Belfast City Council
Air Quality Progress Report 2020

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

June 2020

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Executive Summary

Belfast City Council has completed this 2020 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 exceedances of Air Quality Strategy Objectives and European Commission Limit Values are occurring. The review has also identified locations where ambient air quality has improved and exceedances are no longer occurring.

Belfast City Council has declared four Air Quality Management Areas across the city for exceedances of the nitrogen dioxide annual mean Air Quality Strategy objective. A review of the monitoring data for these Air Quality Management Areas indicates that there have been some recent improvements in nitrogen dioxide levels across the city. As a result, Belfast City Council considers that there may be an opportunity for revocation of the Air Quality Management Area along the Ormeau Road and Upper Newtownards Road, where monitoring data demonstrates recent sustained improved annual mean nitrogen dioxide concentrations, with levels consistently below the annual mean objective. Accordingly, the council will liaise with the Department for Agriculture, Environment and Rural Affairs, Department for Infrastructure and other relevant competent authority partners regarding the revocation process.

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

There have been no monitored exceedances 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 position. No other air quality pollutants will therefore be considered within this 2020 Progress Report.

However, the council is aware of the recent evidence from national studies showing that domestic solid fuel burning contributes more than previously thought to particulate emissions.

The contribution of solid fuel combustion to for fine particulate matter ($PM_{2.5}$) concentrations has also been recognised within the UK Clean Air Strategy 2019. Moreover, the National Atmospheric Emission Inventory, 'Air Pollutant Inventories for England, Scotland, Wales, and Northern Ireland 1990-2017' publication highlights that for Northern Ireland in 2017, residential, commercial and public sector combustion accounted for 52% of overall $PM_{2.5}$ emissions, and that this sector was dominated (82%) by emissions from residential combustion.

Belfast City Council and the Department for Environment, Agriculture and Rural Affairs (DAERA) have therefore decided to undertake a detailed assessment for the city, for fine particulate matter ($PM_{2.5}$) and nitrogen dioxide (NO_2) pollutants. It is anticipated that this project will commence from late 2020.

Several new developments have occurred throughout Belfast since the 2019 Progress Report was published. These developments were identified during the Planning Application process and where necessary, an Air Quality Impact Assessment was requested. The air quality impacts of these developments were then assessed and any necessary development specific mitigation measures were identified and requested as part of the planning process.

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 to promote and enable a shift onto more sustainable modes of transport to achieve compliance with the EU limit value for nitrogen dioxide (NO_2) by 2020. Progress on implementing individual measures within AQAP is reported in the Chapter 8 of this report.

The Air Quality Action Plan (AQAP) 2015-2020 is scheduled to conclude at the end of this year, and the council has already commenced preparations for the development of a new AQAP for the city.

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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 340,220. 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 also comprises part of the surrounding areas of Lisburn and Castlereagh City Council, North Down and Ards District Council, Antrim and Newtownabbey District Council and Mid and East Antrim District Council.

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 to the extent that we do not experience exceedances of any 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 local air quality management.

Although Belfast city does not experience exceedances of any air quality strategy objectives, or European Commission limit values, for particulate matter (PM_{10}), we are aware of growing concerns around the effects of fine particulate matter ($PM_{2.5}$) on human health. Therefore, although not included in Regulations at present for Northern Ireland councils, Belfast City Council has proactively opted to report $PM_{2.5}$ monitoring data as part of this Progress Report.

Moreover, we are aware of the recent evidence from national studies showing that domestic solid fuel burning contributes more than previously thought to particulate emissions.

At the end of 2017, Defra issued a practical guide on open fires and wood burning stoves. The guide provides steps that should be taken to reduce the health impacts of burning solid fuel. This guidance can be found on the Defra smoke control webpage: https://uk-air.defra.gov.uk/library/reports?report_id=948

The contribution of solid fuel combustion to fine particulate matter ($PM_{2.5}$) concentrations has been also recognised within the UK Clean Air Strategy 2019. Therefore, Belfast City Council has decided to undertake a detailed assessment for the city, for fine particulate matter ($PM_{2.5}$) and nitrogen dioxide (NO_2) pollutants. It is anticipated that this project will commence from late 2020.

In recent years, emissions of nitrogen oxides, 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 back in 2006 and it was completed substantially in 2010, with around 90% of planned actions delivered to schedule. Of the outstanding 10% of actions, it was considered that the majority of these would have had limited additional impact within our Air Quality Management Areas.

Although Belfast City Council is directed to comply with the provisions of the Air Quality Strategy for England, Scotland, Wales and Northern Ireland via Part III of the Environment (Northern Ireland) Order 2002, the council is aware also of the pressing need to achieve European Commission air quality limit values at national level in accordance with the schedules prescribed in Directive 2008/50/EC in respect of ambient air quality and cleaner air for Europe and the 4th Daughter Directive. It should be noted that the deadline for achieving limit values for nitrogen dioxide was

1st January 2010 but unfortunately this was not achieved at all locations across the city.

In order to address the remaining 'hot spot' areas of elevated nitrogen dioxide, the council along with relevant partners developed a new Air Quality Action Plan for the city that contains a manageable number of proven air quality mitigation measures. The new Air Quality Action Plan, covering the period 2015-2020, was published in December 2015. Progress on implementing individual measures within this Action Plan is reported in Chapter 8 of this report.

The Air Quality Action Plan 2015-2020 is scheduled to conclude at the end of this year, and the council has already commenced preparations for the development of a new Action Plan for the city.

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 air quality objectives are likely to be achieved. Where exceedances are considered likely, the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of objectives.

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

Progress Reports are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if a Progress Report identifies the risk of exceedance of an Air Quality Objective, the Local Authority is

required to undertake a Detailed Assessment immediately, and not to wait until the next scheduled 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) together with the number of exceedances in each year that are permitted.

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 exceedances 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 December 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 at 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 exceedances was emissions associated with road transport.

Current Air Quality Management Areas are described and depicted in more detail as follows:

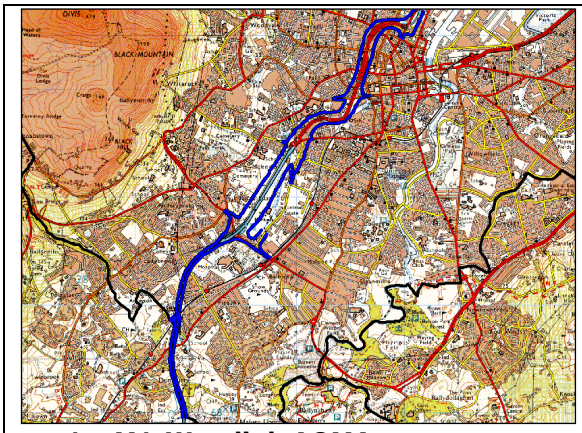
1. The M1 / Westlink corridor from the Belfast City boundary at Sir Thomas and Lady Dixon Park to the end of the Westlink at the junction with Great George's Street and York Street including Stockman's Lane and Kennedy Way. This area was declared for predicted exceedances of both the nitrogen dioxide and particulate material annual mean air quality strategy objectives as well as exceedances 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 exceedances of particulate matter objectives in September 2015, but it continues to exceed the air quality objectives for nitrogen dioxide.

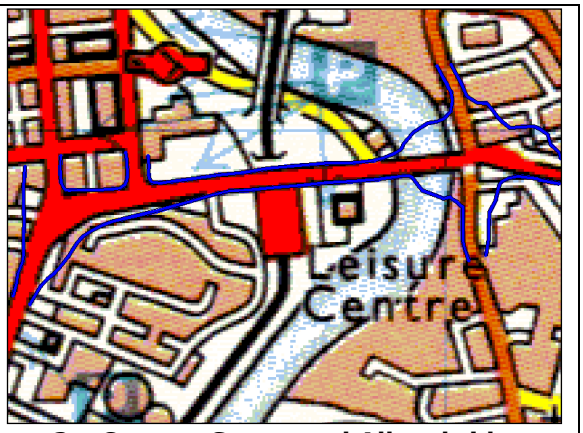
2. Cromac Street to the junction with East Bridge Street and then from East Bridge Street to the junction with the Ravenhill and Albertbridge Roads and Short Strand. This area was declared for predicted exceedances of the nitrogen dioxide annual mean air quality strategy objective.
3. The Upper Newtownards 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 exceedances of the nitrogen dioxide annual mean air quality strategy objective.
4. The Ormeau Road from the junction with Donegall Pass to the city boundary at Galwally. This area was declared for predicted exceedances of the nitrogen dioxide annual mean air quality strategy objective.

It should be noted that the Belfast City Council boundary is denoted by a solid black line within the following Air Quality Management Area maps, although it should also be noted that the council's 1993 boundary was revised and in some cases enlarged during 2015 under the reform of local government.

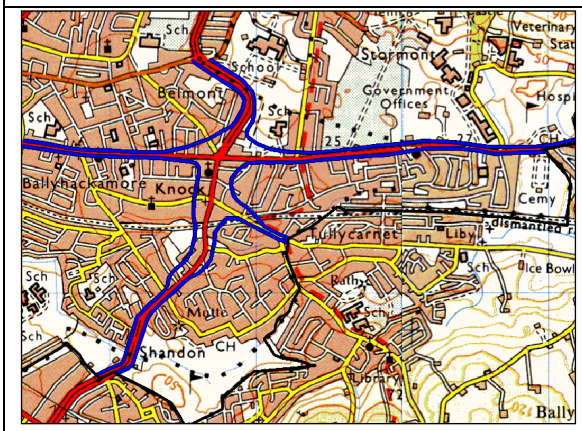
Figure 1.1 – Maps of AQMA Boundaries.



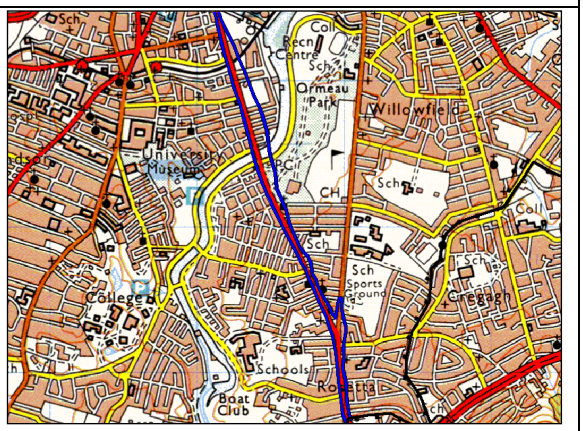
1. **M1-Westlink AQMA**



2. **Cromac Street and Albertbridge Street AQMA**



3. **Upper Newtownards Road AQMA**



4. **Ormeau Road AQMA**

A further detailed air quality review and 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 exceedances of nitrogen dioxide objectives at a number of further locations across the city, including at 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 exceedances 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 Review and 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 monitoring results, as presented in previous annual progress and update and screening assessment reports, identified sustained improvements in particulate matter concentrations within the M1 Motorway / A12 Westlink Air Quality Management Area, confirming that it had been in compliance with the particulate matter objectives for a number of years. This resulted in the Westlink / M1 AQMA being revoked for particulate matter 24 hour and annual mean objectives in September 2015.

The current stage in the Review and Assessment process requires that a Progress Report be completed. This report therefore addresses the requirements of the Defra LAQM.TG(16) technical guidance publication in identifying any significant changes that have occurred since the previous round of Review and Assessment, which may have the potential to affect the local 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 https://www.airqualityni.co.uk/laqm/district-council-reports

The 2019 Progress Report has been completed but is not yet available on the DAERA Northern Ireland Air website.

Table 1.2 Historical Belfast City Council Air Quality Reports.

• Belfast - Updating and Screening Assessment - 2018 - Published: 17th December 2018
• Belfast - Progress Report - 2017 - Published: 17th November 2017
• Belfast - Progress Report - 2016 - Published: 21st October 2016
• Belfast - Updating and Screening Assessment - 2015 - Published: 21st October 2016
• Belfast - LAQM Progress Report - 2014 - Published: 14th November 2014
• Belfast - LAQM Progress Report - 2013 - Published: 1st April 2013
• Belfast - Updating and Screening Assessment report - 2012 - Published: 3rd October 2012
• Belfast - Progress Report - 2011 - Published: 30th April 2011
• Belfast - Detailed Assessment - September 2010 - Published: 30th September 2010
• Belfast - Progress Report - 2010 - Published: 30th April 2010
• Belfast - Updating and Screening Assessment - 2009 - Published: 30th April 2009
• Belfast - Joint Air Quality Progress and Action Plan Progress Report - 2007 - Published: 30th April 2007
• Belfast - Detailed Assessment - April 2007 - Published: 30th April 2007
• Belfast - Joint Air Quality Progress and Action Plan Progress Report - 2008 - Published: 10th June 2008
• Belfast - Updating and Screening Assessment - 2006 Appendix - Published: 31st July 2006
• Belfast - Updating and Screening Assessment - 2006 - Published: 31st July 2006
• Belfast - Health Impact Assessment of the Draft Air Quality Action Plan for Belfast - Published: 1st May 2006
• Belfast - Progress Report - Published: 1st September 2005

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Belfast City Council operates four automatic monitoring stations across the city in order to help inform its air quality management processes and to provide real time information to the public in relation to air pollution levels across the city centre and 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 biweekly (Stockman's Lane AURN site) or on a four-weekly basis by the council's technical staff 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 and is reported on the 'Northern Ireland Air' website in near real time. 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). 2019 data capture levels exceeded the Department's 75% data capture threshold for the calculation of annual statistics at all council sites. Further information regarding our QA/QC procedures and processes can be obtained in Appendix A to this report.

In addition to the council's automatic monitoring sites, Defra operates an urban background monitoring site at Lombard Street. Unfortunately, in 2019 data capture levels at the Belfast Centre site were below the Department's 75% data capture threshold for two pollutants nitrogen dioxide (51%) and sulphur dioxide (73%).

In relation to correction of our automatic monitoring data, this process is generally of principal concern with regard to the treatment of particulate matter monitoring data. In 2019, the Belfast Centre site employed Filter Dynamics Measurement System (FDMS) equipped Tapered Element Oscillating Microbalances (TEOMs) for

particulate matter (PM_{10}) monitoring up until September whereupon the FDMS equipped TEOMs were replaced by Palas Fidas 200, which complies with DEFRA's UK PM Pollution Climate standard. Government equivalence tests have determined that both of types of equipment meet the equivalence criteria and on that basis, no correction factor needs to be applied to this monitoring data.

However, the Stockman's Lane site is equipped with a Beta Attenuation Monitor (BAM) with a heated 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 has already been corrected to the reference equivalent.

During 2019, Belfast City Council replaced ageing NOx API M200A analysers at two of its monitoring sites; namely the Upper Newtownards Road and Stockman's Lane. In addition, the unheated BAM 1020 particulate matter (PM_{10}) analyser at Stockman's Lane was also replaced with a heated inlet variant in order to continue to collect high quality data and to achieve >90% data collection rates throughout the year. Earlier this year, the council replaced a further API M200 NOx analyser, located at the Ormeau Road site.

A location map showing automatic monitoring site locations across the Belfast City Council area is presented in the following Figure 2.1, with further site-specific monitoring details provided in Table 2.1.

Figure 2.1 – Location Map of Automatic Monitoring Sites across Belfast.

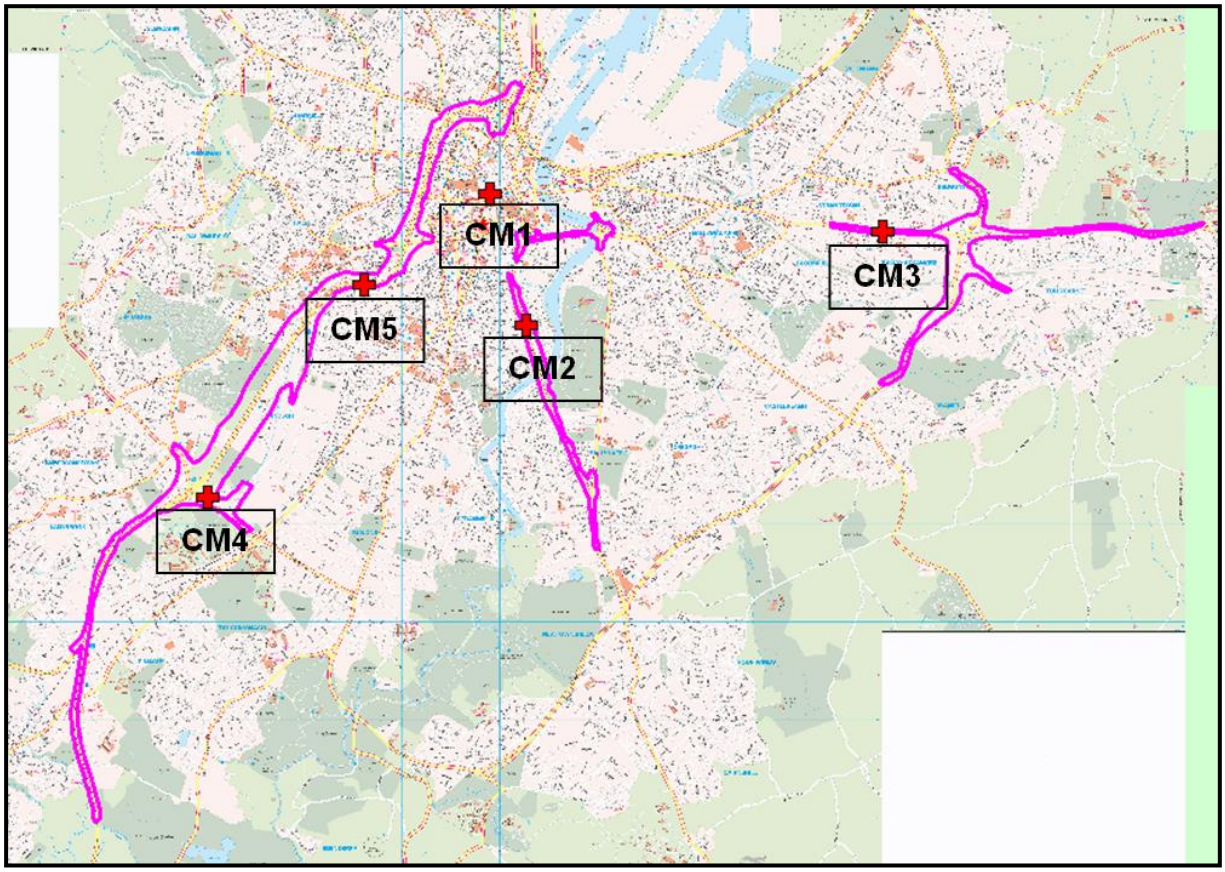


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Table 2.1 – Details of Automatic Monitoring Sites.

