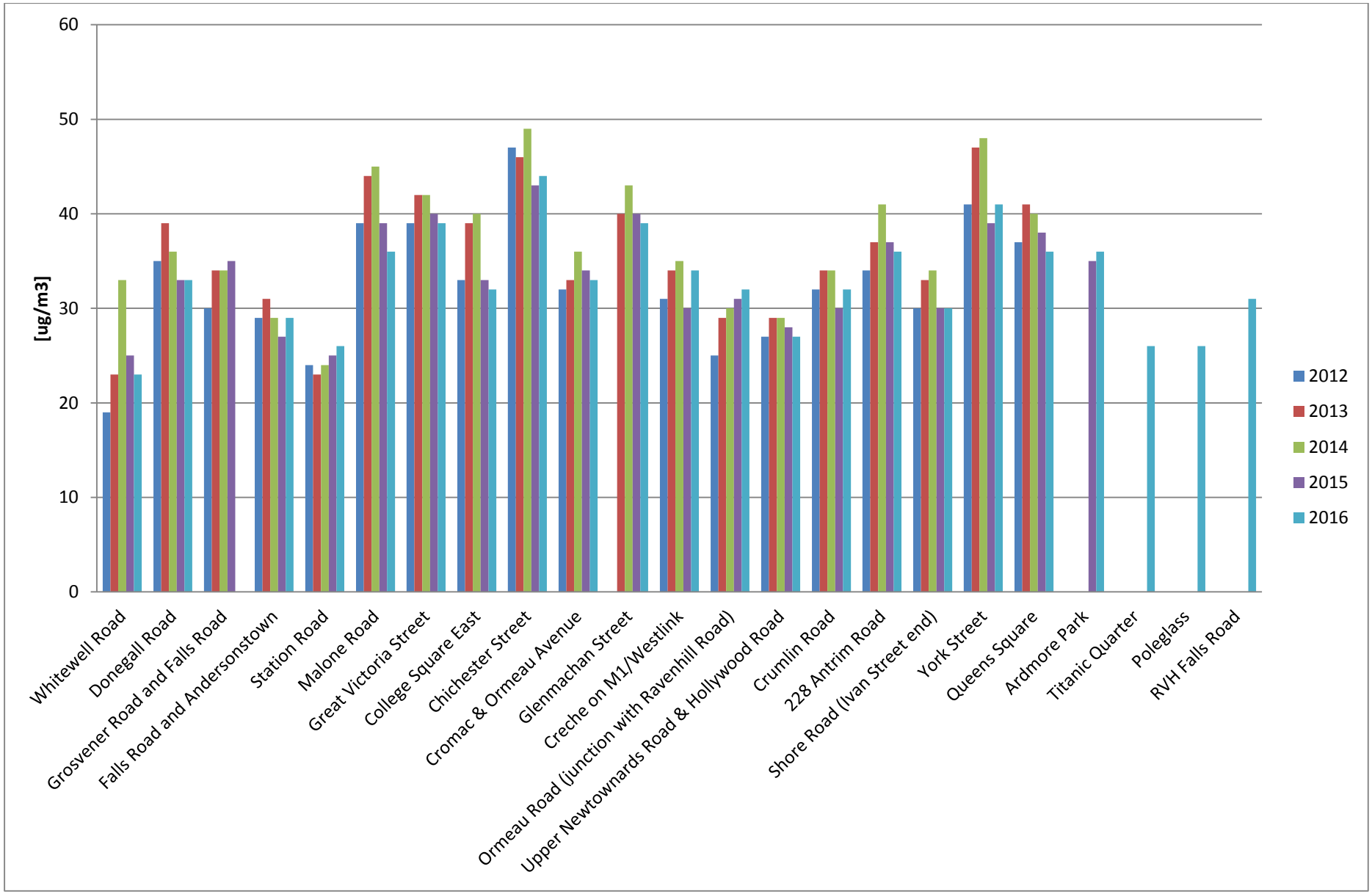
<u>Underlined</u>, annual mean > 60µg/m^3, indicating a potential exceedence of the NO_2 hourly mean AQS objective

[a] Means should be “annualised” as in Boxes 7.9 and 7.10 of LAQM.TG16, if full calendar year data capture is less than 75%

Figure 2.4 – Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites

The following two graphs show trends in nitrogen dioxide diffusion tube data from 2012 where data exists.




60
50
40
30
20
10
0
[ug/m3]
2012
2013
2014
2015
2016
Whitewell Road
Donegall Road
Grosvener Road and Falls Road
Falls Road and Andersonstown
Station Road
Malone Road
Great Victoria Street
College Square East
Chichester Street
Cromac & Ormeau Avenue
Glenmachan Street
Creche on M1/Westlink
Ormeau Road (junction with Ravenhill Road)
Upper Newtownards Road & Hollywood Road
Crumlin Road
228 Antrim Road
Shore Road (Ivan Street end)
York Street
Queens Square
Ardmore Park
Titanic Quarter
Poleglass
RVH Falls Road

2.2.2 Particulate Matter (PM_{10})

As a result of a historic reliance upon solid fuel for domestic heating, Belfast used to experience frequent exceedences of the 24-hour and annual mean objectives for particulate matter (PM_{10}) across the city. However, with completion of the city's smoke control programme and the widespread availability of natural gas to all sectors, domestic and industrial emissions of particulate matter have decreased significantly since around 2000. As a result, the council was able to decommission its Belfast East Clara Street particulate matter monitoring site in 2007.

However, as domestic and industrial emissions have been addressed, emissions of particulate matter from road transport along the M1 Motorway and A12 Westlink corridor gained in prominence. Upon completion of the council's first review and assessment of air quality in 2004, it was concluded that the M1 Motorway and A12 Westlink corridor should be declared as an air quality management area on the basis of modelled and monitored exceedences of the 24-hour and annual mean objectives for particulate matter.

As embodied in the subsequent 2006 Air Quality Action Plan for Belfast, a range of structural improvements, designed to relieve traffic congestion, have been completed for the M1 Motorway and A12 Westlink. As a result, monitored levels of particulate matter have declined over recent years within this air quality management area. This monitoring data is summarised and reviewed in Tables 2.7, 2.8 and in Figure 2.5.

In terms of exceedences of the 40 $\mu g/m^{-3}$ particulate matter annual mean objective there has been no exceedences of the annual mean objective at this location since 2008. Monitoring data from the Belfast Westlink site at Roden Street, which was established in 2010 and is located also within the M1 Motorway / A12 Westlink air quality management area, indicates no exceedences in recent years. PM_{10} monitoring stopped at this site in 2014 and continues at the Stockmans Lane site.

Reflecting upon the particulate matter 24-hour mean objective data, as summarised in Table 2.8, the data has remained comfortably below the objective at all sites during recent years.

On the basis of previous data which demonstrates sustained improvements in particulate matter, the council revoked the M1 Motorway / A12 Westlink air quality management area for exceedences of the particulate matter annual and 24-hour mean objectives in September 2015.

Table 2.7 – Results of Automatic Monitoring for PM_{10}: Comparison with Annual Mean Objective

Site Name	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2016 % [b]	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean Concentration (µg/m^3)				
						2012* [c]	2013* [c]	2014* [c]	2015 [c]	2016 [c]
Belfast Centre Lombard Street	Urban Centre	N	89	89	Y	15	-	16	16	16
Belfast Stockman's Lane	Roadside	Y	97	97	N/A	-	24	21	21	22
Belfast Westlink Roden Street	Roadside	Y	-	-	N/A	26	23	-	-	-

In bold, exceedence of the PM_{10} annual mean AQS objective of 40µg/m^3

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] Means should be "annualised" as in Boxes 7.9 and 7.10 of LAQM.TG16, if valid data capture is less than 75%

* Annual mean concentrations for previous years are optional

Figure 2.5 – Trends in Annual Mean PM_{10} Concentrations at Belfast monitoring sites