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 Background	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)	26 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)	2 m	Y
CM4	Belfast Stockmans Lane	Roadside	331010	371252	3.5	Nitrogen dioxide and Particulate matter (PM_{10})	Y	Chemiluminescence Beta Attenuation Monitor	Y (12 m)	2 m	Y
CM5	Belfast Westlink Roden Street	Roadside	332617	373431	2.6	Nitrogen dioxide	Y	Chemiluminescence	Y (17 m)	5 m	Y

2.1.2 Non-Automatic Monitoring Sites

The government's risk and exposure-based approach to local air quality management means that Belfast City Council's principal focus has been on addressing citywide 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 operates a range of passive diffusion tubes for nitrogen dioxide at a range of both background and roadside locations across the city.

The NOx tube monitoring network has changed considerably since the declaration of the Air Quality Management Areas in 2004. The extensive BCC monitoring network currently comprises 55 tubes throughout the city, which provides annual NO_2 data to assist in the review and assessment process and to aid developers in conducting air quality impact assessments, where deemed necessary. Since the 2019 Progress Report, we have added an additional 14 tubes to the network. These locations are detailed in Figure 2.2 and Table 2.2.

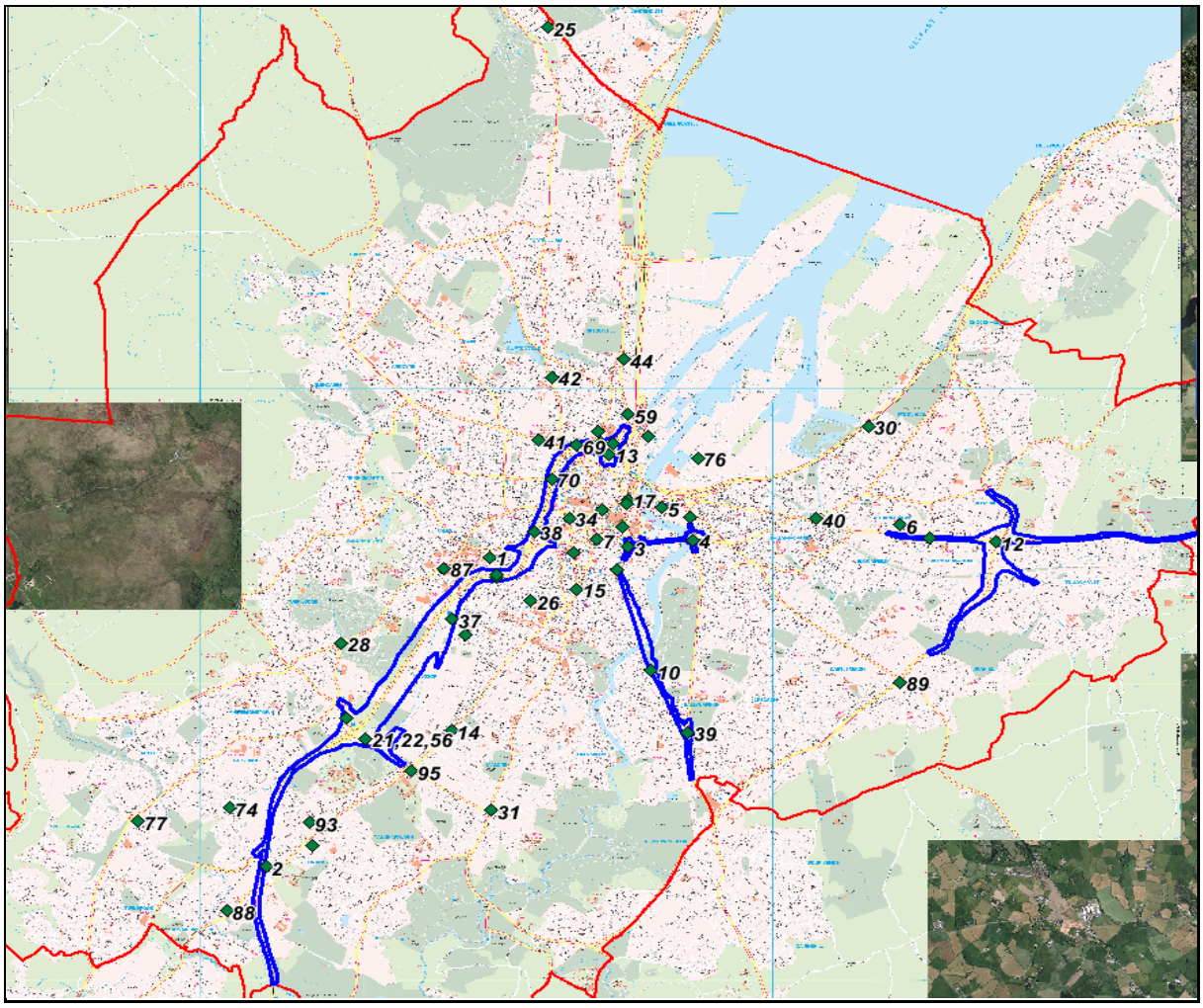
Nitrogen dioxide diffusion tubes comprise a small clear plastic tube containing a chemical reagent supported on stainless steel grids that absorbs the pollutant directly from the surrounding ambient air. In this case, triethanolamine is used as the reagent to monitor levels of ambient nitrogen dioxide. Belfast City Council's diffusion tubes are exposed for successive four or five week periods, in general accordance with the Defra Diffusion Tube Monitoring Calendar 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.

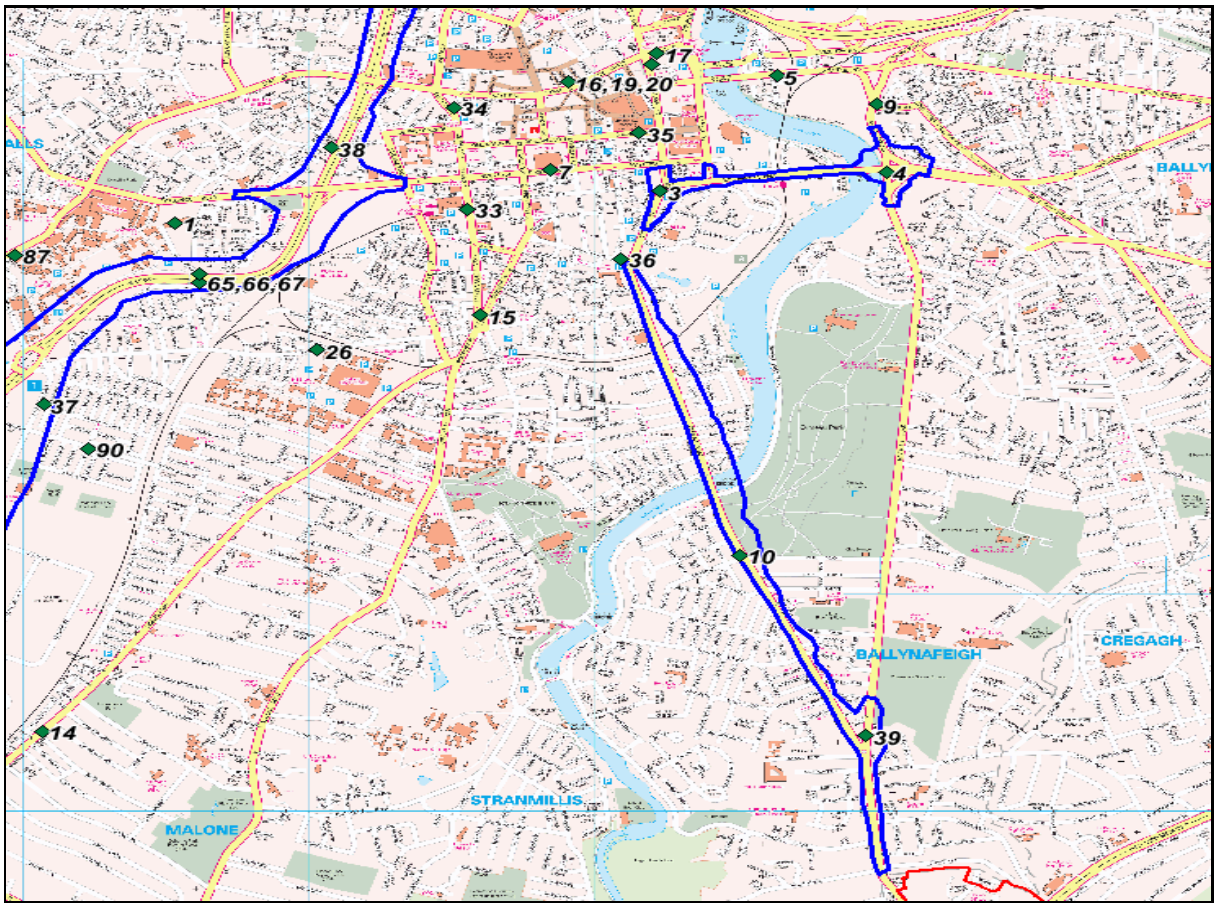
To further ensure that its diffusion tube monitoring data is as accurate as possible, the council co-locates a number of diffusion tubes with reference method compliant chemiluminescent nitrogen dioxide analysers at the Lombard Street, Newtownards Road, Westlink/Roden Street and Stockman's Lane monitoring 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 and used to correct the diffusion tube monitoring data. In the case of the diffusion tube data presented in this report, the monitoring data has been corrected using a bias adjustment factor derived from three roadside co-location studies undertaken at the Upper Newtownards Road, Westlink/Roden Street and Stockman's Lane monitoring sites. 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 2019 data are included in Appendix A to this report. The outputs also show monthly nitrogen dioxide monitoring data for each diffusion tube site for 2019 where available.

Figure 2.2 – Location Maps of Non-Automatic Nitrogen Dioxide Monitoring Sites overlaid on the council's Air Quality Management Areas.