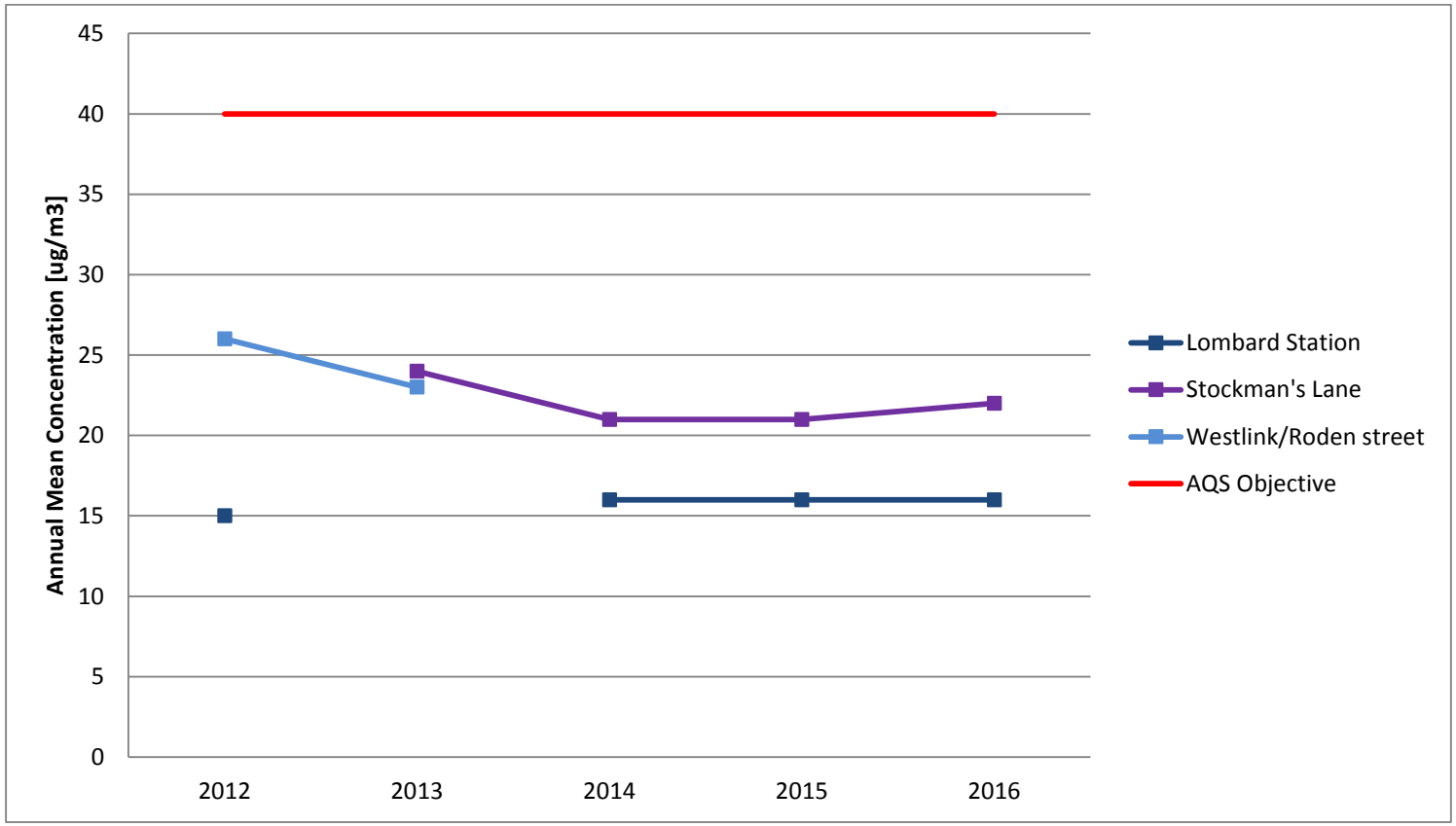


Table 2.8 – Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour Mean Objective

Site Name	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2016 % [b]	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m^3				
						2012* [c]	2013* [c]	2014* [c]	2015 [c]	2016 [c]
Belfast Centre Lombard Street	Urban Centre	N	89	89	Y	7	-	5	3	7
Belfast Stockman's Lane	Roadside	Y	97	97	N/A	-	11	4	4	3
Belfast Westlink Roden Street	Roadside	Y	-	-	N/A	11	13(43)	-	-	-

In bold, exceedence of the PM_{10} daily mean AQS objective (50µg/m^3 – not to be exceeded more than 35 times per year)

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] if data capture for full calendar year is less than 85%, include the 90.4th percentile of 24-hour means in brackets

* Number of exceedences for previous years is optional

2.2.3 Sulphur Dioxide (SO_2)

As a result of a historic reliance upon solid fuel for domestic heating, Belfast City used to experience frequent and widespread exceedences of the 15-minute, 1-hour and 24-hour mean objectives for sulphur dioxide. However, with completion of the city's smoke control programme and the widespread availability of natural gas to all sectors, levels of sulphur dioxide have decreased dramatically since 2000. However, there have been no exceedences of any sulphur dioxide objective in the city since 2002. Sustained low levels of sulphur dioxide have meant that the council has been able to terminate ambient monitoring at all locations with the exception of the Belfast Centre AURN site at Lombard Street. No air quality management areas have been declared for sulphur dioxide across Belfast.

Recent sulphur dioxide monitoring data from the Belfast Centre site is summarised in Table 2.9. As indicated, no exceedence of any objective was observed during 2016.

Table 2.9 – Results of Automatic Monitoring for SO_2: Comparison with Objectives

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2016 % [b]	Number of: [c]		
					15-minute Means > 266µg/m^3	1-hour Means > 350µg/m^3	24-hour Means > 125µg/m^3
Belfast Centre Lombard Street	Urban Centre	N	97	97	0	0	0

In bold, exceedence of the relevant AQS objective (15-min mean = 35 allowed/year; 1-hour mean = 24 allowed/year; 24-hour mean = 3 allowed/year)

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] if data capture for full calendar year is less than 85%, include the relevant percentile in bracket (in µg/m^3): 15-min mean = 99.9th ; 1-hour mean = 99.7th ; 24-hour mean = 99.2th percentile

2.2.4 Benzene

Benzene concentrations have been monitored at the Belfast Centre and the Belfast Roadside site since 2002. Monitoring stopped at the Belfast Roadside site in October 2007. The Belfast Centre site monitors benzene exposure for the City Centre whilst the Belfast Roadside site monitored benzene concentrations experienced at a Roadside location. No exceedence of the 2010 National Air Quality Strategy Objective (3.25 µg/m^{-3} annual mean) or the 2010 EU Limit Value (5 µg/m^{-3} annual mean) for benzene has been monitored in Belfast since 2002.

Previous rounds of R&A and monitored results going back to 2012 provided in Table 3.0 below confirm that there is no exceedence of the running annual mean of 3.25 µg m^{-3} for Benzene within Belfast. Therefore, a Detailed Assessment is not considered necessary.

Table 3.0: Results of monitoring for benzene: Annual mean levels for the Belfast Centre Lombard Street site 2012 – 2016.

Site ID	Site type	Within AQMA?	Valid Data Capture 2016 %	Running annual mean concentrations (µg/m^3)				
				2012	2013	2014	2015	2016
Belfast Centre Lombard Street	Urban Centre	N	100	0.55	0.60	0.64	0.51	0.48

2.2.5 Summary of Compliance with AQS Objectives

Belfast City Council has examined the results from monitoring in the district. Concentrations of ambient pollutants, as prescribed in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland, outside of existing Air Quality Management Areas are all below the objectives at relevant locations, therefore it is the council's view that there is no need to proceed to a Detailed Assessment.

However, the council will continue to monitor ambient conditions across the city in order to confirm that recent improvements in air quality are sustained and that those locations where poor air quality persists are addressed.

3 New Local Developments

3.1 Road Traffic Sources

The following road traffic sources which may have an impact on air quality have been considered since the last Progress Report:

- Narrow congested streets with residential properties close to the kerb.
- Busy streets where people may spend one hour or more close to traffic.
- Roads with a high flow of buses and/or HGVs.
- Junctions.
- New roads constructed or proposed since the last Progress Report.
- Roads with si
- gnificantly changed traffic flows.
- Bus or coach stations.

Belfast City Council confirms that there has been no significant change to any of the above sources since the Progress Report 2016, therefore there is no need to proceed to a Detailed Assessment.

3.2 Other Transport Sources

The following additional transport sources which may have an impact on air quality have been considered since the Progress Report 2016.

- Airports.
- Locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.
- Locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.
- Ports for shipping.

Belfast City Council confirms that there has been no significant change to any of the above sources since the Progress Report 2016, therefore there is no need to proceed to a Detailed Assessment.

3.3 Industrial Sources

The following industrial sources which may have an impact on air quality have been considered since the last Progress Report:

- **Industrial installations:** new or proposed installations for which an air quality assessment has been carried out.
- **Industrial installations:** existing installations where emissions have increased substantially or new relevant exposure has been introduced.
- **Industrial installations:** new or significantly changed installations with no previous air quality assessment.
- Major fuel storage depots storing petrol.
- Petrol stations.
- Poultry farms.

Belfast City Council confirms that there has been no significant change to any of the above sources since the Progress Report 2016, therefore there is no need to proceed to a Detailed Assessment.

3.4 Commercial and Domestic Sources

The following commercial and domestic sources which may have an impact on air quality have been considered since the last Updating and Screening Assessment:

- Biomass combustion plant –individual installations.
- Areas where the combined impact of several biomass combustion sources may be relevant.
- Areas where domestic solid fuel burning may be relevant.
- Combined Heat and Power (CHP) plant.

Belfast City Council confirms that one biomass combustion plant individual installation (7 Airport Road) was approved through the planning process in 2016. This approved installation was supported with an Air Quality Impact Assessment. The assessment demonstrated that the proposal would not have an impact on localised air quality or relevant receptors. Therefore there is no need to proceed to a

Detailed Assessment. Further information on this installation is provided in Section 4 of this report under Planning Applications.

3.5 New Developments with Fugitive or Uncontrolled Sources

The following new developments with fugitive or uncontrolled sources which may have an impact on air quality have been considered since the last Progress Report:

- Landfill sites.
- Quarries.
- Unmade haulage roads on industrial sites.
- Waste transfer stations, etc.
- Other potential sources of fugitive particulate matter emissions.

Belfast City Council confirms that there has been no significant change to any of the above sources since the Progress Report 2016, therefore there is no need to proceed to a Detailed Assessment.

Belfast City Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

Belfast City Council confirms that all the following have been considered:

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

4 Planning Applications

Of the planning applications received by this Service in 2016, nineteen new developments were identified as having the potential to have a negative impact on air quality.

Detailed air quality assessments have been requested for all of these proposed developments. Planning applications and assessments submitted in 2016 in support of these developments concluded that their individual impact would not have an impact on localised air quality or the existing AQMAs. Some of the applications are major development and still under design stage. Details of these applications are provided below in Table 4.1.

Table 4.1 New Developments that had a potential to have a negative impact on air quality in the 2016 period.

Location	Development description	Outcomes of air quality impact assessment
LAND AT D3, AIRPORT ROAD WEST, BELFAST, BT3 9DY	Construction of a new multi-purpose facility at D3 for berthing of cruise ships, and for lay-by and transient storage of project cargo, break bulk and dry bulk during cruise ship off season.	The Air Quality Assessment has demonstrated that the proposed development will not have adverse impact on air quality in the vicinity of the site.
LANDS ADJACENT AND EAST OF NO.43 STOCKMANS WAY, BELFAST	Demolition of existing buildings and erection of residential development comprising of 96 units and associated car parking and landscaping.	The assessment has demonstrated that the increase in pollution concentrations as a result of the development is negligible and future users will not be exposed to pollutant concentrations in excess of the relevant ambient air quality objectives. However, with the existing elevated concentrations of nitrogen dioxide in the area it is considered that the mitigation measures which have been recommended in the Air Quality Impact Assessment, would be beneficial. Consequently, on the basis of the information submitted and in the event that planning permission is to be granted, the applicant should consider incorporating the following measures into the development design. • Recommended that passive/active ventilation units are specified for habitable rooms, restrictions in

Location	Development description	Outcomes of air quality impact assessment
		opening of windows to the Motorway – M1 should also be considered; • Appropriate car parking ventilation systems should be employed to help prevent any build-up of atmospheric pollution in confined or enclosed spaces; • Encourage the use of bicycles – Covered cycle parking will be provided at the site to facilitate the parking of bikes.
37-41 LITTLE PATRICK STREET, BELFAST, BT15 1BA	Demolition of retail unit and construction of 11 storey mixed use development comprising 50 no apartments, ground floor retail and parking, first floor retail and basement parking	The assessment has demonstrated that the proposed development will not have a significant adverse impact on air quality in the vicinity of the site and there will be no significant air quality impact on future residents.
BLACK'S ROAD PARK AND RIDE, JUNCTION OF BLACK'S ROAD AND KINGSWAY, BELFAST, BT10 0NF	Extension of 248 space park and ride site by an additional 307 spaces.	The assessment has demonstrated that future air quality is expected to improve as a result of anticipated reductions in background air quality and improvements in the control of emissions from road vehicles. Furthermore, atmospheric dispersion modelling has shown that the permanent impact of the scheme on local air quality is predicted to be negligible at selected sensitive receptors proximate to the AQMA. With the scheme in place, it is predicted that air quality will improve inside the AQMA as a result of the redistribution of traffic from the M1 to Black's Road. This is likely to yield negligible improvements to air quality inside the AQMA and a negligible reduction on the Black's Road
454-458 DONEGALL ROAD, BELFAST	Demolition of existing retail units and erection of 6 no 2 bedroom apartments with 8 no on site car parking spaces.	AQA requested - to be submitted with the planning application.
48-52 YORK STREET, BELFAST	Demolition of existing buildings and erection of 11 storey building comprising of 3 no ground floor retail units, 307 studios for use as purpose built managed student accomodation with associated communal and amenity facilities, including gym and all associated site access works.	Prior to the occupation of the proposed development, the applicant shall provide to Planning Service, for approval, a Verification Report. This report must demonstrate that the following mitigation measures have been incorporated into the development design and that it is now fit for end-use. • Windows on the York street facade must be secured shut to limit roadside exposure to background NO2 concentrations; • Mechanical ventilation or air exchanger units have been installed (in accordance with relevant Building Control Regulations) in residential units

Location	Development description	Outcomes of air quality impact assessment
		on the York street facade whom may be affected by secured window systems outlined above; • Mechanical ventilation or Air exchange units have been drafted from roof top high points and vented towards the rear of the building.
30-44 BRADBURY PLACE, BELFAST	Demolition of existing buildings and erection of 7 and 12 storey blocks in a mixed use development to include purpose built student accomodation with 267 en-suite study bedrooms, associated shared communal areas and 7 studies with landscaped roof gardens ground floor include reception, 2 retail units, car parking and cycle storage.	We have reviewed the report and can confirm that we have no air quality concerns regarding this proposal.
233-263 SHORE ROAD, BELFAST, BT15 3PN	Construction of a drive-thru restaurant along with car parking access and general site works.	The assessment has demonstrated that the development will not have an adverse impact on air quality in the vicinity of the site and there will be no significant air quality impact on relevant receptors. As a result, this Service has no concerns regarding the air quality impacts of the development proposal.
PROPOSED DEVELOPMENT AT LANDS BOUNDED BY NOS 31-101 ROYAL AVENUE CHURCH STREET WILLIAM STREET WRITERS SQUARE NOS 40 TO 16 DONEGALL STREET NO. 2 WARING STREET 1-21 BRIDGE STREET NOS 2-18 HIGH STREET NOS 1-27 LOMBARD STREET NOS 33 TO 55 ROSEMARY STREET AND INCLUDING NORTH STREET AND NOS. 2-14 LOWER GARFIELD STREET	Proposal to vary conditions 2-5 of Z/2010/1532/F of the royal exchange, Belfast to allow for the development to be phased through a phasing and implementation plan to include demolition and construction parcel plans to be submitted for agreement by council; and to also vary conditions 6-13 (traffic and parking) 14-18 (contaminated land) 21-29 (landscaping) 30-32 (archaeology and listed buildings) and 33 (environmental designations) to enable conditions of the development to be discharged, on a to be agreed phased basis	The revised assessment has demonstrated that the development will not have a significant adverse impact upon air quality in the vicinity of the site and that there will be no significant air quality impact on relevant receptors. As a consequence, this Service has no concerns regarding the air quality impacts of the development proposal. However, based on the outcome of the report and analysis we would support the use of ultra-low emission CHP units at the Energy Centre.

Location	Development description	Outcomes of air quality impact assessment
SITE BOUNDED BY LITTLE YORK STREET, GREAT GEORGES STREET AND NELSON STREET BELFAST	Purpose built managed student accommodation (774 beds) maximum height of 12 storeys.	The consultant has noted that relevant receptors are located on the first floor up and not ground floor. The assessment has demonstrated that future occupants will not be exposed to air quality concentrations exceeding AQ objectives and European Limit Values, therefore mitigation measures in relation to AQ are not essential.
240 – 252 CAMBRIA STREET, BELFAST, BT13 3JJ	Demolish 7no. Existing derelict terraces and replace with 2no 3 bed & 3no 1 bed single storey dwellings	This Service undertook a Screening Assessment to determine the potential impact of the proposed biomass. No AQ concerns were identified. The application is still under consideration with Planning Service.
LANDS ADJACENT AND SOUTH OF 60 DISTILLERY STREET, BELFAST, BT12 5BJ	Erection of residential development comprising 9 dwellings, site access and all associated works.	The assessment has demonstrated that the proposed development will not have a significant adverse impact on air quality in the vicinity of the site. There are no predicted breaches of quality concentrations exceeding AQ objectives and European Limit Values, therefore mitigation measures in relation to AQ are not essential
81-107 YORK STREET, BELFAST	Amendment to planning permission Z/2015/0138/F to develop purpose built managed student accomodation comprising 717 beds with shared communal areas, 2 no retail units at ground floor level: two landscaped courtyards; othere ancillary accomodation including a reception/management suite and communal areas; plant and storage areas, and car parking and cycle provision	The Assessment demonstrated that the increase in pollution concentrations as a result of the development is insignificant and future users will not be exposed to pollutant concentrations in excess of the relevant ambient air quality objectives by the occupational year of 2018.
PRACTICE GROUND LANDS, KNOCK GOLF CLUB, SUMMERFIELD, DUNDONALD, BELFAST, BT16 2QX	Proposed surface car park of 149 no car spaces to lands currently used as knock golf club practice grounds. Proposal includes associated site works, civils, landscaping, site boundary and ballstop fencing	The consultant has assessed the predicted impact of the proposed development on human health in terms of nitrogen dioxide and particulate matter Defra background mapping data required for the assessment. The assessment has considered relevant receptor locations in accordance with government's Local Air Quality Management Technical Guidance LAQM.TG(16). Based on the submitted information, the assessment has demonstrated that the proposed development will not have adverse impact on air quality in the vicinity of the site.
106 CULLINGTREE ROAD, BELFAST, BT12 4BA	Demolition of existing nursing home and erection of a 30 unit dementia care facility with access arrangements from Cullingtree road, car parking,	The assessment has demonstrated that the proposed development will not have adverse impact on air quality in the vicinity of the site and there will be no significant air quality impact on future residents.