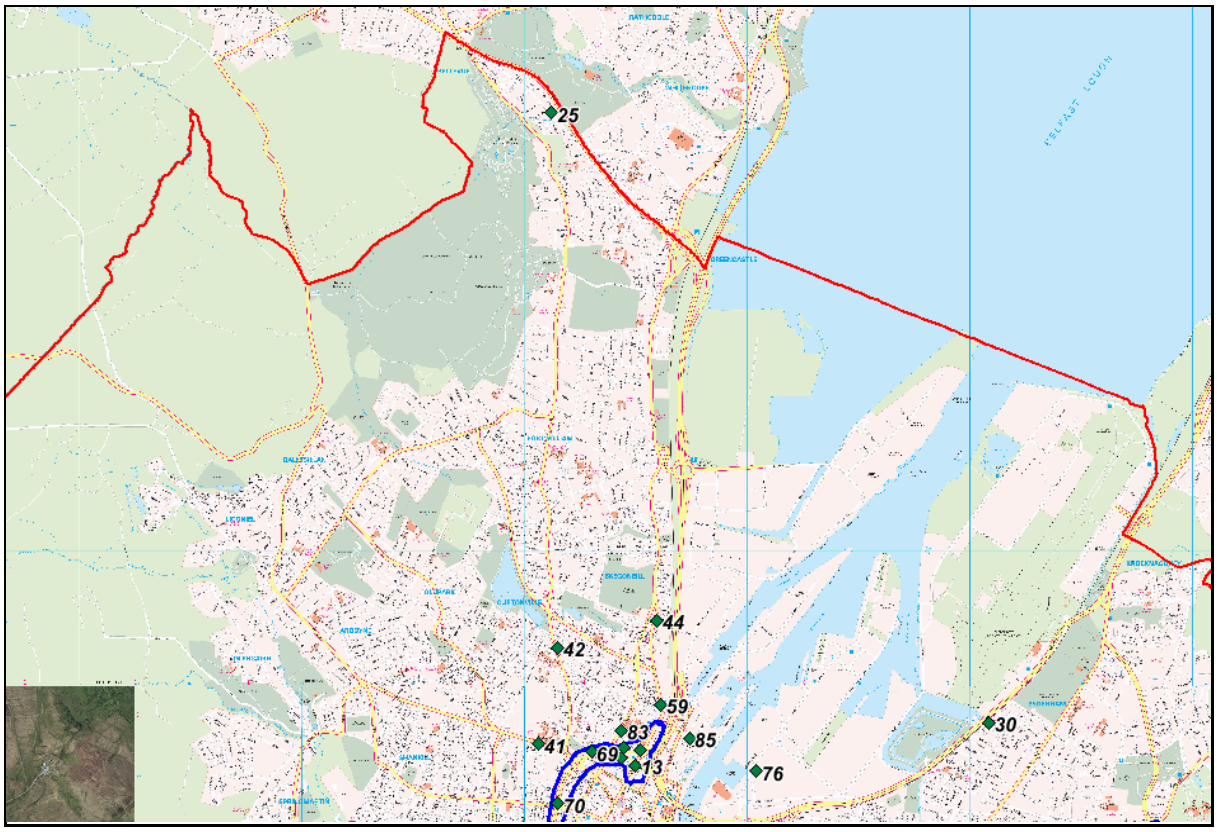
Belfast City Council boundary



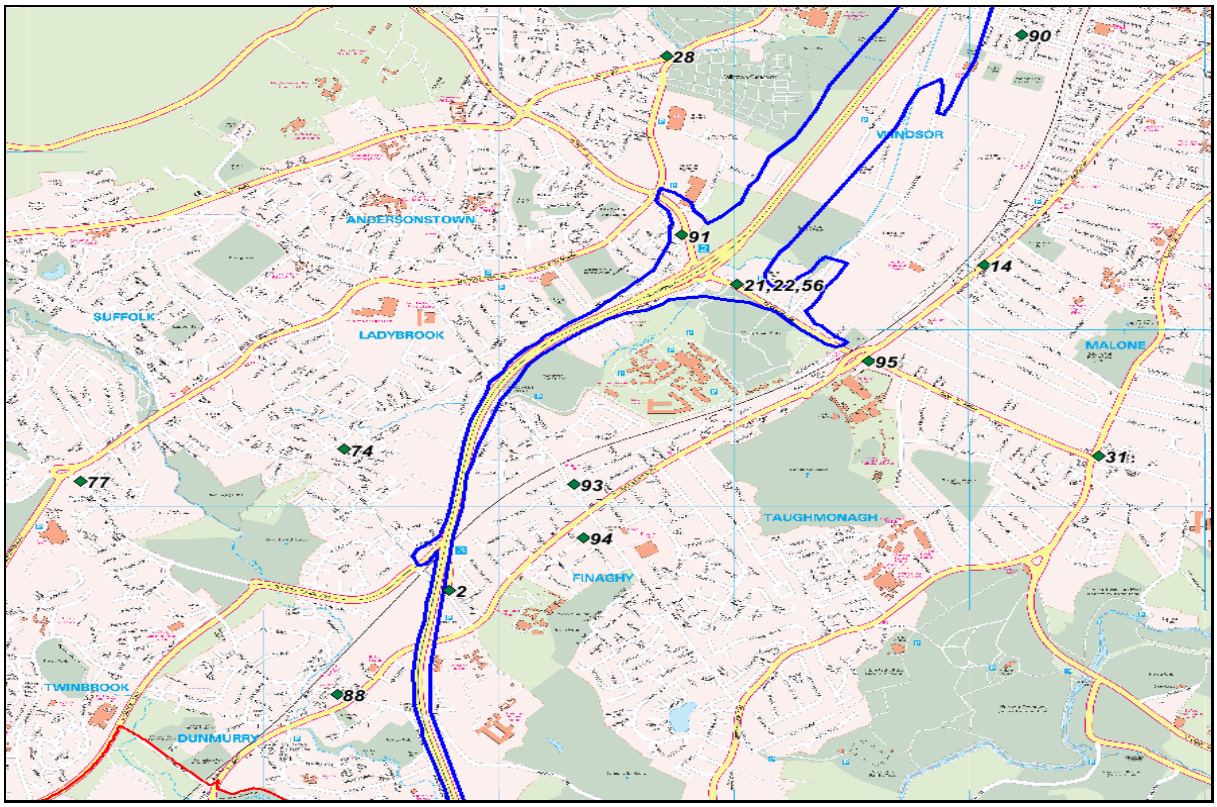
Belfast City Centre



North Belfast



South and West Belfast



East Belfast

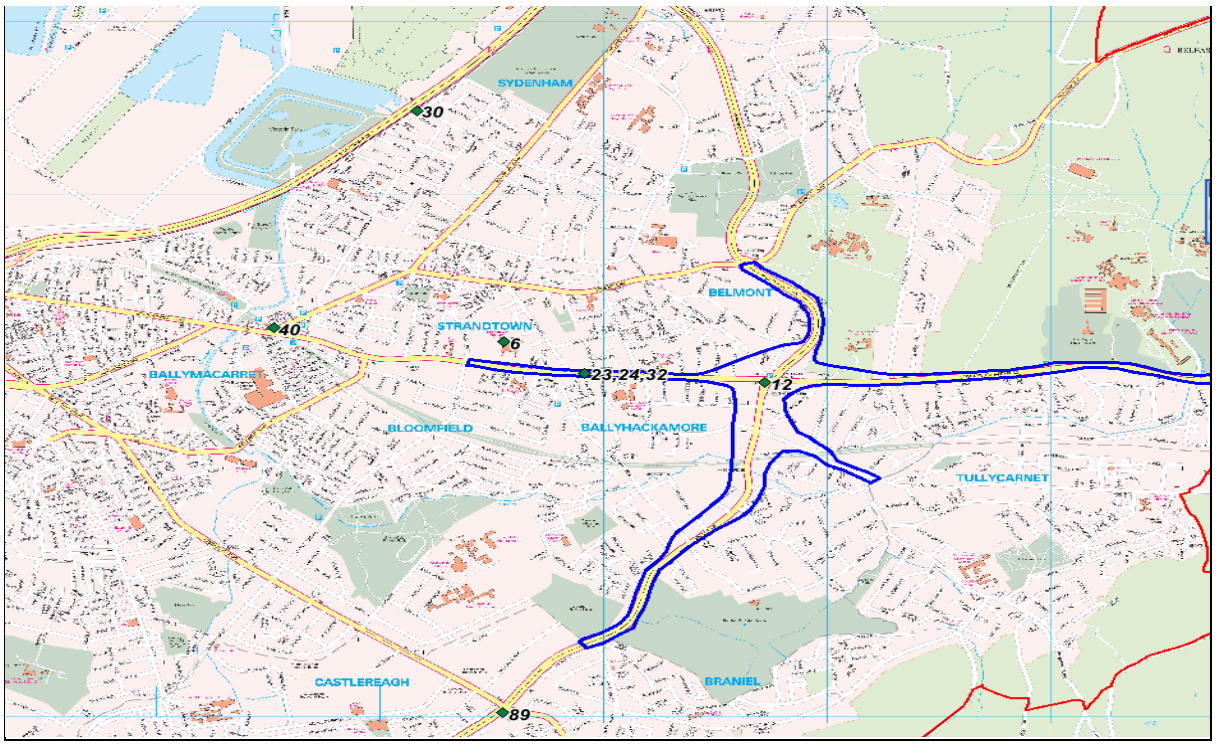


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Table 2.2 – Details of Non- Automatic Monitoring Sites.

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	27	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	10	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	4	Y
9	Short Strand	Roadside	334980	374254	3.2	NO_2	N	N	21	1	Y
10	301 Ormeau Road	Roadside	334503	372176	3.0	NO_2	Y	N	1	6	Y
12	Knock Road	Roadside	338718	373918	2.5	NO_2	Y	N	17	1.5	Y
13	Great George's Street	Kerbside	333981	375102	3.0	NO_2	Y	N	5	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	2	Y
16,19,20	Lombard Street	Urban Background	333898	374358	3.5	NO_2	N	Y	N	26	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	12	2	Y
23,24,32	Ballyhackamore	Roadside	337911	373972	3.0	NO_2	Y	Y	36	2	Y
25	Whitewell Road	Roadside	333230	380877	2.7	NO_2	N	N	5	1	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	5	2	Y
30	Station Road	Roadside	337160	375482	2.7	NO_2	N	N	20	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	1.5	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	3	2	Y
38	Crèche on M1/Westlink	Roadside	333069	374055	3.0	NO_2	Y	N	7	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	3	2	Y
40	Upper Newtownards Road & Hollywood Road	Roadside	336519	374233	3.0	NO_2	N	N	40	3	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	3	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	Roadside	334192	374441	2.7	NO_2	N	N	Building Façade	5	Y
65,66,67	Westlink AQMS	Roadside	332617	373431	2.6	NO_2	Y	Y	17	5	Y
68	Opposite Westlink AQMS	Roadside	332610	373474	2.5	NO_2	Y	N	70	2	Y
69	Peter's Hill	Kerbside	333588	375224	3.5 (above the canyon)	NO_2	Y	N	48	1	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?
70	Henry Place	Kerbside	333281	374767	3.5 (above the canyon)	NO_2	Y	N	23	1	Y
74	Ardmore Park	Roadside	329336	370319	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
82	Molyneux Street	Roadside	334028	375241	2.7	NO_2	Y	N	3	11	Y
83	North Queen Street	Roadside	333857	375412	2.7	NO_2	N	N	9.5	2	Y
84	Portland Place	Roadside	333856	375163	2.7	NO_2	Y	N	3	3	Y
85	Sailors Town	Roadside	334469	375341	2.7	NO_2	N	N	12	11	Y
86	Little Georges Street	Roadside	333877	375260	2.5	NO_2	Y	N	4	2	Y
87	RVH Falls Road	Roadside	331962	373560	2.7	NO_2	N	N	12	2	Y
88	Dunmurry Lane	Roadside	329305	368931	2.7	NO_2	N	N	3	2	Y
89	Upper Knockbreda Rd	Kerbside	337547	372019	2.5	NO_2	N	N	18	1	Y
90	Tates Avenue	Roadside	332221	372667	2.5	NO_2	N	N	11	2	Y
91	Stockman's Crescent	Roadside	330772	371532	2.5	NO_2	Y	N	4.5	22	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?
93	Diamond Gardens	Roadside	330313	370121	2.5	NO_2	N	N	3	2	Y
94	Orpen Road	Roadside	330355	369817	2.5	NO_2	N	N	6	2	Y
95	Balmoral Avenue	Roadside	331568	370818	2.7	NO_2	N	N	8	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 2019 and preceding years from 2015. In all cases, exceedances 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 remain below the 40 μ/gm^{-3} annual mean objective for nitrogen dioxide as denoted by the solid red line on the graph.

As data capture for 2019 was only 51%, data was "annualised" as prescribed in Boxes 7.9 and 7.10 of LAQM.TG16 (Appendix A).

Apart from Belfast Centre (Lombard Street site) there are only two other long-term, continuous, urban background monitoring sites in Northern Ireland, which measure nitrogen dioxide, Ballymena Ballykeel and Derry Rosemount. Both sites exceeded the required 85% data capture in 2019 and as the result were identified as acceptable sites to be used in the 'annualisation process' for the Belfast Centre site.

The Belfast Ormeau Road site experienced extensive problems with air conditioning during 2012 and 2013, which prevented the monitoring equipment from working to full capacity. As this was a recurring problem, a decision was made towards the end of 2013 to upgrade the site infrastructure. 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 such that it was considered unreliable to report for 2013. In addition, we would express some reservations about the reliability of the 2012 monitoring data, as it does not appear to follow any established trends. Following the site upgrade however, the annual mean concentration has remained

reasonably constant at 27 μgm^{-3} in 2014, 27 μgm^{-3} in 2015, 28 μgm^{-3} in 2016, 25 μgm^{-3} in 2017, 26 μgm^{-3} in 2018 and 24μgm^{-3} in 2019.

On the basis of this data, which demonstrates nitrogen dioxide concentrations significantly below the annual mean air quality objective, the council has considered the case for revoking the Ormeau Road Air Quality Management Area (AQMA) for exceedance of the nitrogen dioxide annual mean objective. The Council has liaised with the Department for Agriculture, Environment and Rural Affairs regarding the potential revocation. It has been decided that since monitoring data from the Ormeau Road site forms part of the calculation of the Draft Programme for Government Framework 2016 – 2021 Indicator 37: Improve air quality, this AQMA will remain in place for the next few years.

From the data in Table 2.3, it can be seen that annual mean concentrations of nitrogen dioxide along the Upper Newtownards Road have remained in the range 27 – 35 μgm^{-3} since 2015, meaning that the nitrogen dioxide annual mean objective is now being consistently achieved along the Upper Newtownards Road.

However, the Knock Road non-automatic roadside diffusion tube, located at the junction of the Upper Newtownards Road, Hawthornden Way and the Knock Road has recorded exceedances of the annual mean objective in previous years up until 2017. The 2017 calendar year was the first year when the annual mean concentration at the Knock Road junction fell below the air quality objective (36μgm^{-3}), which is also the case in 2019 (35 μgm^{-3}). The Council will therefore continue to monitor nitrogen dioxide concentrations along the Upper Newtownards Road and at the junction with the Knock Road for a few further years in order to determine whether this improvement in ambient conditions is sustained and what implications it may have for the Air Quality Management Area.

Moreover, it should be noted that the Belfast Rapid Transit Glider commenced operation along this route from September 2018. In order to facilitate operation of the Glider, a bus lane has been established on the Upper Newtownards Road, Albertbridge Road and East Bridge Street, which operates from 07.00 to 19.00, Monday to Saturday. Glider operations together with introduction of the bus lane is

likely to have had a beneficial impact on traffic movements and pollution levels along the Upper Newtownards Road, Albertbridge Road and East Bridge Street.

Unfortunately though, despite the completion of significant structural improvements to the M1 Motorway and A12 Westlink corridor, nitrogen dioxide concentrations along Stockman's Lane continue to significantly exceed the 40 μgm^{-3} annual mean objective. However, the 2019 nitrogen dioxide annual mean was 45 μgm^{-3} which is a 8% reduction from the previous year's annual mean of 49 μgm^{-3}.

The nitrogen dioxide 2019 annual mean concentration (34 μgm^{-3}) monitored at the Westlink Roden Street during 2019 has also decreased in comparison to the previous year's annual mean (40μgm^{-3}). The annual mean air quality objective has not been exceeded at the Westlink Roden Street since 2011. However, some roadside diffusion tubes (Black's Road, opposite Westlink AQMS, Henry Place and Great George's Street) located along the Westlink corridor have recorded exceedances of the annual mean objective in 2019. Therefore, the council will continue its monitoring within the Westlink Corridor / M1 Air Quality Management Area to identify any exceedances and nitrogen dioxide concentrations and trends.

Historically, modelled and monitored exceedances 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 exceedances of the 1-hour objective.

From ambient monitoring data for Stockman's Lane and Westlink/Roden Street as summarised in Table 2.4, it can be seen that the number of exceedances of the hourly objective has substaintally decreased over recent years, now demonstrating compliance with the 200 μgm^{-3} objective, not to be exceeded more than 18 times per year - since 2013. In fact, there were no exceedances of the 1 hour mean objective at either site during 2019. As there are residential properties located directly adjacent to the carriageway at 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 in order to identify any further exceedances and establish 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 2019 % [b]	Annual Mean Concentration (µg/m^3)				
					2015* [c]	2016* [c]	2017* [c]	2018[c]	2019[c]
Belfast Centre	Urban Background	N	51	51	29.0	29.0	25.0	27	26[c]
Belfast Ormeau Road	Roadside	Y	77	77	27.0	28.0	25.0	26	24
Belfast Ballyhackamore	Roadside	Y	99	99	33.0	35.0	31.0	29	27
Belfast Stockmans Lane	Roadside	Y	99	99	**50.0**	**50.0**	**52.0**	**49**	**45**
Belfast Westlink Roden Street	Roadside	Y	99	99	34.0	39.0	34.0	40	34

In bold, exceedance 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.

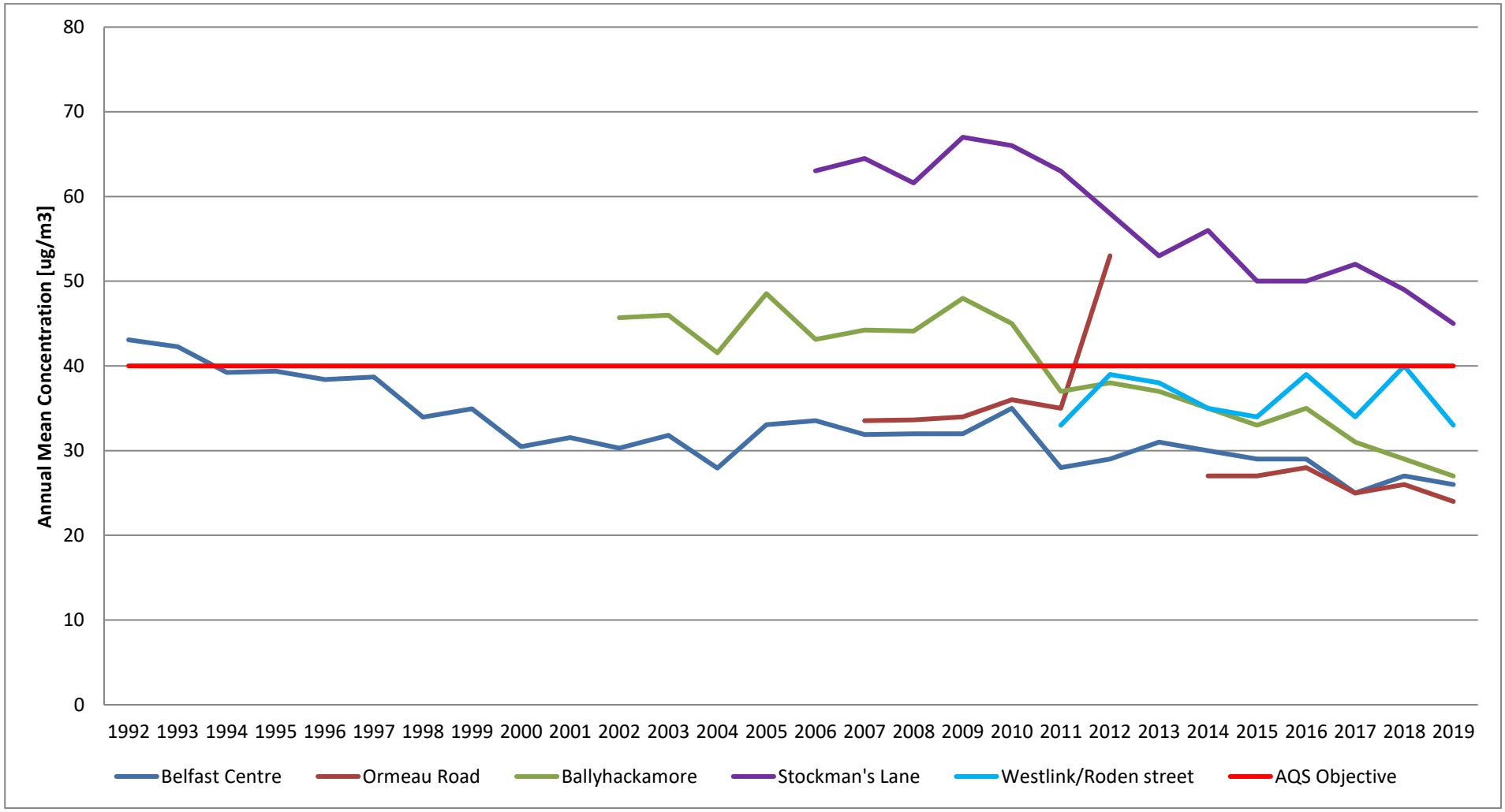


Table 2.4 – Results of Automatic Monitoring for NO_2: Comparison with the 1-hour mean objective.

Site ID	Site Type	Within AQMA ?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2019 % [b]	Number of Hourly Means > 200µg/m^3				
					2015* [c]	2016* [c]	2017* [c]	2018[c]	2019[c]
Belfast Centre	Urban Background	N	51	51	0	1	1	0	0 (93)
Belfast Ormeau Road	Roadside	Y	77	77	0	2	0	0	0 (86)
Belfast Ballyhackamore	Roadside	Y	99	99	0	1	0	0	0
Belfast Stockmans Lane	Roadside	Y	99	99	7	10	2	3	0
Belfast Westlink Roden Street	Roadside	Y	99	99	2	1	0	0	0

In bold, exceedance of the NO_2 hourly mean AQS objective (200 µg/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 exceedances 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 63 diffusion tubes at 55 relevant locations across the city. Data from these tubes for 2019 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 2019 nitrogen dioxide diffusion tube monitoring, it is noted that the concentrations have slightly increased in comparison to the 2018 monitoring year's results at most locations. However, it should be noted that the 2019 bias adjustment factor (0.91) was slightly higher than the last year's one (0.86). Moreover, Belfast City Council has added an additional 14 NOx tubes to the Belfast diffusion tube monitoring network.