Location	Development description	Outcomes of air quality impact assessment
	landscaping and associated site works	
7 AIRPORT ROAD, BELFAST	Construction and operation of combined heat and power generating station	Based upon the output of the modelling studies, this Unit is satisfied that ambient emissions from the proposed Combined Heat and Power Generating Station are unlikely to lead to exceedences of Air Quality Objectives or European Limit Values at relevant receptors.
LAND WEST OF DONEGALL QUAY, NORTH OF THE M3 CROSS HARBOUR BRIDGE, EAST OF TOMB STREET AND 50M SOUTH OF CORPORATION SQUARE	Multi storey car park, access road, alterations to existing car parking and road layouts and associated site works.	The assessment has demonstrated that the proposed development will not have a significant adverse impact on air quality in the vicinity of the site and there will be no significant air quality impact on relevant receptors
BELFAST TRANSPORT HUB	The BTH project comprises developing an integrated transport facility that will form a key gateway into Belfast City Centre. The site is located on the site of the Europa Bus Centre and Great Victoria Street (GVS) Train Station.	AQA requested - to be submitted with the planning application as part of the EIA.
SIROCCO BOUND TO THE NORTH BY BRIDGE END, TO THE EAST BY SHORT STRAND	Outline planning application for a mixed use development comprising office development (circa 69,000 sq m); hotel (circa 375 beds); apart-hotel (120 beds); circa 815 residential units (including private, private rented sector and social/affordable); parking (multi-storey, podium and basement); pedestrian/cycle bridge; local retail; restaurants; bars and cafes; new public realm and amenity open spaces; and associated internal access roads, landscaping and infrastructure works.	AQA requested - to be submitted with the planning application as part of the EIA.

5 Air Quality Planning Policies

It is important for all local authorities to think about how they can best bring air quality considerations into the planning process at the earliest possible stage and it is no longer satisfactory to simply demonstrate that a development is no worse than the existing or previous land use on a particular site.

Very little development bypasses the planning stage therefore it provides an opportunity to identify and prevent potential problems from arising in the first place an excellent example of where prevention is far better than trying to find a cure.

In light of this, Belfast City Council produced and in June 2009 launched ‘Air quality and land use planning: A Belfast specific guidance note for developers and air quality consultants’. The document outlines what the Council, as a key consultee for the Planning Service, would look for in forming its opinion on a proposed development and its potential impact on air quality.

Since production of the Belfast specific guidance document, in 2015 EPUK & IAQM produced an updated air quality guidance document: Land-Use Planning & Development Control: Planning for Air Quality, May 2015. BCC now refer to the criteria as set in this document for determining if and when an air quality assessment is required.

6 Implementation of Action Plans

In 2006, the council, along with relevant partner organisations launched an Air Quality Action Plan (AQAP) for the city designed to address areas of air quality concern, safeguard good air quality and to achieve national air quality strategy objectives and EU limit values by 2010. Around 90 per cent of the action plan was complete by the 2010 deadline but, although the air quality limit values for particulate matter have now been achieved, limit values for nitrogen dioxide continue to be exceeded and give cause for concern in some locations.

In order to fulfil our statutory obligations under the provisions of the Environment (Northern Ireland) Order 2002, the council and relevant partner organisations committed to the development of a revised AQAP for the city to tackle the outstanding nitrogen dioxide (NO_2) pollution issues.

In December 2015 we launched a new AQAP 2015-2020 that draws upon all forms of air quality and transport planning activities, including sustainable transport options as well as engineering solutions. The aim of this AQAP is to improve road vehicle operations and promote and enable a shift onto more sustainable modes of transport to achieve compliance with the NO_2 EU limit value by 2020. Table 6.1 below provides progress information on the Belfast Air Quality Action Plan since it was launched.

Table 6.1 Belfast Air Quality Action Plan Progress

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date
1	Belfast Multi-Modal Transport Model	This model will provide the capability to estimate the likely change in air quality arising from different transport investment options.	DfI	2014-2016	The Belfast model has been constructed and audited.	Completed March 2017
2	Belfast Rapid Transit (BRT)	Increase in the usage of the public transport would contribute to reduced congestion and improved air quality.	DfI	Ongoing construction commenced 2014	Sections of the BRT route completed, and bus lanes introduced, in East and West Belfast. Further sections currently in construction. Contract for provision of BRT vehicles awarded and construction proceeding. On target for operational date in September 2018	Estimated completion 2018
3	Belfast Transport Hub	Experience in Great Britain and Europe shows that investing in public transport infrastructure, particularly this type of project, improves the public transport. Increase in the usage of the public transport generally contributes to reduced congestion and improved air quality,	DfI / Translink	Pre-planning application process commenced 2015. Planning applications due to be submitted Q2, 2017.	Feasibility design complete and OBC1 approved for single option development.	Estimated opening of new station end 2020

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date
4	Bicycle Strategy for NI	The Bicycle Strategy will contribute to improvements in the physical environment. Increased levels of cycling could reduce congestion, improved air quality, reduce noise pollution and contribute to a cleaner environment. The Bicycle Strategy will be followed with a Bicycle Network Plan for Belfast to guide the development & operation of bicycle infrastructure in the city for the next 10 years.	DfI	Bicycle Strategy launched in 2015 to be followed by a 10yr Network Plan for Belfast	The Department for Infrastructure has published the Draft Belfast Bicycle Network 2017 Consultation Document. The Draft Belfast Bicycle Network 2017 is to guide the development and operation of the bicycle infrastructure for the next 10 years and is a progression from the Bicycle Strategy published in 2015. The Bicycle Strategy identified 3 pillars, one of which was to build a comprehensive network for the bicycle. The draft document is a public consultation exercise on a bicycle network for Belfast.	Ongoing
5	ecarNI	There are significant benefits to both the environment and to the driver in the use of electric vehicles.	DfI	2015	A network of 336 public charge points across Northern Ireland is now in place and commercially operated by the Electricity Supply Board. A further 54 charge points have been installed in the public sector estate to facilitate workplace initiatives. The Department continues to work with partners in the Office for Low Emission Vehicles and the private sector to build capacity for the Ultra Low Emission Vehicle market.	Ongoing

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date
6	Park and Ride (P&R) (Bus & Rail)	DfI considering additional P&R schemes. This would have positive effect on reducing air quality in Belfast by providing alternative transport for commuters coming into the city rather than private car.	DfI	DfI Park and Ride Delivery Programme	DfI Strategic Park & Ride Delivery programme 2013-2016 delivered over 2,100 additional spaces across Northern Ireland. A new Programme, for the period 2016-2020, has been established and will deliver further additional spaces across the country.	Ongoing
7	York Street Interchange	The York Street interchange redevelopment will in effect improve the throughput of traffic and reduce background concentrations of NO2.	DfI	Scheme on hold pending funding. Possible start late 2018	On hold	Estimated completion 2022

<table>
<tr><th>No.</th><th>Measure</th><th>Focus</th><th>Lead Authority</th><th>Planning & Implementation Phase</th><th>Progress since 2015</th><th>Estimated Completion Date</th></tr>
<tr><td>8</td><td>Fleet improvement</td><td>Fleet improvement will reduce emissions from buses and consequently improve air pollution especially along the busy roads.</td><td>Translink</td><td>Translink Fleet procurement programme in place for the period 2013-2020</td><td>Current Euro Class breakdown for the Metro Fleet is as follows: -

<table><tr><th>Euro Class</th><th>Number of Vehicles</th><th>% of Vehicles</th></tr><tr><td>Pre Euro</td><td>0</td><td>0.00%</td></tr><tr><td>Euro 1</td><td>0</td><td>0.00%</td></tr><tr><td>Euro 2</td><td>20</td><td>7.35%</td></tr><tr><td>Euro 3</td><td>101</td><td>37.13%</td></tr><tr><td>Euro 4</td><td>39</td><td>14.34%</td></tr><tr><td>Euro 5</td><td>58</td><td>21.32%</td></tr><tr><td>Euro 6</td><td>54</td><td>19.85%</td></tr></table>
Please note that 23 new Euro 6 Metro Double Decks are expected for delivery in the coming month. These will replace all of the Euro 2 vehicles left in the Metro Fleet.</td><td>2020</td></tr>
</table>

9	Promote Public Transport	The impact of this measured will be low initially, but should increase over time as further marketing campaigns encourage greater usage of public transport.	Translink	Ongoing publicity campaigns	**Marketing / Comms campaigns:** • Extensive Marketing / Communications carried out for Smartmovers • Dedicated Bus & Train Week • Metro Smartlink, Metro Daylink, Metro Saturdays, Metro corridor Offers • NI Railways 1/3 off /Goldline 1/3 off – Me Time campaign on rail • Summer / holiday offers, Airport Services • P&R • Mastercard Competition • Goldline campaign – Regional Roadshows • Metro Offers – corridor specific • Ulsterbus 1/3 off after 9.30am • Flexible travel after 6.30pm travel home bus train no matter what ticket you have • Rail 50% off vouchers issued to Bangor and Larne Lines • Ylink – almost 30k card sales inc +28% growth • Metronomics – corporate business Challenge • Metro Evening offer after 6.30pm - £2 return • Metro Legends • Mlink – Metro • Bus and Train Week • Enterprise	Ongoing

					• Easter offers • Eco Schools Travel challenge. **NOTE: BRAND NEW SMARTMOVERS FULLY INTEGRATED MAR / COMMS CAMPAIGN COMMENCED MARCH 2017** Also a number of Sponsorships carried out in Belfast Area to promote PT / CSR. Highlights include: • Ulster in Bloom • Belfast City Marathon • Eco Schools Sponsorship • Tall Ships • NIABF Sponsorship - Anti Bullying Week • Festival of Fools • East Belfast Partnership • Feile Sponsorship • Culture Night • Belfast Children's Festival - Young at Art During 2015/16 passenger journeys increased by 400, 000 and in financial year 2016/17 Metro continue to experience impressive increases of over 3% , with approximately 1 million more passenger journeys compared to 2015/16. Belfast remains one of the few cities in the UK which is	

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date
					experiencing sustained growth in passenger journeys, delivered through investment in modern fleet, improved bus priority measures and enforcement of bus lanes, value for money promotions and innovative marketing and active travel promotional campaigns, plus continuous improvement in service provision, through increased capacity, frequency and delivery of more reliable, timely services.	
10	Assess Feasibility for a Belfast FCC	FCC combined with the use of low emission vehicles could have a significant impact on emissions level.	RHA & FTA	Investigate and explore options 2015-2020	BCC have completed an online survey available from 10 February to 31 March 2017 to collect and then evaluate feedback on the need or want for a Belfast Freight Consolidation Centre (FCC). Future decision making on this measure will be based on outcomes from the survey.	Investigation & research to be completed 2020
11	ECO Stars	Uptake of this scheme would result in greener and modern delivery vehicles in the city centre (reductions in emissions).	RHA & FTA	Investigate and explore options 2015-2020	ECO Stars Scotland Manager delivered presentation to Belfast AQ Steering Group. Following consideration of the cost benefits to implement this scheme in Belfast, LAQM Funding was not secured from DAERA to progress this measure further.	Completed 2016

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date
12	Servicing and Loading Bays (S&L)	More loading bays in the city would reduce engine idling caused by vehicles having to wait for suitable parking space. It would also reduce the occurrence of double parking therefore reducing traffic congestion.	Transport NI	Transport NI S&L Bays review is scheduled for 2015-2017	TransportNI will be reviewing the operating times of the loading bays in central Belfast, between April and June 2017. A decision on implementation will depend on the outcome of this review.	2017
13	Coca-Cola Zero Belfast Bikes	Using the bikes for shorter city centre journeys will cut congestion and improve air quality.	BCC	Operational April 2015	Belfast Bikes has expanded with an additional 10 stations added to the network serving areas outside the core city centre area. The scheme has now generated over 380,000 trips.	Completed 2015 & ongoing expansion
14	BCC Fleet Improvement	This will reduce overall emissions from council fleet.	BCC	2015	A further £2.4m was then spent on fleet replacements in 2015/16 (over 80% of this in Cleansing); we are currently spending £2.1m during the 2016/17 year and council approval has already been obtained to spend a further £2.1m in 2017/18 and another £1.95m in 2018/19.	Ongoing

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date
15	Active Travel Plan	Increasing use of public transport and active travel such as walking and cycling should reduce single occupancy car use, improve air quality and result in a beneficial effect on health.	BCC	Travel Plan implementation 2014 - 2020	Phase 1 (2014-2016) of the Active Travel Plan is now complete and work has begun on developing a phase 2 plan (2017-20). In phase 1, partners completed / progressed a total of 26 of 31 actions including: • the development of a draft Bicycle Network for Belfast by DfI; • the funding of a workplace active travel programme by PHA; • support to community walking and cycling programmes via Active Belfast; and • the delivery of an annual Active Travel Challenge by Sustrans. The remaining 5 actions to be progressed, will be considered within the phase 2 plan.	2020

7 Conclusions and Proposed Actions

7.1 Conclusions from New Monitoring Data

Belfast City Council has presented a range of monitoring data within this Progress Report that addresses a number of the pollutants prescribed within the UK Air Quality Strategy. Although these pollutants are routinely measured across the city, the council's focus remains principally upon addressing existing air quality management areas and upon those areas of the city centre where traffic congestion might lead to further exceedences of the nitrogen dioxide annual mean and hourly objectives. There were no monitored exceedences for any of the air quality strategy objectives for sulphur dioxide, benzene and particulate matter during 2016.

Nevertheless, 2016 monitoring data for nitrogen dioxide confirms continuing exceedences of the annual mean for nitrogen dioxide in the vicinity of Stockmans Lane, which is located within the M1 Motorway / A12 Westlink air quality management area. Similar exceedences of the annual mean objective were recorded at Great George's Street near to the end of the A12 Westlink where it joins with the M2 and M3 motorways. However, automatic monitoring site at Westlink / Roden Street indicates compliance with both annual and hourly mean objectives for nitrogen dioxide along this section of the A12 Westlink, suggesting that structural improvements have reduced the number of exceedences locations along the M1 Motorway / A12 Westlink to a series of nitrogen dioxide 'hot spots'.

Historical monitoring data for the Upper Newtownards Road air quality management area revealed sustained exceedences of the nitrogen dioxide annual mean objective. The last six years have demonstrated a decrease in nitrogen dioxide levels to the extent that the annual mean objective has been achieved at Ballyhackamore since 2011. The magnitude of the decrease in nitrogen dioxide levels along the Upper Newtownards Road was beyond the year-on-year reductions that might have been predicted using Defra's forward projection factors. Accordingly, the reductions in ambient nitrogen dioxide levels within this air quality management area are welcomed, however, the council will continue to maintain its monitors in this location in order to determine whether the decrease is sustained over coming years.

Therefore, in conclusion, it is considered that our 2016 monitoring data supports the continuing need for all our existing air quality management areas for the time being, and we will continue to monitor closely ambient nitrogen dioxide levels within all the air quality management area. Furthermore, our monitoring data confirms that no further air quality management areas need to be declared for the city at this time.

7.2 Conclusions relating to New Local Developments

Of the planning applications received and reviewed in 2016 it was concluded they would have no significant negative impact on existing local air quality. In addition no significant changes in local circumstances were identified within Belfast which would require more detailed consideration. It is therefore not considered necessary to proceed to a 'Detailed Assessment' based on new local developments or potential sources.

7.3 Proposed Actions

In conclusion, the 2017 Progress Report has not identified the need to proceed to a Detailed Assessment for any pollutant under consideration.

Furthermore, Belfast City Council has already highlighted that it operates an expansive air quality monitoring network across the city for nitrogen dioxide and other ambient pollutants. On this basis, the council is content that existing monitoring locations provide a detailed representation of pollution levels the city and, as a consequence, does not need to be expanded at this time.

With regard to our four existing air quality management areas, it is considered that although there has been decline in ambient nitrogen dioxide levels in recent years, the air quality management areas will need to be maintained to identify further trends before we could consider the possibility of revocation. Exception to this is the Weslink/M1 AQMA which was revoked for exceedences of particulate matter in September 2015.

In terms of forward actions, the council along with relevant partners have developed a comprehensive Air Quality Action Plan that draws upon all forms of air quality and transport planning activities, including sustainable transport options as well as

engineering solutions. The action plan was finalised and launched in December 2015 It is considered that successful implementation of the measures will improve road vehicle operations and promote and enable a shift onto more sustainable modes of transport to achieve compliance with the nitrogen dioxide UK Objectives and EU Limit Value by 2020.