Annual mean exceedances during 2019 occurred at Black's Road (42µg/m^3), Great George's Street (45 µg/m^3), Stockman's Lane (45 µg/m^3 – adjusted (triplicates) tubes mean), opposite Westlink AQMS (45µg/m^3) and Henry Place (53µg/m^3). All are located within existing the M1 Motorway / A12 Westlink Air Quality Management Area and have been the subject of mitigation measures for some time. Nevertheless, Defra NO_2 distance calculations have been provided for the above locations to calculate concentrations at relevant receptor locations. (Appendix B).

In relation to Stockman's Lane location, we calculated NO_2 concentration at two 'worst case scenario' locations R1 and R2. The calculated results indicate that during 2019, nitrogen dioxide concentrations were below the annual mean objective in relation to relevant receptor locations. It is therefore not considered necessary to undertake a detailed assessment for these locations.

Table 2.5 – Results of NO_2 Diffusion Tubes 2018.

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2019 (Number of Months or %) [a]	2019 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.91[b]
1	Royal Victoria Hospital	Urban Background	N	N	100%	21
2	Black's Road	Roadside	Y	N	83%	**42**
3	61 Cromac Street	Roadside	Y	N	100%	36
4	Ravenhill Road	Roadside	Y	N	92%	28
5	Queen's Bridge	Roadside	N	N	83%	27
6	North Road	Urban Background	N	N	100%	14
7	Donegall Square South	Roadside	N	N	100%	32
9	Short Strand	Roadside	N	N	92%	40
10	301 Ormeau Road	Roadside	Y	N	100%	30
12	Knock Road	Roadside	Y	N	92%	35
13	Great George's Street	Kerbside	Y	N	92%	**45**
14	Lisburn Road	Roadside	N	N	100%	27
15	Shaftesbury Square	Kerbside	N	N	92%	31
16,19,20	Lombard Street	Urban Centre	N	Y	100%	26

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2019 (Number of Months or %) [a]	2019 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.91[b]
17	Albert Clock	Roadside	N	N	100%	40
21,22,56	Stockmans Lane	Roadside	Y	Y	100%	**45**
23,24,32	Ballyhackamore	Roadside	Y	Y	100%	27
25	Whitewell Road	Roadside	N	N	92%	25
26	Donegall Road	Kerbside	N	N	100%	31
28	Falls Road and Andersonstown	Roadside	N	N	75%	27
30	Station Road	Roadside	N	N	92%	22
31	Malone Road	Roadside	N	N	83%	31
33	Great Victoria Street	Roadside	N	N	100%	36
34	College Square East	Roadside	N	N	92%	33
35	Chichester Street	Roadside	N	N	100%	40
36	Cromac & Ormeau Avenue	Kerbside	Y	N	**67%**	31
37	Glenmachan Street	Roadside	Y	N	92%	38
38	Crèche on M1/Westlink	Roadside	Y	N	100%	28

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2019 (Number of Months or %) [a]	2019 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.91[b]
39	Ormeau Road (junction with Ravenhill Road)	Roadside	Y	N	100%	36
40	Upper Newtownards Road & Holywood Road	Roadside	N	N	75%	27
41	Crumlin Road	Roadside	N	N	92%	27
42	228 Antrim Road	Roadside	N	N	83%	31
44	Shore Road (Ivan Street end)	Roadside	N	N	75%	30
59	York Street	Roadside	Y	N	83%	36
63	Queens Square	Kerbside	N	N	100%	34
65,66,67	Westlink AQMS	Roadside	Y	Y	100%	34
68	Opposite Westlink AQMS	Roadside	Y	N	100%	**45**
69	Peter's Hill	Kerbside	Y	N	100%	40
70	Henry Place	Kerbside	Y	N	92%	**53**
74	Ardmore Park	Roadside	N	N	100%	30
76	Titanic Quarter	Roadside	N	N	92%	22
77	Poleglass	Roadside	N	N	75%	24

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2019 (Number of Months or %) [a]	2019 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.91[b]
82	Molyneux Street	Roadside	Y	N	100%	36
83	North Queen Street	Roadside	N	N	83%	33
84	Portland Place	Roadside	Y	N	92%	30
85	Sailors Town	Roadside	N	N	100%	28
86	Little Georges Street	Roadside	Y	N	83%	33
87	RVH Falls Road	Roadside	N	N	83%	33
88	Dunmurry Lane	Roadside	N	N	100%	26
89	Upper Knockbreda Rd	Kerbside	N	N	100%	34
90	Tates Avenue	Roadside	N	N	100%	27
91	Stockman's Crescent	Roadside	Y	N	75%	24
93	Diamond Gardens	Roadside	N	N	92%	24
94	Orpen Road	Roadside	N	N	100%	18
95	Balmoral Avenue	Roadside	N	N	**58%**	39

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

Underlined, annual mean > 60µg/m^3, indicating a potential exceedance 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 exceedance 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 (2015 to 2019)

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]				
			2015 (Bias Adjustment Factor = 0.96)	2016 (Bias Adjustment Factor = 0.89)	2017 (Bias Adjustment Factor = 0.78)	2018 (Bias Adjustment Factor = 0.86)	2019 (Bias Adjustment Factor = 0.91)
1	Royal Victoria Hospital	N	22	22	18	20	21
2	Black's Road	Y	**43**	40	36	36	**42**
3	61 Cromac Street	Y	39	37	31	30	36
4	Ravenhill Road	Y	33	31	26	27	28
5	Queen's Bridge	N	31	30	25	26	27
6	North Road	N	16	17	14	12	14
7	Donegall Square South	N	34	33	29	31	32
9	Short Strand	N	**45**	**44**	39	40	40
10	301 Ormeau Road	Y	34	32	27	28	30
12	Knock Road	Y	**42**	**41**	36	35	35
13	Great George's Street	Y	**47**	**50**	36	**44**	**45**
14	Lisburn Road	N	27	28	26	26	27
15	Shaftesbury Square	N	34	34	31	32	31
16,19,20	Lombard Street	N	29	28	25	25	26
17	Albert Clock	N	**42**	38	33	39	40

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]				
			2015 (Bias Adjustment Factor = 0.96)	2016 (Bias Adjustment Factor = 0.89)	2017 (Bias Adjustment Factor = 0.78)	2018 (Bias Adjustment Factor = 0.86)	2019 (Bias Adjustment Factor = 0.91)
21,22,56	Stockmans Lane	Y	**49**	**49**	**50**	**48**	**45**
23,24,32	Ballyhackamore	Y	34	36	31	24	27
25	Whitewell Road	N	25	23	20	23	25
26	Donegall Road	N	33	33	28	31	31
28	Falls Road and Andersonstown	N	27	29	25	27	27
30	Station Road	N	25	26	23	26	22
31	Malone Road	N	39	36	35	33	31
33	Great Victoria Street	N	40	39	34	35	36
34	College Square East	N	33	32	31	33	33
35	Chichester Street	N	**43**	**44**	36	**41**	40
36	Cromac & Ormeau Avenue	Y	34	33	30	32	31
37	Glenmachan Street	Y	40	39	28	36	38
38	Crèche on M1/Westlink	Y	30	34	24	27	28
39	Ormeau Road (junction with Ravenhill Road)	Y	31	32	29	31	36

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]				
			2015 (Bias Adjustment Factor = 0.96)	2016 (Bias Adjustment Factor = 0.89)	2017 (Bias Adjustment Factor = 0.78)	2018 (Bias Adjustment Factor = 0.86)	2019 (Bias Adjustment Factor = 0.91)
40	Upper Newtownards Road & Hollywood Road	N	28	27	25	26	27
41	Crumlin Road	N	30	32	26	28	27
42	228 Antrim Road	N	37	36	29	33	31
44	Shore Road (Ivan Street end)	N	30	30	28	28	30
59	York Street	Y	39	**41**	32	38	36
63	Queens Square	N	38	36	32	35	34
65,66,67	Westlink AQMS	Y					34
68	Opposite Westlink AQMS	Y					**45**
69	Peter's Hill	Y					40
70	Henry Place	Y					**53**
74	Ardmore Park	N	35	36	31	32	30
76	Titanic Quarter	N		26	21	24	22
77	Poleglass	N		26	24	26	24
82	Molyneux Street	Y					36
83	North Queen Street	N					33

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]				
			2015 (Bias Adjustment Factor = 0.96)	2016 (Bias Adjustment Factor = 0.89)	2017 (Bias Adjustment Factor = 0.78)	2018 (Bias Adjustment Factor = 0.86)	2019 (Bias Adjustment Factor = 0.91)
84	Portland Place	Y					30
85	Sailors Town	N					28
86	Little Georges Street	Y					33
87	RVH Falls Road	N		31	33	35	33
88	Dunmurry Lane	N			23	25	26
89	Upper Knockbreda Rd	N			35	33	34
90	Tates Avenue	N					27
91	Stockman's Crescent	Y					24
93	Diamond Gardens	N					24
94	Orpen Road	N					18
95	Balmoral Avenue	N					39

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

Underlined, annual mean > 60 µg/m^3, indicating a potential exceedance 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 annual mean diffusion tube data from 2015 where such data exists.

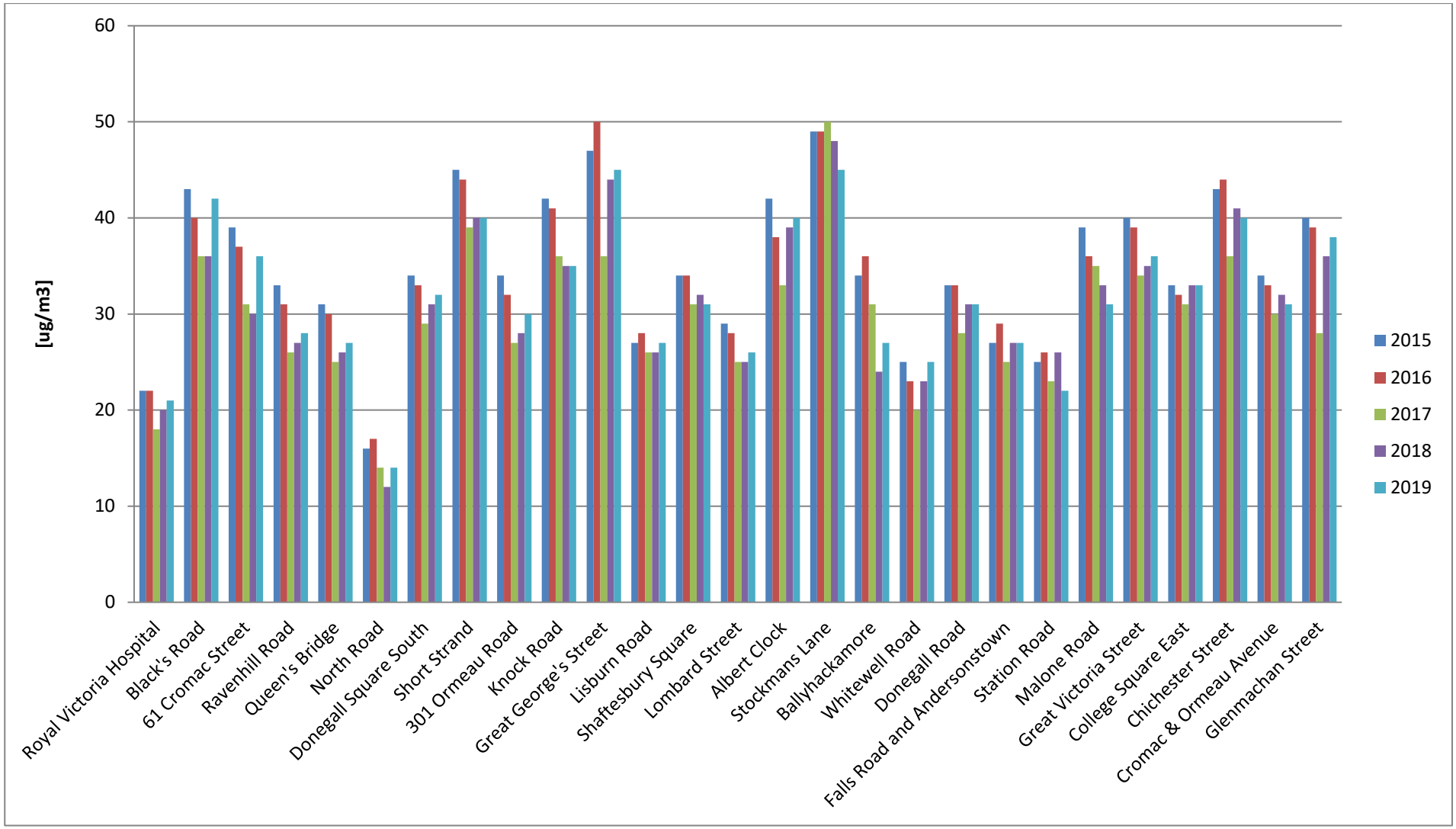
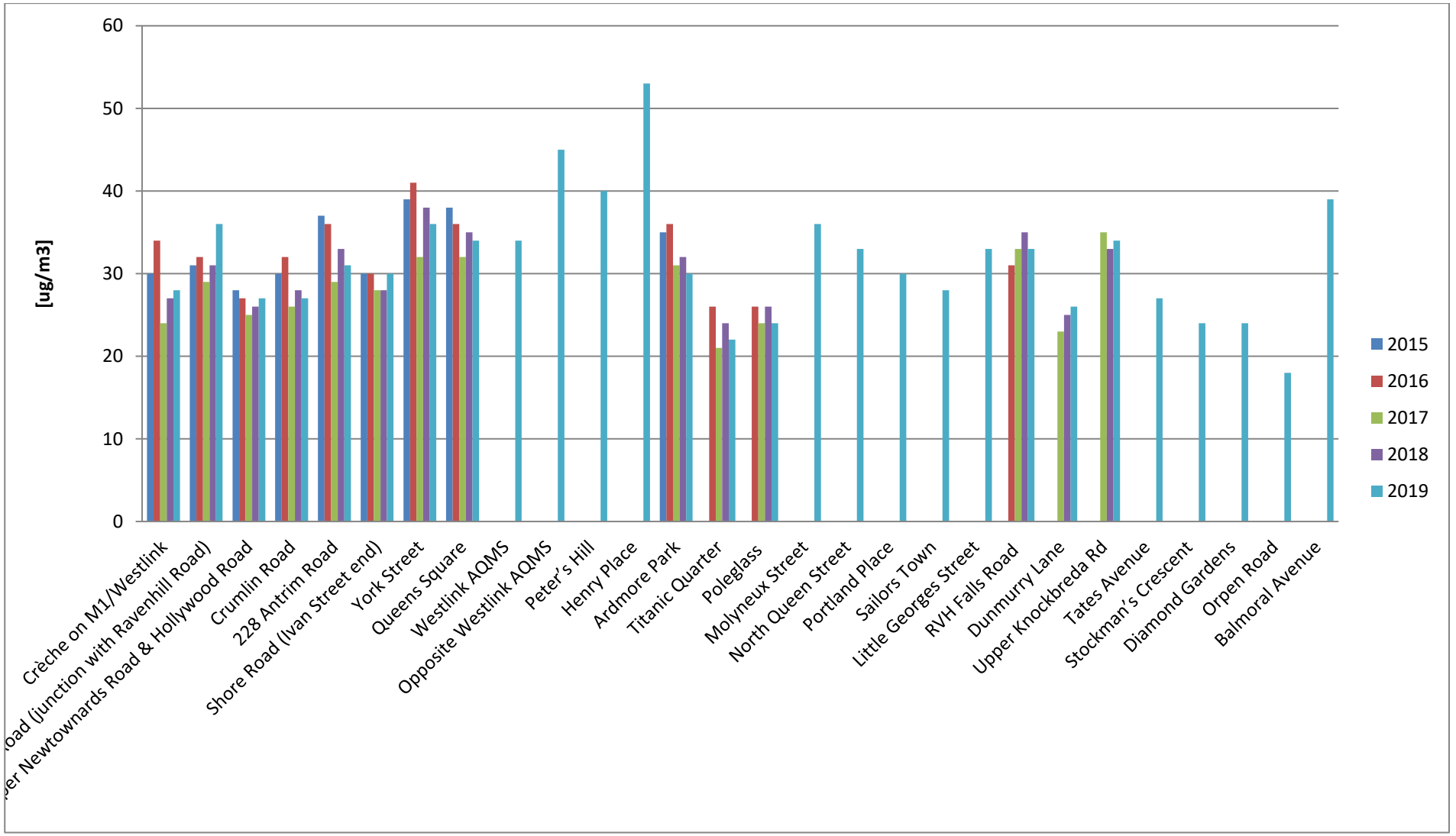


Figure 2.4 cont. – Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites.



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 exceedances 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, emissions of particulate matter have decreased significantly since around 2000. As a result, the council was able to decommission its Belfast Clara Street particulate matter monitoring site in east Belfast in 2007.

However, as domestic and industrial emissions were addressed, so 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 exceedances 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, were completed for the M1 Motorway and A12 Westlink. As a result, monitored levels of particulate matter began to decline within this Air Quality Management Area. Monitoring data for this site is summarised and reviewed in Tables 2.7, 2.8 and in Figure 2.5.