8 References

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http://laqm.defra.gov.uk/supporting-guidance.html

Defra 'Workplace Analysis Scheme for Proficiency (WASP) NO2 diffusion tubes proficiency tests'.
http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html

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Environment (Northern Ireland) Order 2002.
www.legislation.gov.uk/nisi/2002/3153/contents/made
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0050:en:NOT

Environment (Northern Ireland) Order 2002.
http://www.legislation.gov.uk/nisi/2002/3153/contents/made

Northern Ireland Air – Air Quality in Northern Ireland website
http://www.airqualityni.co.uk/

Appendices

Appendix A: Quality Assurance / Quality Assurance and Quality Control (QA / QC) Data

Appendix B: Defra NO_2 Distance Calculator Results

Appendix A: QA/QC Data

Diffusion Tube Bias Adjustment Factors.

As in previous years, we have employed a triplicate collocation study at the Belfast Centre Lombard Street AURN monitoring site in order to obtain a local diffusion tube bias adjustment factor for 'correcting' our diffusion tubes monitoring data. The bias adjustment factor was calculated and our data 'corrected' using the Defra Bias Adjustment Factor Calculation spreadsheet (with a 95% confidence interval as an estimate of the uncertainty on the bias adjustment factor). Outputs from the spreadsheet are presented as follows:

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	06/01/2016	03/02/2016	32.9	35.2	32.2	33	1.5	5	3.8	33.4	99	Good	Good
2	03/02/2016	03/03/2016	34.3	34.6	33.4	34	0.6	2	1.6	34.6	97	Good	Good
3	03/03/2016	05/04/2016	33.7	32.3	29.0	32	2.4	8	6.0	27.1	97	Good	Good
4	05/04/2016	04/05/2016	27.7	26.7	24.5	26	1.6	6	4.1	25.2	99	Good	Good
5	04/05/2016	25/05/2016	34.7	32.0	30.0	32	2.3	7	5.8	26.3	99	Good	Good
6	25/05/2016	29/06/2016	29.6	28.2	31.5	30	1.7	6	4.1	28.2	100	Good	Good
7	29/06/2016	29/07/2016	23.5	23.5	22.9	23	0.4	2	0.9	17.7	99	Good	Good
8	29/07/2016	24/08/2016	25.0	22.8	23.6	24	1.1	5	2.8	16.1	99	Good	Good
9	24/08/2016	28/09/2016	27.3	28.0	27.0	27	0.5	2	1.4	21.0	97	Good	Good
10	28/09/2016	26/10/2016	37.0	34.2	36.1	36	1.4	4	3.5	29.7	99	Good	Good
11	26/10/2016	30/11/2016	40.7	45.0	39.9	42	2.8	7	6.8	41.6	99	Good	Good
12	30/11/2016	11/01/2017	46.2	39.8	41.0	42	3.4	8	8.4	37.7	99	Good	Good
13													
												Good precision	Good Overall

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

Overall survey -->

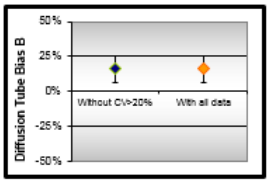
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Lombard Station 16,19,20

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

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.89 (0.82 - 0.97)
Bias B	13% (3% - 23%)
Diffusion Tubes Mean:	32 μgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	28 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	28 (26 - 31) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.89 (0.82 - 0.97)
Bias B	13% (3% - 23%)
Diffusion Tubes Mean:	32 μgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	28 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	28 (26 - 31) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Adjustment of SINGLE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tube Measurements

Site Name/ID	Periods													Raw Mean	Valid periods	Adjusted measurement (95% confidence interval) with all the data 12 periods used in this calcuations
	1	2	3	4	5	6	7	8	9	10	11	12	13			
1. RVH	27.8	26.8	22.6	17.5	25.4	21.4	16.0	16.2	21.6	26.7	32.0	37.6		24.3	12	Adjusted with 95% CI 22 (20 – 24)
2. Blacks Rd	42.4	52.7	47.1	44.0	47.0	35.8	34.2	39.2	42.4	40.1	61.7	57.4		45.3	12	Adjusted with 95% CI 40 (37 – 44)
3. 61 Cromac Str	42.0	46.1	40.0	43.3	46.4	36.7	31.1	33.2	33.8	42.5	56.7	50.5		41.9	12	Adjusted with 95% CI 37 (34 – 41)
4. Ravenhill Rd	33.9	33.7	34.5	34.2	41.1		23.3	28.1	28.5	36.9	45.0	44.2		34.9	11	Adjusted with 95% CI 31 (29 – 34)
5. Queens Bridge	34.6	37.1	35.7	37.9	36.5	33.9	24.9	26.6	22.5	35.6	40.7	41.8		34.0	12	Adjusted with 95% CI 30 (28 – 33)
6. North Road	24.3	21.6	18.5	13.6	11.1	12.2		21.3		13.8	25.0	25.1		18.6	10	Adjusted with 95% CI 17 (15 – 18)
7. Donegal Sq. South	38.9	38.2	36.2	34.7	37.7	36.4	27.6	33.0	32.1	37.5	47.9	44.7		37.1	12	Adjusted with 95% CI 33 (30 – 36)
9. Short Strand	49.2	48.5	48.1	52.5	59.8	56.2	40.1	43.0	41.1	45.6	54.6	59.3		49.8	12	Adjusted with 95% CI 44 (41 – 48)
10. 301 Ormeau Rd	36.2	38.2	37.6	30.2	33.1	31.1	27.7		29.1	35.2	40.3	46.8		35.1	11	Adjusted with 95% CI 31 (29 – 34)
12. Knock Rd	45.0	47.0	45.6	42.8	44.5	40.5	34.7	40.1	38.6	54.3	58.7	58.4		45.8	12	Adjusted with 95% CI 41 (38 – 44)
13. Gr Georges Str	48.5	48.1	58.2	56.6	72.6	69.2	36.0	45.5	44.8	67.7	60.8	65.0		56.1	12	Adjusted with 95% CI 50 (46 – 54)
14. Lisburn Rd	33.3	32.9	27.5	28.8	30.8	25.2	26.0	27.6	28.3	34.0	38.6	45.5		31.5	12	Adjusted with 95% CI 28 (26 – 31)
15. Shaftesbury Sq	37.9	36.2	42.3	34.9	43.2	38.1	29.3	32.7	33.1	38.9	45.8	49.0		38.4	12	Adjusted with 95% CI 34 (32 – 37)
17. Albert Clock	45.0	45.8	43.7	36.1	44.5	36.6	31.0	36.9	40.7	45.1	46.6	55.5		42.3	12	Adjusted with 95% CI 38 (35 – 41)
25. Whitewell Rd	29.2	27.2	23.2	20.7	30.8	21.9	19.2	26.3	21.2	35.3	28.2	28.5		26.0	12	Adjusted with 95% CI 23 (21 – 25)
26. Donegal Rd	39.5			34.2	40.0	38.1	27.7	29.9	30.7	43.3	50.5	40.8		37.5	10	Adjusted with 95% CI 33 (31 – 36)
28. Falls and Andgtown	36.4	33.6	31.1	26.7	37.5	31.1	23.7		29.1	37.3	36.0	39.6		32.9	11	Adjusted with 95% CI 29 (27 – 32)
30. Station Rd	31.4	29.1	26.3	26.4	30.9	24.7	18.6	19.7		45.1	38.5	31.3		29.3	11	Adjusted with 95% CI 26 (24 – 28)
31 Newforge Lane	44.6	45.4	45.5	37.9			28.9	32.4	33.3	48.0	45.2	45.3		40.6	10	Adjusted with 95% CI 36 (33 – 39)
33 Great Victoria Street	48.5	43.6	45.4	40.2	48.0	39.0	35.9	37.0	39.5	39.3	54.1	50.9		43.4	12	Adjusted with 95% CI 39 (36 – 42)
34 College Square East		35.1	40.9	35.5	43.7	41.5	24.2	29.4	30.5	36.4	39.2	43.2		36.3	11	Adjusted with 95% CI 32 (30 – 35)
35 Chichester Street	43.9	43.4	43.5	49.2	59.1	56.8	36.4	41.6	41.2	57.4	61.5	52.9		48.9	12	Adjusted with 95% CI 44 (40 – 47)
36 Cromac/Ormeau Avenue	40.5		35.5	34.6		37.1	29.7	31.5	30.7	44.6	46.6	44.9		37.6	10	Adjusted with 95% CI 33 (31 – 36)
37 Westlink/Glenmachan Str	47.4	45.4	45.0	41.7	43.6		33.1	33.1		40.0	58.5	48.8		43.7	10	Adjusted with 95% CI 39 (36 – 42)

Bias Factor A 0.89 (0.82 - 0.97)
Bias B 13% (3% - 23%)
Tube Precision: 5 Automatic DC: 99%

The bias adjustment factor used in these calculations include all the data and no screening of data due to poor precision has been applied.

Adjustment of SINGLE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tube Measurements

Site Name/ID	Periods													Raw Mean	Valid periods	Adjusted measurement (95% confidence interval) with all the data 12 periods used in this calcuations
	1	2	3	4	5	6	7	8	9	10	11	12	13			
38 Creche on MI/Westlink	31.9	32.5	32.7	28.4	43.2	37.5	64.6	28.8	28.4	49.2	38.2	38.6		37.8	12	Adjusted with 95% CI 34 (31 – 37)
39 Ormeau Rd/Ravenhill Rd	39.2	39.7		32.2		33.1	27.6		30.8	34.8	44.3	37.3		35.4	9	Adjusted with 95% CI 32 (29 – 34)
40 Hollywood Rd Arches				25.3	26.4	24.9		23.6	26.1	36.7	41.4	37.3		30.2	8	Adjusted with 95% CI 27 (25 – 29)
41 Crumlin Rd		36.2	35.4	31.9	45.0	40.6		28.5	29.9	36.2	40.0	35.3		35.9	10	Adjusted with 95% CI 32 (29 – 35)
42 228 AntrimRd	42.5	40.9	43.0	31.7	43.2	42.6	28.5		35.7	48.5	46.2	44.2		40.6	11	Adjusted with 95% CI 36 (33 – 39)
44 Shore Rd (Ivan St. End)	36.0	31.8	34.5	26.6	36.7	33.2	22.4	29.0	31.5	42.8	37.0	39.4		33.4	12	Adjusted with 95% CI 30 (27 – 32)
59 York Street	45.4	44.5			49.1	47.4	30.8		38.0	54.0	54.4	53.0		46.3	9	Adjusted with 95% CI 41 (38 – 45)
63 Queen's Sq	32.7	40.3	36.1	33.4	43.7	53.3	29.8	34.2	35.8	46.1	51.8	51.5		40.7	12	Adjusted with 95% CI 36 (33 – 39)
74 Ardmore Park	50.1	44.7	41.2		39.6	30.5	29.9	30.9	36.0	34.9	53.6	51.6		40.3	11	Adjusted with 95% CI 36 (33 – 39)
76 Titanic Quarter		34.0	25.5	26.8	32.4		19.0	23.0			37.2			28.3	7	Adjusted with 95% CI 25 (23 – 27)
77 Poleglass	30.6	28.5	27.3	25.2	27.1	30.1	20.2	25.2	24.9	36.2	36.6	33.3		28.8	12	Adjusted with 95% CI 26 (24 – 28)
87 RVH Falls Road		39.3	39.4	28.7			9.8	33.2				43.3		32.3	6	Adjusted with 95% CI 29 (26 – 31)

Bias Factor A 0.89 (0.82 - 0.97)
Bias B 13% (3% - 23%)
Tube Precision: 5 Automatic DC: 99%

The bias adjustment factor used in these calculations include all the data and no screening of data due to poor precision has been applied.

Diffusion Tube Bias Adjustment Factors

Using the spreadsheet, we have determined that diffusion tube agreement with the automatic nitrogen dioxide analyser at the Belfast Centre AURN site for our Gradko supplied and analysed diffusion tubes was deemed ‘good’ for all available sampling periods in 2016. In addition, the precision checks were also deemed ‘good’ for all sampling periods. The overall bias factor was calculated as 0.89.

Discussion of Choice of Factor to Use

For those local authorities that do not wish, or are unable to undertake a triplicate diffusion tube collocation study, government publishes a database of bias adjustment factors derived from other local authority co-location studies throughout the United Kingdom. These factors are used subsequently to calculate a combined bias adjustment factor for a range of nitrogen dioxide diffusion tube laboratories. The latest factors were published in March 2017 and cover sampling periods up until 2016. In 2016, the government derived bias adjustment factor for Gradko Laboratories for a 20% solution of triethanolamine was 0.94. This factor compares well with the council’s 2016 locally derived bias adjustment factor of 0.89. Historially, we have always used our own bias adjustment factors and for consistency in results we will continue with the same methodology.

Short-term to Long-term Data Adjustment

Guidance for the treatment of diffusion tube monitoring data, as provided in Table 2.5 of this report, requires that where annual mean results are based upon monitoring data of less than 9 months sampling, these means should be “annualised” in accordance with the procedure outlined in Box 7.10 of the government’s local air quality management technical guidance LAQM.TG16.

In order to complete the annualising process, councils are required to identify nearby long-term background continuous monitoring sites for nitrogen dioxide or alternatively use a number of background diffusion tube sites with 12 months of data. As there are only two such sites in Northern Ireland, historically we used data from both the Belfast Centre AURN (urban centre) and Derry City Council Brooke Park (urban

background) sites. The Brooke Park background site has been re-located and the data capture for 2016 is below 85%. We only have one background diffusion tube site which has 12 months data. We contacted the LAQM Helpdesk to confirm the approach to take and were advised that it would be sufficient to use only Lombard Street to complete the annualising response as below:

"Your query has been allocated the unique reference code: 3897 and you should use this as a reference for any further follow up regarding the following response.

Generally advice would be to use more than one station if possible, to 'smooth' any anomalies in the data. However, if there is only one site available for you to use, then that will have to be sufficient"

Individual adjustment factors have been calculated for three diffusion tube monitoring site, commensurate with the diffusion tube exposure periods. The adjustment ratios for our sites with less than 9 months of data is summarised as follows:

Tube 76 Titanic (DC58%): Annualising NO2 Diffusion Tube Monitoring

Date	B1 (Lombard Station)	D1(tube)	B1 when D1 is available
Jan	33.4		
Feb	34.6	34.0	34.6
Mar	27.1	25.5	27.1
Apr	25.2	26.8	25.2
May	26.3	32.4	26.3
Jun	28.2		
Jul	17.7	19.0	17.7
Aug	16.1	23.0	16.1
Sep	21.0		
Oct	29.7		
Nov	41.6	37.2	41.6
Dec	37.7		
Average	**28.2**	**28.3**	**26.9**

Am/Pm = 1.05
D1 = 28.3 * 1.05 = 29.72
D1 Bias(0.89) = 26.4

Tube 87 RVH/Falls Road (DC50%): Annualising NO2 Diffusion Tube Monitoring

Date	B1 (Lombard Station)	D1(tube)	B1 when D1 is available
Jan	33.4		
Feb	34.6	39.3	34.6
Mar	27.1	39.4	27.1
Apr	25.2	28.7	25.2
May	26.3		
Jun	28.2		
Jul	17.7	9.8	17.7
Aug	16.1	33.2	16.1
Sep	21.0		
Oct	29.7		
Nov	41.6		
Dec	37.7	43.3	37.7
Average	**28.2**	**32.3**	**26.4**

Am/Pm = 1.07
D1 = 32.3 * 1.07 = 34.6
D1 Bias(0.89) = 30.8

Tube 40 Holywood Road (DC67%): Annualising NO2 Diffusion Tube Monitoring

Date	B1 (Lombard Station)	D1(tube)	B1 when D1 is available
Jan	33.4		
Feb	34.6		
Mar	27.1		
Apr	25.2	25.3	25.2
May	26.3	26.4	26.3
Jun	28.2	24.9	28.2
Jul	17.7		
Aug	16.1	23.6	16.1
Sep	21.0	26.1	21.0
Oct	29.7	36.7	29.7
Nov	41.6	41.4	41.6
Dec	37.7	37.3	37.7
Average	**28.2**	**30.2**	**28.2**

Am/Pm = 1.00
D1 = 30.2 * 1.00 = 30.2
D1 with Bias(0.89) = 26.9

QA/QC of Automatic Monitoring Data

As highlighted in the body of this report, Belfast City Council operates a number of automatic monitoring sites across the city. In order to ensure that our data is accurate and precise, we calibrate our sites on a four-weekly basis, in accordance with the requirements of Defra.

For our automatic nitrogen dioxide analysers, we complete a two-point calibration using zero air and a nitric oxide span gas of certified concentration. We obtain our calibration gases under contract from Air Liquide who also provide similar gases to government owned AURN monitoring stations. By considering instrument operating parameters and the results of successive calibrations, we can make a determination regarding the ongoing performance of our analysers.

Where an instrument is found not to be operating within normal operating parameters, we refer the matter promptly to We Care 4 Air who are retained by the council to provide service and maintenance support for our equipment.

Finally the council is a member of AEA's Calibration Club which promotes and supports best practice in the application of quality control to automatic air-monitoring data in line with the government's local air quality management technical guidance LAQM.TG16). AEA staff visit our sites on a six-monthly basis and compare the performance of our analysers against a range of laboratory grade standards. AEA subsequently provides a series of calibration and scaling factors that are used to correct our automatic monitoring data. These scaling procedures enable the council to robustly compare our air quality data with Air Quality Strategy Objectives and European Union Limit Values.