In terms of exceedances of the 40 μgm^{-3} particulate matter annual mean objective, there have been no exceedances of the annual mean objective within this AQMA since 2008. Monitoring data from the Belfast Westlink site at Roden Street, which was established in 2010 and is located within the M1 Motorway / A12 Westlink Air Quality Management Area, indicated no exceedances of particulate matter objectives up until 2014 whereupon PM_{10} monitoring was discontinued. Particulate matter monitoring continues however 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 historical monitoring data, which demonstrated sustained improvements in particulate matter, the council revoked the M1 Motorway / A12 Westlink Air Quality Management Area for exceedances of the particulate matter annual and 24-hour mean objectives in September 2015.

2019 year results, with an annual mean of 18 μgm^{-3} recorded at the Stockman's Lane site are slightly higher than 2018 results (15μgm^{-3}). However, data from the past several years indicates a continuing downward trend in PM_{10} concentrations within the M1 Motorway / A12 Westlink Air Quality Management Area.

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

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2019 %[b]	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration μg/m^3				
						2015* [c]	2016* [c]	2017* [c]	2018 [c]	2019 [c]
Belfast Centre Lombard Street	Urban Background	N	88	88	Y	14	16	12	16	15
Belfast Stockman's Lane	Roadside	Y	94	94	Y	21	22	21	15	18

In bold, exceedance 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.

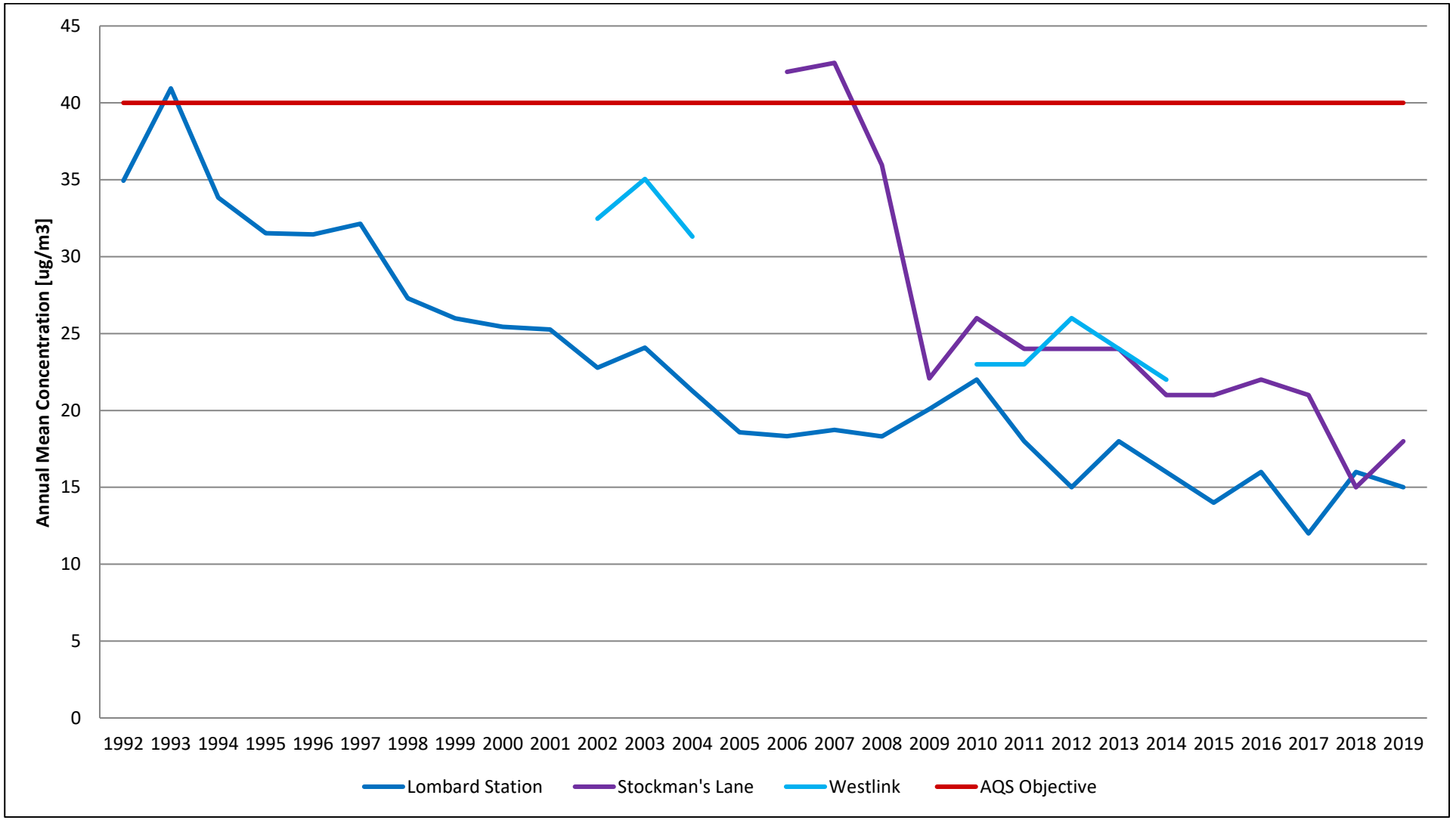


Table 2.8 – Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour Mean Objective.

Site ID	Site Type	Within AQMA ?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2019%[b]	Confirm Gravimetric Equivalent	Number of Exceedances of 24-Hour Mean (50 μg/m^3)				
						2015* [c]	2016* [c]	2017* [c]	2018 [c]	2019 [c]
Belfast Centre Lombard Street	Urban Background	N	88	88	Y	3	7	1(22)	0	2
Belfast Stockmans Lane	Roadside	Y	94	94	Y	4	3	2	0	4

In bold, exceedance 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 exceedances 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 exceedances 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. There have been no exceedances 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 exceedance of any objective was observed during 2019.

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 2019 %[b]	Number of Exceedances (percentile in bracket μg/m³)[c]		
					15-minute Objective (266 μg/m³)	1-hour Objective (350 μg/m³)	24-hour Objective (125 μg/m³)
Belfast Centre Lombard Street	Urban Background	N	73	73	0 (13)	0 (8)	0 (5)

In bold, exceedance 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/m³): 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 Belfast Roadside sites since 2002. The Belfast Centre site monitors benzene exposure for the City Centre whilst the Belfast Roadside site monitored benzene concentrations at a roadside location on the Upper Newtownards Road. Whilst monitoring concluded at the Belfast Roadside site in October 2007, no exceedances of the 2010 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 have been recorded in Belfast since 2002.

Previous rounds of R&A and monitored results going back to 2015, provided in Table 2.10 below, confirm that there has been no exceedance of the running annual mean of 3.25 µg m^{-3} for benzene within Belfast. Therefore, a Detailed Assessment is not considered necessary.

Table 2.10: Results of monitoring for benzene: Annual mean levels for the Belfast Centre Lombard Street site 2015 – 2019.

Site ID	Site type	Within AQMA?	Valid Data Capture 2019%	Running annual mean concentrations (µg/m^3)				
				2015	2016	2017	2018	2019
Belfast Centre	Urban Background	N	100	0.54	0.49	0.46	0.45	0.44

2.2.5 Other Pollutants Monitored

Fine particulate matter ($PM_{2.5}$)

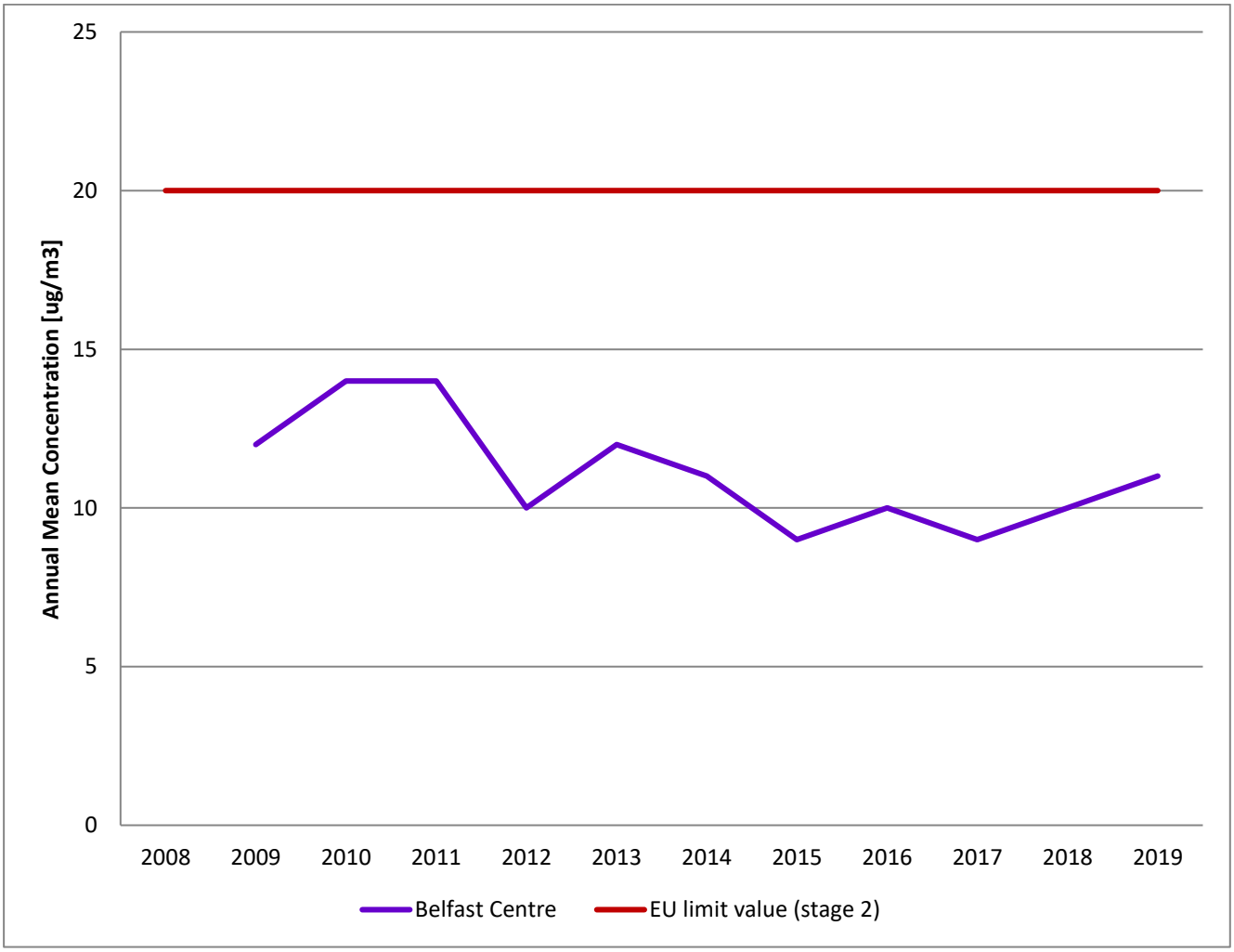
Fine particulate matter ($PM_{2.5}$) concentrations have been monitored at the Belfast Centre AURN site since 2008. Although it is not a statutory requirement for NI local authorities to report on $PM_{2.5}$ levels, as this pollutant is not covered by the LAQM regulations, Belfast City Council has included $PM_{2.5}$ results for 2019 in this progress report - Table 2.11 and Figure 2.6 below.

The annual average for this pollutant in 2019 was 11µg/m^3, which is below the UK air quality objective of 25µg/m^3. Moreover, $PM_{2.5}$ concentrations recorded at the Belfast Centre site are also below the EU (stage 2) limit value of 20µg/m^{-3}. There was also a 21% reduction in the pollutant concentration recorded between 2010 and 2019. Belfast City Council will monitor this trend over the next year to determine if the UK target for reduction of this pollutant of 15% between 2010 and 2020 has been met (National exposure reduction target, Directive 2008/50/EC)

Table 2.11: Results of monitoring for $PM_{2.5}$: Annual mean levels for the Belfast Centre Lombard Street site 2015 – 2019.

Site ID	Site type	Within AQMA?	Valid Data Capture 2019%	Annual mean concentrations (µg/m^3)				
				2015	2016	2017	2018	2019
Belfast Centre	Urban Background	N	88	9.0	10.0	9.0	10.0	11.0

Figure 2.6 – Trends in Annual Mean $PM_{2.5}$ Concentrations at Belfast Centre monitoring site.



2.2.6 Summary of Compliance with AQS Objectives

Belfast City Council has examined the results from monitoring within its 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 receptor locations. It is therefore the council's view that there is no need to proceed to a Detailed Assessment at this time.

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 significantly changed traffic flows.
- Bus or coach stations.

Belfast City Council confirms that as there has been no significant change to any of the above-mentioned sources since the 2019 Progress Report, 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 2019 Progress Report.

- 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 as there has been no significant change to any of the above-mentioned sources since the 2019 Progress Report, 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 as there has been no significant change to any of the above-mentioned sources since the 2019 Progress Report, 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 the above installations are considered as a part of the council's planning process. Where necessary, an Air Quality Impact Assessment is requested to demonstrate that the proposal will not have an impact on localised air

quality or relevant receptors. Further information on planning applications, which required an Air Quality Impact Assessment, is provided in Section 4 of this report. The Assessments submitted to date have demonstrated that proposed developments would not have a significant adverse impact on air quality in the vicinity of the development sites. Accordingly, there is no need to proceed to a Detailed Assessment.

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 as there has been no significant change to any of the above-mentioned sources since the 2019 Progress Report, 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 further confirms that all the following sources 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

During 2019, Belfast City Council's Environmental Protection, Public Health and Housing Unit considered numerous planning applications for developments that had the potential to negatively impact upon air quality.

Detailed or screening air quality impact assessments were requested for all of the proposed developments that in the council's view had the potential to have a negative impact on air quality or to introduce new receptors into an existing area of poor air quality.

A summary of Planning Applications and Air Quality Impact Assessments (AQIA) submitted or requested during 2019, in support of larger developments is presented in the following Table 4.1.

Table 4.1 Major new developments that had a potential to have a negative impact on air quality in the 2019 period.

Location	Development Description	Actions Taken
Airport Road West (Power Generation Station located on lands	Erection of 480MW Combined Cycle Gas Turbine (CCGT) Power Station comprised of turbine hall/heat recovery steam generator building with 50m exhaust stack, air cooled condenser, 2 storey administration building, 2 storey workshop building, gas insulated substation, gas compressor station, gas pressure reduction station, associated water and fuel tanks and other associated infrastructure and ancillary development including provision of site access and road works to facilitate extension to pedestrian footways and delineation of a right hand turn lane. Construction of new Above Ground Installation (AGI) at Kinnegar Army Barracks and new underground pipeline along Airport Road West, Esplanade Road with option of also following Heron/Moscow Road and which will connect the Power Station Site to the existing gas transmission infrastructure at Kinnegar Barracks.	Response provided on NIPP 18/01/2019. '*The submitted air quality information has demonstrated that the impact of emissions from the proposed Belfast Power Ltd. 480MW CCGT plant will not be significant on local air quality in relation to the relevant Air Quality Standards Regulations. Furthermore, there are no predicted exceedances of relevant air quality standards with the proposed Belfast Power Ltd. 480MW CCGT Plant in operation... The cumulative assessment indicated that there would be no predicted exceedances of air quality standards.*' Application granted April 2019.

Location	Development Description	Actions Taken
	Ref: LA04/2017/0878/F	
14 College Square North and South of 62-76 Hamill Street	Residential development over 7 floors (48 social housing units in a mix of 1 and 2 beds) with associated site access, car parking and landscaping works. Ref: LA04/2018/1719/F	Response provided on NIPP 27/08/2019. AQIA reviewed. Despite the consultant underestimating the future background NO_2 values, the assessment has demonstrated that future users will not be exposed to pollutants concentrations in excess of the relevant ambient air quality objectives. As a result, there are no concerns regarding the air quality impacts of the construction and operational phase of the development proposal, with recommended conditions below: - **The installed gas fired boiler for the proposed development shall meet the technical specification as detailed within the air quality impact assessment (Chapter 3, Air Quality Impact Assessment, Hamill Street, Belfast, Irwin Carr, April 2019). Moreover, a location and height of a flue of the proposed boiler should provide adequate dispersion of the emissions.** **Application granted May 2019.** - **A Dust Management Plan containing recommended mitigation measures be approved by the Planning Service and implemented during on the site construction works.**
96 Templemore Avenue	Restoration and refurbishment of the existing building with minor demolition at the rear and internal alterations to provide existing pool and heritage/interpretative facility with a new extension which will provide new 25m 6-lane pool with spectator gallery, wet and dry change, spa and expanded gym facility and car parking. Ref: LA04/2018/2603/F	Response provided on NIPP 23/05/2019. The AQO previously reviewed and commented upon an Air Quality Screening Assessment, dated 4th July 2018 and completed by WYG. This screening assessment demonstrated that predicted increases in air pollution as a result of the proposed development are insignificant and that future users will not be exposed to pollutant concentrations in excess of relevant air quality objectives. The following conditions were recommended: - **Any gas fired heating boiler installed in the hereby permitted development as part of the heating system must meet a minimum emission standard of <40 mg NOx / kWh.** - **The flue of any combustion plant must terminate above the highest point of the building, which that combustion plant serves so as to maximise dispersal of any residual emissions.** Application granted Aug 2019.