QA/QC of Diffusion Tube Monitoring

Workplace Analysis Scheme for Proficiency (WASP) nitrogen dioxide proficiency testing.

Government provides an additional layer of surety for local authorities operating nitrogen dioxide diffusion tubes through the independent analytical proficiency-testing scheme. Through the Workplace Analysis Scheme for Proficiency, laboratories are provided with a number of test samples that are designed to test their proficiency in

undertaking chemical analysis of diffusion tubes. The WASP scheme is operated independently by the Health and Safety Laboratory.

For the 2016 sampling period, Gradko's performance was assessed as follows:

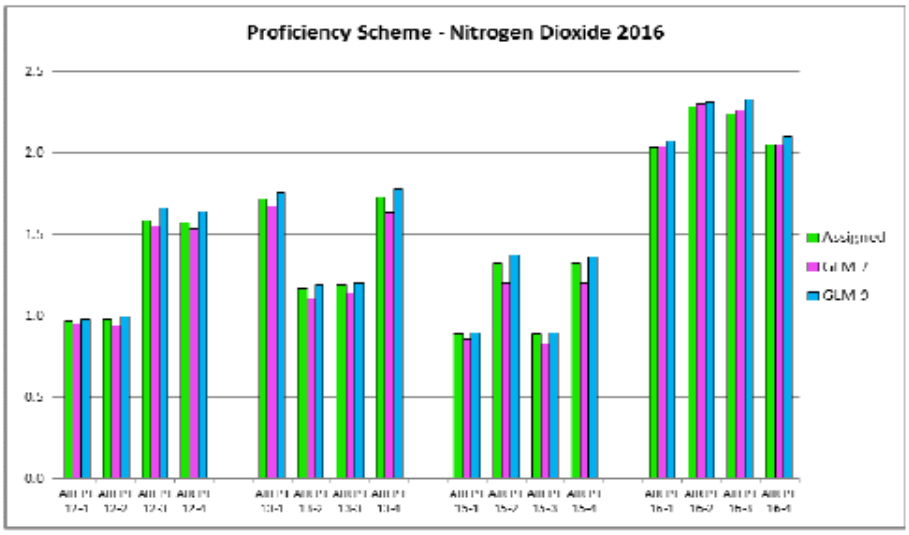
gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 email:diffusion@gradko.com

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

Date	Round	Assigned value	Camspec M550 - GLM 7			QuAAtro - GLM 9		
			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

Appendix B: Defra NO_2 Distance Calculator

Short Strand Monitoring Location

Enter data into the red cells

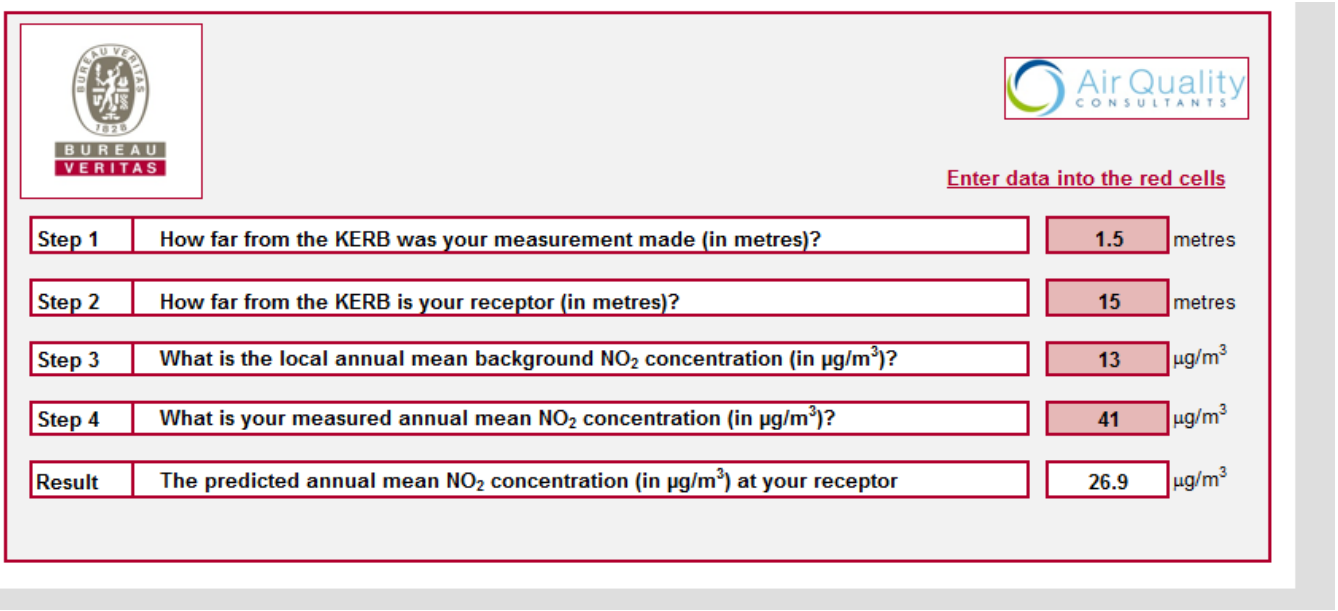
Step 1	How far from the KERB was your measurement made (in metres)?	1	metres
Step 2	How far from the KERB is your receptor (in metres)?	16	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	24.5	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	44	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	33.1	µg/m^3

Chichester Street Monitoring Location

Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	2	metres
Step 2	How far from the KERB is your receptor (in metres)?	5	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	24.5	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	44	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	39.8	µg/m^3

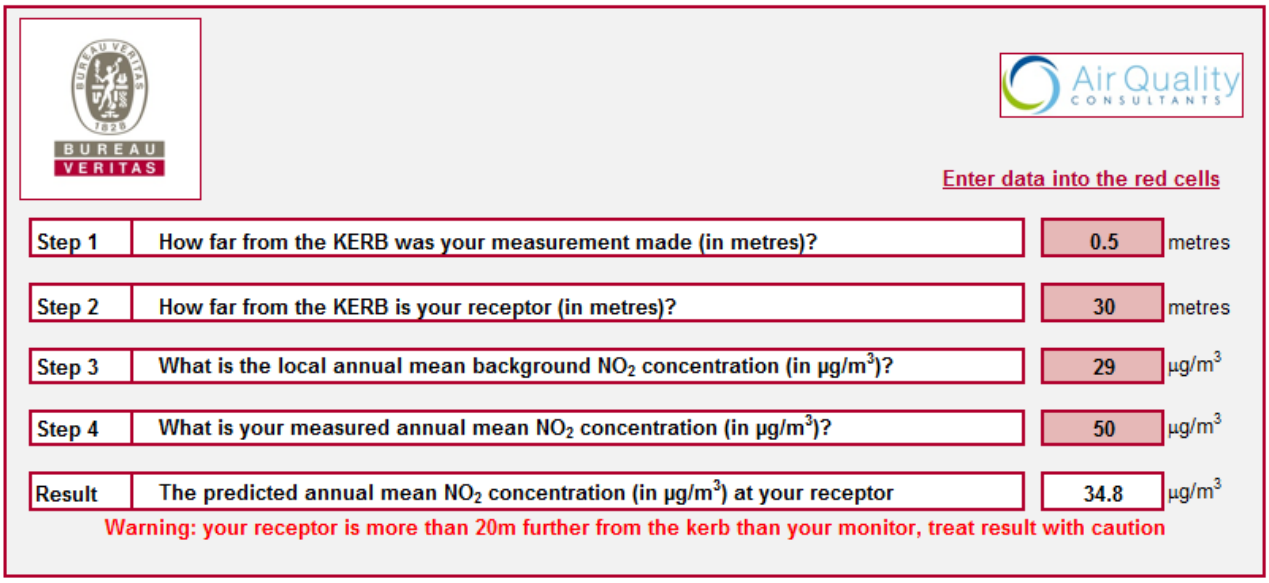
Knock Road Monitoring Location



Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	1.5	metres
Step 2	How far from the KERB is your receptor (in metres)?	15	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	13	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	41	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	26.9	$\mu g/m^3$

Great Georges Street Monitoring Location (2016 Lombard Street NO2 concentration used as background)



Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	0.5	metres
Step 2	How far from the KERB is your receptor (in metres)?	30	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	29	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	50	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	34.8	$\mu g/m^3$

Warning: your receptor is more than 20m further from the kerb than your monitor, treat result with caution

Stockman's Lane Monitoring Location (2016 Lombard Street NO2 concentration used as background)

Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	2	metres
Step 2	How far from the KERB is your receptor (in metres)?	16	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	29	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	49	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	39.3	µg/m^3

York Street Monitoring Location (2016 Lombard Street NO2 concentration used as background)

Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	2	metres
Step 2	How far from the KERB is your receptor (in metres)?	7	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	29	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	41	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	37.5	µg/m^3