Location	Development Description	Actions Taken
5 Laganbank Road (El Divino Nightclub)	Residential development comprising 154 units and ground floor retail unit, including reception and management suite area, internal and external communal space, open space and environmental improvements, car parking with access of Mays Meadow, bin storage, cycle parking, plant equipment and storage. (amended plans) Ref: LA04/2019/0517/F	AQIA submitted and reviewed with a response provided on NIPP 08/05/2019. The assessment did not adequately demonstrate that future occupants of the development would not be exposed to air quality concentrations exceeding UK objectives during the opening year of the development. Accordingly, the consultant was requested to provide a revised air quality impact assessment for both operational and construction phase of the development. A further response provided 04/10/2019 reviewed the CEMP submitted and confirmed that the contractor will provide a Dust Management Protocol document for use throughout the works and implement mitigation measures to deal with dust generation and migration accordingly.
St. Comgall's Primary School, Divis Street	Refurbishment and improvements to existing main school building, two adjacent pavilions and site to support a range of community-based heritage, culture, education, leisure, seminar and exhibition uses (as well as office, café, toilet accommodation). Ref: LA04/2018/1886/F	An AQIA was submitted and reviewed, with a response provided on NIPP 15/01/2019. The assessment demonstrated that residential properties, located in the vicinity of the St. Comgall's Primary School, will not be exposed to air quality concentrations exceeding UK Air Quality objectives or European Limit Values as a consequence of the proposed redevelopment. The following condition was recommended: - **The installed combustion plant for the proposed development shall meet the technical specification as detailed within the air quality assessment (Chapter 5, WYG: Air Quality Assessment, St Comgall's Primary School Refurbishment, Belfast, BT12 4AQ, March 2019) Application granted June 2019.**
Land at Lyndon Court	Demolition of existing building and erection of 175 bed aparthotel with associated bar, restaurant and conferencing facilities and associated works. Ref: LA04/2019/0553/F	An AQIA was submitted and reviewed, with a response provided on NIPP 06/11/2019. Air Quality Consultants have concluded that there will be no parking spaces associated with the proposed development. Moreover, the proposed development will include a gas boiler no greater than 100kW with an emission rate less than 5mg/sec. As a result, there are no concerns regarding the air quality impacts of the operational phase of the development proposal. The following conditions were recommended: - **The installed combustion plant for the proposed development shall meet the technical specification as indicated within the air quality assessment (Chapter 3, IRWIN CARR CONSULTING: Queen Street**

Location	Development Description	Actions Taken
		Hotel, Belfast: Air Quality Impact Assessment, (March 2019). Moreover, the emissions should be released from a vent or stack in a location and at a height, which provides adequate dispersion. - **A final Dust Management Plan must be submitted to and agreed by the Planning Service. The Dust Management Plan must be based on the dust risk assessment and recommendations detailed by the consultant within the Air Quality Impact Assessment IRWIN CARR CONSULTING Air Quality Impact Assessment, (March 2019).** Application granted Dec 2019.
10-16 Hill Street	Refurbishment alterations to Hill Street façade for new window arrangements and timber cladding, part-demolition and rebuild of rear extension to provide additional floor, and change of use, from existing office block to 17 No. bedroom boutique hotel, with associated ground floor restaurant and bar, and all associated site works. Ref: LA04/2019/0265/F	Response provided on NIPP 11/06/2019. '*It is noted that the existing oil heating system is to be decommissioned... It is noted that no centralised heating system is proposed. Air condition units are proposed. Based on this information we have no further concerns regarding air quality.'* Application granted Jan 2020.
6 Nelson Street	Erection of 2No. boiler flues. Ref: LA04/2019/0337/F	Response provided on NIPP 31/05/2019. The proposed combustion plants are unlikely to give rise to impacts, provided that the emissions are released from a stack in a location and at a height that provides adequate dispersion. Accordingly, the following condition was recommended: - **The installed combustion plants for the proposed development shall meet the technical specification as indicated within CHP Technical Data Sheet for T20 Natural Gas Indoor Canopy and Andrews EC380/1900 gas fired hot water heaters information. Moreover, the emissions should be released from stacks in a location and at a height that provides adequate dispersion and in accordance to the drawing 02 North Elevation A1 (No 17699-90-004).** Application granted June 2019.

Location	Development Description	Actions Taken
721-739 Lisburn Road	Mixed use commercial and residential development providing 79 apartments with associated amenity space, c.8999 sq ft of retail floor space in 6 units, c.6950 sq ft Gym, 67 car parking spaces, bin storage and assoc. site and access works and public realm improvements. Ref: LA04/2019/1100/F	An AQIA was submitted and reviewed, with a response provided on the NIPP dated 11/07/2019. The assessment has demonstrated that future users will not be exposed to pollutants concentrations in excess of the relevant ambient air quality objectives. As a result, there were no concerns regarding the air quality impacts of the operational phase of the development proposal, provided the recommended condition was adhered to: - **The installed combustion plants for the proposed development shall meet the technical specification as indicated within chapter 1.5.10 Air Quality Impact Assessment, 721-739 Lisburn Road, SNC-LAVALIN ATKINS, April 2019. Moreover, the emissions should be released from stacks in a location and at a height that provides adequate dispersion and in accordance to the above assessment information.** Application granted June 2019.
Primark Store	Redevelopment of bank buildings for retail proposal. Ref: LA04/2019/0009/PAD	AQIA reviewed 02/07/2019. The data, in conjunction with the outcomes of the Air Quality Impact Assessment, would indicate that the impact of emissions from the proposed heating system will not be significant on local air quality. Moreover, there is no predicted exceedances of the relevant ambient air quality standards with the boiler heating system in operation. As a result, there were no concerns regarding the air quality impacts of an operational phase of the proposal, provided the following conditions are adhered to: - **The installed combustion plant for the proposed development shall meet the technical specification as detailed within the Air Dispersion Modelling and Air Quality Impact Assessment Report for the Proposed Boiler Heating System in the Primark Belfast – Bank Buildings Reinstatement, AONA Environmental, April 2019 (Chapter 4 and Appendix B).** - **The emissions should be released from a stack in a location and at height that provides adequate dispersion and as indicated within Chapter 4 of the above air quality assessment (the proposed flues of the combustion plant terminates approximately**

Location	Development Description	Actions Taken
		1,500mm above Roof 2 finished level, stack height 29.9m).
57-59 & 61-63 Dublin Road	Demolition of existing buildings and erection of 10 storey mixed use development comprising a restaurant on the ground and mezzanine floors and 71 No. apartments. Ref: LA04/2019/0991/F	A revised assessment, dated 12/08/2019 was subsequently received and reviewed. However, the assessment has seemingly not considered the cumulative impact from road transport and the development's boiler plant emissions. Therefore, the following conditions were recommended: - **Prior to the commencement of the development, the applicant shall submit in writing to the Planning Authority and have agreed, an updated Air Quality Impact Assessment for the proposed development. This updated Air Quality Impact Assessment shall evaluate the overall air quality impact of the proposed development at relevant human health receptor locations, to include transport and combustion plant emissions. The Air Quality Impact Assessment shall be conducted in line with industry best practice and the provisions of the government's Local Air Quality Management Technical Guidance LAQM.TG(16).** - **In the event that the Air Quality Impact Assessment identifies any exceedances of national or European human health based standards or objectives, the applicant is required to provide details of mitigation measures as part of the Air Quality Impact Assessment to be integrated into the development, together with an assessment demonstrating when the human health based standards or objectives are to be achieved.** - **All demolition and construction activities shall be undertaken in line with best practice guidance. Demolition and construction activities shall pay due regard to the current standards; BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014 A2: Noise and Vibration Control on Construction and Open Sites.** Permission granted February 2020.

Location	Development Description	Actions Taken
Queens Road (Lands directly south of Titanic Belfast)	Erection of hotel comprising 276 beds, conference facilities, restaurant /cafe/bar uses (including roof top bar), landscaped public realm, car parking and associated site and road works. Ref: LA04/2019/1636/F	An AQIA was submitted and reviewed, with a response provided on NIPP 05/11/2019. The air quality assessment indicates no significant change in traffic volumes as a result of the development. Moreover, the consultant has stated that the heating system and associated emissions for the proposed development are not likely to be significant. The following conditions were therefore recommended: - **The installed combustion plants for the proposed development shall meet the technical specification (low NOx technology) as indicated within chapter 4.1.4 Air Quality Impact Assessment, Hamilton Dock Hotel, Titanic Quarter (June 2019). Moreover, the flue of any combustion plant must terminate 1m above roof level.** - **Prior to commencement on site, a dust management that includes the mitigation measures outlined within Appendix B of Air Quality Impact Assessment (AQIA), Hamilton Dock Hotel, Titanic Quarter, RPS (June 2019) shall be implemented during any demolition or construction works.**
5-6 College Square North	Change of use & refurbishment of Wilton House to provide 8 apartments including alterations to rear & side elevation of Wilton House and demolition of existing rear return & erection of new build 5-storey residential development to provide 23 dwellings (15 new build) including entrance lobby, courtyard, bin storage and new ramped access off College Square North. (Amended plans and description). Ref: LA04/2018/2097/F	An AQIA was submitted and reviewed, with a response provided on the NIPP dated 06/12/2019. The assessment has sufficiently 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. As a result, there are no concerns regarding the air quality impacts of the operational phase of the development proposal. The following conditions were recommended: - **Mitigation measures, as detailed within Construction Dust Impact Assessment Report, 5-6 College Square North, Belfast, AONA ENVIRONMENTAL, September 2019 shall be implemented throughout the construction phase of the development.**
Land bounded by Royal Avenue York Street and Church Street	Application for outline planning permission for demolition, redevelopment and part change of use to create a mixed use development comprising retail, offices, cafe/restaurant, residential, hotel,	An AQIA was submitted and reviewed with a response provided on the NIPP dated 03/12/2019. The assessment demonstrated no concerns regarding the air quality impacts of the development proposal. However, it was noted that only traffic sources were considered as part of the assessment.

Location	Development Description	Actions Taken
	cultural/community space, parking, servicing, access and circulation arrangements, the creation of new streets, the configuration of Writers Square, public realm works, landscaping and associated site and road works. The proposal includes works to alter listed buildings, restoration of retained listed buildings and facades, and partial demolition of North Street Arcade, retaining its facades. Details of the retained elements of the Listed Braddells building, Former Assembly Rooms and North Street Arcade facades are provided along with the layout of the new Arcade. (Amended scheme, revised description and reduced site area). Ref: LA04/2017/2341/O	Therefore, should the proposed development include any substantial combustion plants at later stage of the design process then the air quality impact associated with the combustion plant will have to be cumulatively assessed together with road transport emissions.
1-27 Castle Street (Primark)	Conservation led redevelopment and restoration of Bank Buildings, including reinstatement of previously removed upper floor structures from Bank Street, Royal Avenue and Castle Street facades and reinstatement of 1970s wall on Bank Street, for the erection of a retail store connecting to existing Primark store on Castle Street with ancillary cafe and associated site works. Ref: LA04/2019/1903/F	An AQIA was submitted and reviewed with a response provided on the NIPP 07/11/2019, stating '*Based on the provided information the Air Quality Impact Assessment would indicate that the impact of emissions from the proposed heating system will not be significant on local air quality. Moreover, there is no predicted exceedances of the relevant ambient air quality standards with the boiler heating system in operation.*' The following conditions were therefore recommended: - **Prior to the operation of the development, the combustion plant for the proposed development shall be installed and meet the technical specification detailed within the Air Dispersion Modelling and Air Quality Impact Assessment Report for the Proposed Boiler Heating System in the Primark Belfast – Bank Buildings Reinstatement, AONA Environmental, dated April 2019 (Chapter 4 and Appendix B).** - **Combustion emissions shall be released from a stack in a location and at height that provides adequate dispersion in accordance with Chapter 4 of the above air quality assessment (the proposed flues of the combustion plant terminates approximately 1,500mm above Roof 2 finished level, stack height 29.9m).**

Location	Development Description	Actions Taken
1-7 Fountain Street	Demolition of existing property and erection of new mixed use development consisting of 176 bed apart- hotel over ground plus 7 upper floors and c.10,000sq.m of office on 6 levels, over ground floor, type a1 ,a2,a3 retail units and carpark consisting of c. 36 parking spaces. Ref: LA04/2018/1580/PAD	An AQIA was submitted and reviewed, however combustion plants not assessed. It is acknowledged that information on the stack design and likely emissions arising from the combustion plants are considered to be indicative at this early stage of the design process. In view of the lack of known detail at this stage regarding the proposed combustion processes for heating and hot water provision, it was requested that the following pre-commencement condition should be implemented: - **Prior to commencement of the hereby permitted development, the applicant must submit an updated air quality impact assessment providing full specification details, including emission rates and flue termination heights, of the proposed combustion systems for heating and hot water. The updated assessment must demonstrate that there will be no significant adverse air quality impacts associated with operation of the proposed combustion plant and with the overall development.** In view of the built-up of location of the development site, as well as the size and nature of development proposed (which includes demolition), the following condition was also recommended: - **Prior to commencement of development on site, including demolition, site clearance or site preparation, a Construction Environmental Management Plan (CEMP) shall be submitted to and approved in writing by the Planning Authority. The CEMP shall include measures to control noise, dust and vibration during the demolition / construction phase, demonstrating the use of 'best practicable means'. No works, development, demolition, site clearance or site preparation shall be carried out unless in accordance with the approved CEMP. The CEMP shall include rationale for and details of the chosen piling methodology and demonstrate that noise and vibration levels will not have an adverse impact on nearby premises. The CEMP must incorporate the dust mitigation**

Location	Development Description	Actions Taken
		measures as detailed in Chapter 5 the AONA Air Quality Impact Assessment, dated March 2019. The CEMP must also have due regard to Parts 1 and 2 of BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites, Noise and Vibration and to the IAQM, 'Guidance on the assessment of dust from demolition and construction version 1.1', and dated February 2014. The PAD has since progressed to a full application (LA04/2019/2299/F), which was reviewed and granted in April 2020.
40-50 Townsend Street	New residential scheme consisting of 39 apartments in 3 blocks varying in height from 3 to 4 storeys. Ref: LA04/2018/2076/F	The revised AQIA was reviewed and a response as provided on the NIPP 18/06/2019, stating that '*The assessment has demonstrated that future users will not be exposed to pollutants concentrations in excess of the relevant ambient air quality objectives. As a result, this Service has no concerns regarding the air quality impacts of the operational phase of the development proposal*'. The assessment also modelled impacts from dust emissions to which a condition was recommended: - **A Dust Management Plan containing recommended mitigation measures be approved by the Planning Service and implemented during on the site construction works.** Permission was granted in November 2019.
43-63 Chichester Street	Demolition of existing building at Oxford and Gloucester House and erection of 11 storey mixed use building, ground floor coffee/restaurant/retail use incl. odour abatement, upper floor office accommodation and all associated site and access works. Ref: LA04/2019/0909/F	An AQIA was submitted and reviewed with a response was provided on the NIPP dated 18/06/2019 stating '*The assessment has indicated that the number of additional vehicle movements are anticipated to be below the level that current guidance suggests could potentially cause a significant effect on local air quality. Moreover, the proposed energy generation plant will only operate as emergency generator in the event of a failure to the national grid supply.*' As a result there are no concerns regarding the air quality impacts of the operational phase of the development proposal.' Dust impacts have also been assessed with a condition recommended: - **Dust management measures, as detailed within chapter 5 of the AECOM: Air Quality Assessment, Chichester Street Paper Exchange (March 2019) shall be implemented throughout the**

Location	Development Description	Actions Taken
		duration of the demolition/construction phase of the development. The proposal was granted in November 2019.
81-87 Academy Street and 2-6 Exchange Street	Erection of 16 storey residential building comprising 105 units (60 x one bed and 45 x two bed), ancillary ground floor uses including management suite, cafe, servicing (refuse/recycling/cycle storage/general storage), roof terrace, plant room, substation and associated public realm works. (Amendment to planning permission reference (LA04/2017/2811/F). Ref: LA04/2019/2257/F	An AQIA was submitted and reviewed, with a response provided on NIPP 24/12/2019, stating that the assessment has demonstrated that future occupants will not be exposed to air quality concentrations exceeding UK Air Quality objectives and that the proposed development will not have a significant impact on air quality in the local area. However, information on the CHP stack design and location are not provided at this stage of the design process; therefore, it was requested that this information to be provided once the final design of the development is agreed. The applicant will be required to submit details of the location and termination height of the CHP flue(s) and additional information on CHP emissions, considering the applicability of the above objective to outdoor aspects of the proposed development to include the roof terrace. The conditions recommended are as below: - **Prior to commencement of development, a Construction Environmental Management Plan must be submitted for review and approval by Belfast City Council. This Plan should outline the methods to be employed to minimise noise, vibration and dust impact from demolition and construction operations demonstrating 'best practicable means. The Plan should pay due regard to BS 5228:2009+1 A1:2014 Code of practice for noise and vibration control on construction and open sites part 1: Noise and Part 2: Vibration, and IAQM Guidance on the assessment of dust from demolition and construction 2014and include the proposed noise, dust and vibration monitoring methods, noise, vibration and dust mitigation methods and arrangements for neighbour liaison.** - **Prior to the installation of the combined heating and hot water plant details of the emission rates and location and height of the termination point (S) of the flue must be provided to Belfast City**

Location	Development Description	Actions Taken
		Council for review and approval in writing. Based on this information an additional air quality assessment may be required. The assessment must demonstrate that occupants of the proposed development, including the users of the roof top terrace will not be exposed to concentrations of air pollution in excess of air strategy objectives. The application is currently ongoing.
Adelaide Business Centre, Apollo Road	Proposed Apart-Hotel (87no. bedrooms & 26 no. serviced apartments), 14no. Business Studios and 10no. live/work studios with associated car parking and landscaping. Ref: LA04/2019/1598/F	An AQIA was submitted and reviewed with a response provided on the NIPP dated 03/09/2019, stating '*The assessment has demonstrated, that exceedances of the air quality objectives for nitrogen dioxide and particulate matter are not expected at modelled receptor locations... RPS have submitted further information to this Service advising that a mechanical ventilation system has been recommended as a mitigation measure for ambient air quality... RPS have advised however that the development proposal does not include any substantial combustion processes, which could have an unacceptable impact at relevant receptors. RPS have added that at this early stage of the design process, there is no detailed information about the proposed combustion plant to be installed for heating and for hot water provision.*' Recommended conditions are detailed below: - **Mechanical ventilation shall be incorporated into the design of the proposed development. The design of the ventilation system, including the position of all air intakes, must take account of the location of nearby industrial emission sources as well as flue termination points for the combustion system to be installed at the proposed development so as to ensure that the occupants of the development are not exposed to air pollution in excess of the UK Air Quality Strategy objectives.** - **In the event that a combustion plant is proposed at a subsequent design stage of the development, which has a single or combined NOx emission rate greater than 5mgs-1, the applicant must submit an updated air quality impact assessment for the development. The assessment**

Location	Development Description	Actions Taken
		shall include a specification for the combustion plant to be installed, to include emission rates and flue termination heights, of the proposed combustion systems for heating and hot water. The updated assessment must demonstrate that occupants of the proposed development will not be exposed to concentrations of air pollution in excess of air strategy objectives. The application is currently ongoing.
Botanic Link	Purpose built managed student accommodation with 253 beds comprised of 220 cluster beds and 33 studio flats, shared communal facilities reception/management suite, retail/café unit fronting Botanic Avenue, external amenity space, provision of cycle stands, public realm works at University road and Botanic Avenue, and other ancillary accommodation including plant, storage and refuge areas. Ref: LA04/2019/0417/F	An AQIA was submitted and reviewed, with a response provided on the NIPP 10/04/2019, stating '*The assessment has demonstrated that future occupants will not be exposed to air quality concentrations exceeding AQ objectives and European Limit Values.'* As a result, there are no concerns regarding the air quality impacts of the development proposal. However, the following condition has been recommended: - **The boilers and central heating plant associated with this permitted proposal shall meet the technical specification (or equivalent) as detailed in section1.45 and table 1.21 of RPS: Air Quality Impact Assessment Report, Proposed Student Accommodation, Botanic Link, Belfast (February 2019). The flue will terminate above roof level.** Planning approval was granted in June 2019.
Former Monarch Laundry Site	Residential development of 53No. apartments (minimum building height 2.5 storey with maximum 5 storey), 53No. car parking spaces, refuse storage and cycle parking area, landscaping and all associated site and access works. LA04/2019/1445/O	An AQIA was submitted and reviewed, with a response provided on the NIPP 25/09/2019. Several queries were raised regarding the robustness of the modelling. Given these issues, the conditions below were recommended: - **A Dust Management Plan containing the recommended mitigation measures as detailed within Section 7. Mitigation of the WYG MKB57 Limited, Former Monarch Laundry Site, Belfast. Proposed Residential Development Air Quality Impact Assessment May 2019 shall be implemented throughout all demolition and construction works on the site.** - **At the reserved matters stage, the applicant shall submit for written approval a revised Air Quality**

Location	Development Description	Actions Taken
		Impact Assessment. The AQIA shall adequately assess the cumulative impact of both transport and combustion plant sources on future residential receptors. The application was granted in December 2019.
Giant's Park	Leisure Mixed Use Development (281 Ha). Ref: LA04/2019/0409/DET	The proposed development is likely to significantly increase road traffic on local roads where exceedances of air quality objectives are recorded. Therefore, in order to address the likely impact of this development and to mitigate the adverse health effects associated with air pollution; this Service would request that a detailed Air Quality Impact Assessment be carried out to the satisfaction of this Service. (Full Planning application LA04/2019/1540/F now under consideration)
Giant's Park	Centralised Anaerobic Digestion (CAD) plant to include a bunded tank farm, (6no. digester tanks, 2no. buffer tanks. 1no. storage tank and associated pump rooms), biogas holder, biogas conditioning system, temperature control system, waste-water treatment plant (WWTP), motor circuit control room building, hot/cold water recovery system, feedstock reception and digestate treatment building, product storage building, odour control system and associated tanks, emergency gas flare, back-up boiler, administration/office building, car parking, 3no. weighbridges, fire water tank and pumphouse, pipelines to existing combined heat and power (CHP) plant engines, switchgear, earth bunding, 3no. accesses to existing Giant's Park Service road infrastructure and ancillary plant/site works. Ref: LA04/2019/1540/F	An AQIA was submitted and reviewed, with a response provided on NIPP dated 21/10/2019 stating that proposed and existing sensitive locations will not experience a significant air quality impact. The AQIA also predicted pollutant concentrations to be significantly lower than the appropriate guideline limits therefore, there are no concerns regarding air quality impact from operation of the proposed Anaerobic Digestion plant. However, the following advice was given to ensure no impacts from the proposed development: - **The Applicant is advised that 'Medium Combustion Plant' may require authorisation as a consequence of the transposition of the Medium Combustion Plant Directive into Northern Ireland legislation via the Pollution Prevention and Control (Industrial Emissions) (Amendment) Regulations (Northern Ireland) 2018. This Legislation is enforced by the Northern Ireland Environment Agency and Local Authorities. The relevant statutory body for this plant will contact the applicant with details of the authorisation process in due course.**
Lands at Glenmore adjacent to Monagh By-Pass	Proposed major mixed-use development comprising 652 no. Dwellings (522 no. social housing units and 130 no. affordable housing units); 2 no. replacement Residential Care Homes; Mixed Use Area including Local	A detailed AQIA has been requested (dated 09/08/2019).

Location	Development Description	Actions Taken
	Neighbourhood Retail Centre, Coffee Shop and Hotel; Class B Business Uses within Employment Zone comprising Class B1 (b) and (c) Offices and Light Industrial Units; and Community Facilities including Community Building and Multi-Use Games Area (MUGA) Pitch. Development Includes access from Monagh Bypass, associated internal road network, open space, children's play area(s), landscaping and all other site and access works. Ref: LA04/2019/1474/PAD	
Lands at Glenmore adjacent to Monagh By-Pass	Proposed major mixed-use development comprising 652 no. Dwellings (522 no. social housing units and 130 no. affordable housing units); 2 no. replacement Residential Care Homes; Mixed Use Area including Local Neighbourhood Retail Centre, Coffee Shop and Hotel; Class B Business Uses within Employment Zone comprising Class B1 (b) and (c) Offices and Light Industrial Units; and Community Facilities including Community Building and Multi-Use Games Area (MUGA) Pitch. Development Includes access from Monagh Bypass, associated internal road network, open space, children's play area(s), landscaping and all other site and access works. Ref: LA04/2019/1462/DET	As above (dated 13/08/2019).
Parklands, Knocknagoney Dale, Knocknagoney	Demolition of existing residential building and construction of 90No. apartments with associated car parking and landscaping. Ref: LA04/2019/0025/F	An AQIA was submitted and reviewed, with a response provided on the NIPP 26/02/2019, stating that the findings of the air quality assessment indicate that there are no significant impacts on relevant receptors or no significant impacts on existing air quality associated with the proposed development. Based on the information submitted, the following condition was recommended: - **The gas-fired boilers installed within the proposed development shall meet the technical specification as detailed within the air quality impact assessment (Chapter 1.4.4 and Appendix 2,**

Location	Development Description	Actions Taken
		RPS Air Quality Impact Assessment, November 2018). The proposal was granted in September 2019.
Queen's PEC	Installation of a combined heat and power unit (CHP). Ref: LA04/2019/2192/F	Technical information of the combustion plant proposed as part of the application was requested on 12/12/2019.
RVH Energy Centre	Enabling works, for a new energy centre, to include the construction of a cross-over duct, single storey medical gas house, VIE compound, the demolition of existing buildings and all associated works. Ref: LA04/2018/2669/F	The response provided on the NIPP on 19/06/2019 states '*the purpose of the submitted assessment is only to determine a suitable stack height for the new energy centre and to assess cumulative effects of the operational phase of the proposed and temporary combustion plants. It is understood that these works will be subject to a separate planning application. The works associated with the planning application LA04/2018/2669/F are not a part of this assessment.*' The AQIA was also submitted and reviewed with no concerns, and a recommended condition was applied: - **Installed combustion plants for the proposed development shall meet the technical specification as detailed within the air quality assessment (RVH, Energy Centre Air Quality Assessment, MOTT MACDONALD, March 2019). Moreover, the emissions should be released from stack in a location and at a height that provides adequate dispersion and in accordance to the Consultants specification (70m).** This proposal was granted in November 2019.
15 Scrabo Street	Residential development comprising 151 apartments and ancillary uses including; management suite, communal space, reception area and servicing (refuse/recycling/bicycle storage) and plant equipment; and associated car parking and public realm improvements to Scrabo Street, Station Street and Middlepath Street. Ref: LA04/2019/2387/F	An AQIA was submitted and reviewed, with a response provided on the NIPP 25/11/2019 noting concerns regarding the assessment, therefore a revised AQIA was requested. This proposal is ongoing.
Stockman's Way	Erection of mixed-use development consisting of a 25no. bed hotel and 88no. apartments with associated car parking, landscaping and road widening works to Stockman's Way.	An AQIA was submitted and reviewed, with a response provided on the NIPP 12/09/2019, stating no concerns. However, as it was unknown at that stage whether any combustion plant would be proposed as part

Location	Development Description	Actions Taken
	(Revised description and amended plans received). Ref: LA04/2019/1615/F	of the assessment, the following condition was recommended: - **In the event that substantial combustion plant/plants is proposed at further stage of the development's design, the applicant must submit an updated air quality impact assessment providing full specification details, including emission rates and flue termination heights, of the proposed combustion systems for heating and hot water. The updated assessment must demonstrate that there will be no significant adverse air quality impacts associated with operation of the proposed combustion plant and with the overall development.** This proposal is ongoing.
Westgate House, 2-4 Queen Street	Demolition of existing building and construction of 54no. apartments with associated landscaping and a retail unit at ground floor. Ref: LA04/2019/0068/F	An AQIA was submitted and reviewed, with a response provided on the NIPP 01/05/2019 stating no concerns with a recommended condition: - **Prior to the commencement of construction or demolition works on site, a final Dust Management Plan must be submitted the Planning Service for approval in writing. The Dust Management Plan must be based on the dust risk assessment and recommendations detailed within the RPS report: Air Quality Impact Assessment, Westgate House, Queen Street/Castle Street, Belfast, Report reference NI1923_031218_AQF01, dated December 2018.** This proposal is still under consideration of the Planning Authority.
15 Wildflower Way	Demolition of buildings and clearing of site for a retail warehouse building, associated car parking and accesses. Ref: LA04/2019/1782/F	An AQIA was submitted and reviewed, with a response provided on the NIPP 24/12/2019 noting concerns with the assessment. A revised AQIA was therefore requested.
Casement Park	Re-development of Casement Park to provide a new Stadium (Capacity of 34578). Development comprises: demolition of the existing facilities; construction of new pitch, boundary wall and stands, incorporating bar/restaurant & ancillary kitchen areas, conference, training, community and cultural heritage	Additional information was reviewed in October 2019. This service was satisfied with the methodology of the AQIA and that residents would not be exposed to exceedances in ambient air quality objectives. However, the following conditions were recommended: - **Prior to the commencement of the of the demolition/construction phase of the development, and in**

Location	Development Description	Actions Taken
	and education facilities, ancillary offices, player accommodation and welfare facilities, press/media & broadcast facilities, replacement floodlighting, stadium/event management suite, ground support facilities including new arrangements for vehicles and pedestrians, electronic display installations, storage, surface and undercroft car parking, hard and soft landscaping, new landscaped pedestrian access from Mooreland Park to Stockman's Lane. Use of the stadium for up to three outdoor music concerts in any calendar year (Further environmental information received Feb 2020. Ref: LA04/2017/0474/F	**accordance with Sub-section 11.4.6 and Section 11.6 of Chapter 11.0 Air Quality, Odour and Climate of the RPS Environmental Statement (ES) 2018, a final Dust Management Plan shall be submitted to the Planning Authority for written approval. The dust mitigation measures detailed within the Draft Construction Environmental Management Plan (Draft Dust Management Plan, Appendix 4 of Volume III Appendix 2.1) shall be adopted within a final Dust Management Plan. The Dust Management Plan shall be implemented as agreed.** - **The Dust Management Plan contained within the Construction Environmental Management Plan (CEMP), as approved by the Planning Authority, shall be implemented for the duration of the demolition/construction phases of the development.** - **The combustion plant installed within the proposed development shall meet the technical specification as detailed within Appendix 11.3 and Sub-section 11.4.10 of Chapter 7.0 Air Quality, Odour and Climate of the RPS Environmental Statement (ES) 2018.** - **Prior to operation of the development, the four cooking odour abatement systems shall be installed to a 'very high level' of odour control in accordance with the specifications contained within Sub-section 11.6.2.1, Section 11.6 Mitigation Measures, Chapter 11.0 Air Quality, Odour and Climate of the RPS Environmental Statement (ES) 2018, and in compliance with industry guidance EMAQ+ 'Control of Odour and Noise from Commercial Kitchen Exhaust Systems' issued September 2018. The odour abatement systems shall be permanently retained thereafter.** - **Prior to operation of the development, the four odour abatement flue discharge points shall terminate at least 1000mm above the finished roof line of the**

Location	Development Description	Actions Taken
		development in accordance with the annotated detail presented in Drawing Number MMD-310320-M-DR-00-XX-4004 (Restaurant Level – Kitchen extract and Flue Strategy Layout) and MMD-310320-M-DR-00-XX-4005 (Upper Concourse Level - **Kitchen extract and Flue Strategy Layout) of 'RPS - Further Environmental Information (FEI) July 2019, Updated Figure 2.1', Dfl date stamp 11th July 2019. The odour abatement flues shall be permanently retained thereafter.** - **The four cooking odour abatement systems installed within the development shall be cleaned and maintained in accordance with the manufacturer's instructions to ensure compliance with the above condition.** This application is ongoing.
3-9 Dalton Street	Demolition of existing building and construction of 178No. apartments, a gym, 3No. retail units and associated car parking and landscaping. Ref: LA04/2018/2649/F	An AQIA was submitted and reviewed, with a response provided dated 21/05/2019 stating that the assessment has demonstrated that the operational impact of the proposed development on existing receptors in the local area is predicted to be negligible and also future occupants will not be exposed to air quality concentrations exceeding AQ objectives and European Limit Values. As a result, there are no concerns regarding the air quality impacts of the development proposal. This application is ongoing.
King's Hall	Mixed-use regeneration proposal for the former RUAS site around the King's Hall. Outline planning permission with all matters reserved for retirement living at Plot 6, medical or health services at Plot 9, multi-storey car park, local retail uses, restaurant and cafe uses, leisure and gym facilities at Plot 8, associated internal access roads, new public realm and amenity open space including central plaza and access from Upper Lisburn Road (as per planning approval reference LA04/2018/0040/F). Outline planning permission with no matters reserved for residential development at Plot 3 with ground floor local retail use/	A detailed Air Quality Impact Assessment was requested at the PAD stage.

Location	Development Description	Actions Taken
	restaurant and cafe uses/leisure and gym facilities, associated landscaping, car parking and access from Upper Lisburn Road (as per planning approval reference LA04/2018/0040/F). Ref: LA04/2019/1426/PAD	
Former Sirocco Works, Short Strand	Mixed use development comprising offices, residential apartments (including affordable), hotel and serviced apartments, retail and professional services, community and cultural, leisure uses, cafes, bars, restaurants, with associated car parking, circulation and servicing arrangements; public realm works, landscaping, replacement of existing pedestrian bridge fixed to railway bridge and associated access works to Short Strand and Bridge End with other infrastructural works, and demolition of existing structures including boundary walls. (Revised description and amended/additional info). Ref: LA04/2018/0811/O	An AQIA was submitted and reviewed, with a response dated 06/06/2019 stating no major concerns with the assessment. However, it was noted that the proposed gas heating system, to include combustion flue locations and emission discharge velocities, have not been detailed in full at this stage. To enable the best dispersion of emissions, it was therefore requested that the following condition be attached to any planning permission granted: - **Prior to commencement of each phase of the development, the applicant shall submit to the Planning Authority for approval a detailed Air Quality Impact Assessment (AQIA). The AQIA shall confirm the final design of the centralised energy and hot water plant and demonstrate that there are no significant adverse air quality impacts associated with the operation of the proposed plant and the development and that modelled air pollution levels will not exceed the air quality objectives at human health receptor locations.** - **The flue of any combustion plant must terminate above the highest point of the building, which that combustion plant serves.** - **The installed gas boilers for the proposed development shall meet the technical specification as detailed within the Appendixes 10.1 and 10.2 ES, FEI Volume Three, January 2019.** - **Prior to any work commencing for each phase of development on site, including demolition, site clearance or site preparation, a Construction Environmental Management Plan (CEMP) for that phase shall be submitted to and approved in writing by the Planning Authority. The CEMP shall include measures to control noise, dust and vibration during the demolition / construction**

Location	Development Description	Actions Taken
		phase demonstrating the use of 'best practicable means'. No works, development, demolition, site clearance or site preparation shall be carried out unless in accordance with the approved CEMP. The CEMP shall include rationale for and details of the chosen piling methodology and demonstrate that noise and vibration levels will not have an adverse impact on nearby premises. The CEMP must incorporate the dust risk assessment recommendations identified within the RPS Air Quality Assessment, ES June 2018. The plan must have due regard to parts 1 and 2 of BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites, and IAQM 'Guidance on the assessment of dust from demolition and construction 2014'. This application is ongoing.

5 Air Quality Planning Policies

Most developments across the city are subject to the Planning process, which provides an opportunity to identify and prevent potential air quality problems from arising in the first place.

In June 2009 and in view of the need for a consistent approach to air quality management as part of the planning process, Belfast City Council launched its *'Air quality and land use planning: A Belfast specific guidance note for developers and air quality consultants*' document. The document outlines what the council's Environmental Protection Unit, as an internal consultee to the Belfast Planning Service, would look for in forming its opinion on a proposed development and its potential impact on ambient air quality.

Since production of this Belfast specific guidance document, Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have produced their 2017 guidance document entitled, '*Land-Use Planning & Development Control: Planning For Air Quality Guidance from Environmental Protection UK and the Institute of Air Quality Management for the consideration of air quality within the land-use planning and development control processes'*. The council's Environmental Protection Unit now refers to the qualifying criteria set out in this document in order to determine when an Air Quality Impact Assessment is required.

Belfast City Council is currently developing its Local Development Plan (LDP) that outlines how land across the city will be used and developed in the future. The Belfast Local Development Plan - Draft Plan Strategy 2035 consultation document includes numerous references and commitments to improving air quality across the city. In addition, Appendix E: List of Supplementary Planning Guidance indicates that a new Supplementary Planning Guidance document (ENV1) will be published specifically to address 'Environmental Quality'. Ambient air quality will be a key component and consideration of this supplementary planning guidance document and it is noted that where relevant to a particular development proposal,

Supplementary Planning Guidance will be taken into account as a material consideration in making planning decisions.

6 Climate Change Strategies

In October 2019, Members of Belfast City Council declared a climate emergency and agreed that urgent action was needed to prepare for climate change, agreeing to take forward its adaptation and mitigation plans in tandem in order to expedite the process.

The plans form part of the Council's wider Resilience Strategy which aims to transition Belfast to an inclusive low-carbon, climate-resilient economy within a generation.

Belfast City Council is committed to:

- becoming a carbon-neutral organisation as urgently as possible
- producing an action plan setting out how we will become a carbon-neutral organisation
- work with partners across Belfast and with central and devolved government to seek to ensure that Belfast district's net carbon emissions are reduced by 80% compared to 2005 levels as quickly as possible

Currently the council is working towards publishing a climate adaption and mitigation plan. When published in 2021, the plan will aim to deliver the vision set out in the draft Belfast Resilience Strategy - to transition to a low-carbon economy in a generation.

The plan is being developed in consultation with a number of cities as part of Belfast's membership of the Resilient Cities Network.
Our climate plan will focus actions that we can take as a council in relation to:

- Climate adaptation - actions taken to prepare for the effects of climate change, such as building flood defences.
- Climate mitigation - processes associated with preventing or alleviating the impacts of climate change, such as reducing greenhouse gas emissions by reducing our carbon footprint.

7 Implementation of Action Plans

In 2006, the council, along with relevant partner organisations launched its first 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 across the city, limit values for nitrogen dioxide continue to be exceeded and give cause for concern in a few remaining 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 to promote and enable a shift onto more sustainable modes of transport to achieve compliance with the NO_2 annual mean EU limit value by 2020. Table 6.1 below provides progress information on the 2015 Belfast Air Quality Action Plan since its launch.

The Air Quality Action Plan (AQAP) 2015-2020 is scheduled to conclude at the end of this year, and the council has already commenced working on the new AQAP for the city.

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. The Model has been used in the Belfast Metropolitan Transport Study for preliminary testing of illustrative measures. Preliminary work has commenced to procure model enhancements and revalidation prior to detailed modelling works to be undertaken as part of the development of a new Belfast Metropolitan Transport Plan.	Completed March 2017

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date
2	Belfast Rapid Transit (BRT)	Increase in the usage of the public transport would contribute to reduced congestion and improved air quality.	DfI	Complete	Now complete. BRT came into operation on 3 September 2018. The service has proved extremely successful with patronage figures showing some 45,000 additional passenger journeys per week on the BRT corridors, when compared with the previous year. This is an increase of some 30%. When patronage on the BRT corridors is compared to the 2013 baseline figure (prior to the commencement of the BRT implementation works) this is an increase of some 70%. Programme completed and system launched in September 2018. In the first year of full operation, public transport usage on the BRT Glider corridors was up by over 70% (approximately 4.5 million additional journeys) compared to the baseline patronage numbers in 2014, when delivery of the programme commenced.	Complete

3	Belfast Transport Hub	Experience in Great Britain and Europe shows that investing in public transport infrastructure, particularly this type of project, can improve public transport uptake. Increase in the usage of the public transport generally contributes to reduced congestion and improved air quality,	DfI / Translink	Enabling Works commenced Q1 2020 Main Works due to commence Q1 2022	Feasibility design complete and OBC1 approved for single option development. Enabling Works commenced Q1 2020 Main Works due to commence Q1 2022 Estimated opening of new station Q3 2024 Estimated full completion Q4 2025 **Enabling Works** • Foundations for temporary buildings for engineering and bus welfare facilities modular buildings underway • Excavations in preparation for bus routes and soil remediation underway • Design submissions ongoing • Utility diversion planning underway and route options being planned with statutory authorities • Temporary modular offices being procured with installation planned for Q1 2021 **Main Works** • Arup design for main works to be completed in June 2020 •First stage tenders being assessed – two bidders to be selected for second stage in July 2020	Estimated opening of new station Q3 2024 Estimated full completion Q4 2025

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date
					• Second stage tender process to be launched September 2020 • Main Works Contractor scheduled to be appointed Q3 2021 • Babcock Rail Systems have been appointed to carry out Early Contractor Involvement for Permanent Way works and design for Signalling & Telecoms • Application submitted in April 2020 for Peace Plus European Funding on Rail Systems	
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	A public consultation on the draft Belfast Bicycle Network was held in January 2017 and in early 2018, a consultation report was published. The Department has since done further work on developing an active travel feasibility study for north and west Belfast. Over coming weeks, the Minister wants to consider carefully how the provision and enhancement of dedicated cycle routes can assist as part of her vision to enable infrastructure that provides safer, sustainable transport that connects communities and improves lives.	Ongoing

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date
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 320 22kWh (fast) charge points at 160 locations and a further 17 50kWh DC rapid 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 Utility Regulator recently published its decision to remove the Maximum Resale Price (MRP) of Electricity on the electricity cost of charge points following consultation, allowing commercial operators to charge above cost price for electricity supply. It is anticipated this will support the development and maintenance of ULEV public infrastructure (and therefore also the uptake of ULEV's). 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
6	Park and Ride (P&R) (Bus & Rail)	DfI considering additional Park & Ride 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. The Park & Ride Strategic Delivery Programme (2016-2020) has delivered over 1,400 spaces. A new Programme has been established for the period 2021-2024 and will deliver further additional spaces.	Ongoing

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date
7	York Street Interchange	The York Street interchange redevelopment will in effect improve the throughput of traffic and reduce background concentrations of NO_2.	DfI	Scheme on hold pending funding. Possible start 2022	On hold – current review of DFI spending priorities ongoing	Estimated completion 2026

<table>
<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>The Metro & Glider Euro Class Profile 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>0</td><td>0.00%</td></tr>
<tr><td>Euro 3</td><td>47</td><td>16.79%</td></tr>
<tr><td>Euro 4</td><td>36</td><td>12.86%</td></tr>
<tr><td>Euro 5</td><td>54</td><td>19.29%</td></tr>
<tr><td>Euro 6</td><td>143</td><td>51.07%</td></tr>
</table>

Back in March 2017 things looked 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>

While this is how things looked back in April 2010:-</td>
<td>2020</td>
</tr>
</table>

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date

Euro Class	Number of Vehicles	% of Vehicles
Pre Euro	0	0.00%
Euro 1	26	9.25%
Euro 2	56	19.93%
Euro 3	155	55.16%
Euro 4	44	15.66%
Euro 5	0	0.00%
Euro 6	0	0.00%

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	• Extensive marketing/Communications carried out for Smartmovers campaign (focus on environmental benefits & active travel, 'Take a Breather' (new Smartmovers fully integrated mar/comms campaign commenced March 2017) • Dedicated Bus &Train Week (2016-2019) included multi-agency Active Travel Challenge • NI Railways 1/3 off campaigns to promote off-peak travel • NI Railways campaign to promote commuter travel • aLink campaign to promote annual travel product (Tax Smart scheme withdrawn by HMRC in 2018) • Promotion of secure cycle shelters at selected Glider halts & train stations • 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 • Enterprise business and leisure travel campaigns and seasonal campaigns including January Seat Sale, Dublin Day Tripper. • Summer, Easter, Halloween & Christmas offers	Ongoing

					• Seasonal late night Nightmovers services – Metro, Goldline and NI Railways • Back To School campaign 'A Breath of Fresh Air' • NI Railways 'Lucky Seats' promotion including CoolFM presenter travel videos • Glider Campaigns: Teaser, Launch, I Get Glider, Easy Glider & 1st birthday (over 2 million more journeys in year 1) • Metro & Glider dayLink promotion • Metro is Belfast Campaign • Metro & Glider Campaigns: special evening, weekend, Christmas evening and Christmas day fares • Airport Express Summer & Mid-Term service promotion • Balmoral Show Transport Partner Activity • Ulsterbus & Goldline-return for a single after 9.30am, X1X2, X3X4 and X5 cross border online promotion • Foyle Metro service launch 2017, Foyle Metro brand campaign • Ulsterbus Causeway Rambler • Goldline 212 Giants Causeway promotion of service • Ulsterbus Peninsula Day Ticket • Ulsterbus 404 Bangor to Newcastle	

					• yLink campaign, 50% off summer single promotion, over 65k card sales and 41k active cards • Youth Engagement events: Translink Youth Summits 2017 & 2018 and Translink Regional Roadshows 2019 • Since 2014/15 financial year Metro and Glider services have increase passenger journeys to over 30 million per year (2019/20). That is an impressive increase of over 4 million journeys (+15.5%) Old Comments: In addition, 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	

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date
					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 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

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date
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
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	A low number of replies were received from local businesses when they were consulted regarding possible reductions to hours of operation of servicing and loading bays. Another consultation exercise will be carried out once the current Covid restrictions are relaxed.	2017
13	Just Eat 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 a network of 47 stations throughout the city. The scheme has now generated over 900,000 trips. A strategic review has been completed to inform future operation and any potential expansion of the scheme.	Completed 2015 & ongoing expansion

<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>14</td><td>BCC Fleet Improvement</td><td>This will reduce overall emissions from council fleet.</td><td>BCC</td><td>2015</td><td>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.

Current Euro Class breakdown for the BCC Fleet is as follows: -

<table>
<tr><th>Euro Standard</th><th>Fleet Composition 01/04/20</th><th>% of Vehicles</th></tr>
<tr><td>Euro 3</td><td>7</td><td>2</td></tr>
<tr><td>Euro 4</td><td>32</td><td>8</td></tr>
<tr><td>Euro 5</td><td>72</td><td>19</td></tr>
<tr><td>Euro 6</td><td>168</td><td>44</td></tr>
<tr><td>Electric</td><td>12</td><td>3</td></tr>
<tr><td>Plant/Ag</td><td>90</td><td>24</td></tr>
<tr><td>Total</td><td>381</td><td>100</td></tr>
</table>
</td><td>Ongoing</td></tr>
</table>

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: • Development of a draft Bicycle Network for Belfast by DfI; • Funding of a workplace active travel programme by PHA; • Support to community walking and cycling programmes via Active Belfast; and • Delivery of an annual Active Travel Challenge by Sustrans. The remaining 5 actions are considered at Phase 2 below: Legacy and associated actions of the Active Travel Plan have continued to be implemented through a series of collaborative partnerships, including: • The delivery of a comprehensive active travel schools programme, funded by PHA and DfI and delivered by Sustrans; • The extension of a workplace active travel programme, funded by PHA and delivered by Sustrans;	2020

No.	Measure	Focus	Lead Authority	Planning & Implementation Phase	Progress since 2015	Estimated Completion Date
					• The continuation of community active travel programmes, funded by PHA and delivered by Sustrans; • The expansion of the annual Sustainable Travel Challenge, to include the weeks of public transport, walking and cycling. Funded by PHA, DfI and Translink, with the Challenge platform delivered by Sustrans; • The publication of the Bike life Belfast (2019) report, which monitors trends and attitudes to cycling in the city. Funded through DfI and delivered by Sustrans; • The launch of the Cycle Friendly Employers Accreditation scheme and accreditation of the first series of employers in the city, including QUB and DfI.	

8 Conclusions and Proposed Actions

8.1 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 exceedances of the nitrogen dioxide annual mean and hourly objectives. There were no monitored exceedances for any of the Air Quality Strategy objectives for sulphur dioxide, benzene and particulate matter during 2019.

Nevertheless, 2019 monitoring data for nitrogen dioxide confirms continuing exceedances of the annual mean for nitrogen dioxide in the vicinity of Stockman's Lane, which is located within the M1 Motorway / A12 Westlink Air Quality Management Area. Similar exceedances of the annual mean objective were recorded at Henry Place and Great George's Street, near to the end of the A12 Westlink where it joins with the M2 and M3 motorways and also at two other roadside diffusion tube sites at Black's Road and opposite Westlink AQMS located along the Westlink corridor.

However, the nitrogen dioxide 2019 annual mean at Stockman's Lane site was 45 μgm^{-3} which is 8% reduction from the previous year's annual mean of 49 μgm^{-3}. Moreover, the nitrogen dioxide 2019 annual mean concentrations (34 μgm^{-3}) monitored at the Westlink Roden Street site also decreased in comparison to the previous year's annual mean (40μgm^{-3}). The annual mean air quality objective has not been exceeded at the Westlink Roden Street since 2011.

From ambient monitoring data for Stockman's Lane and Westlink/Roden Street as summarised in Table 2.4, it can be seen that the number of exceedances of the hourly objective has substantially decreased over recent years, now demonstrating compliance with the 200 μgm^{-3} objective, not to be exceeded more than 18 times per

year - since 2013. In fact, there were no hours at both sites in 2019 when the hourly means exceeded 200µgm^{-3}.

Historical monitoring data for the Upper Newtownards Road Air Quality Management area revealed sustained exceedances of the nitrogen dioxide annual mean objective. The last number of years have however demonstrated decreases 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 has been beyond the year-on-year reductions that might have been reasonably 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 Knock Road non-automatic roadside diffusion tube site, located at the junction of the Upper Newtownards Road, Hawthornden Way and the Knock Road has recorded exceedances of the annual mean objective in previous years up until 2017. The 2017 calendar year was the first year when the annual mean concentration at the Knock Road junction was below the air quality objective (36 µgm^{-3}), which is also the case in 2019 (35 µgm^{-3}). The council will therefore continue to monitor nitrogen dioxide concentrations along the Upper Newtownards Road and at the junction with the Knock Road in order to determine whether this improvement in ambient conditions is sustained and what implications it may have for this Air Quality Management Area.

The Belfast Ormeau Road site experienced extensive problems with the air conditioning during 2012 and 2013, preventing the monitoring equipment working to full capacity. The site enclosure was upgraded in 2014, which has resolved this problem. Following the site upgrade, the annual mean concentration has remained reasonably constant at 27 µgm^{-3} in 2014, 27 µgm^{-3} in 2015, 28 µgm^{-3} in 2016, 25 µgm^{-3} in 2017, 26 µgm^{-3} in 2018 and 24µgm^{-3} in 2019.

On the basis of this data, which demonstrates nitrogen dioxide concentrations significantly below the annual mean air quality objective, the council has considered the case for revoking the Ormeau Road Air Quality Management Area (AQMA) for

exceedance of the nitrogen dioxide annual mean objective. During 2019, the council liaised with the Department for Agriculture, Environment and Rural Affairs regarding the potential revocation. It has however been decided that since monitoring data from the Ormeau Road site forms part of the calculation of the Draft Programme for Government Framework 2016 – 2021 Indicator 37: Improve air quality, that this AQMA and associated monitoring will remain in place over the next few years.

In conclusion, Belfast City Council will continue to monitor ambient nitrogen dioxide levels at all current monitoring locations in order to ensure that recent downward trends are maintained.

Finally, Belfast City Council confirms that no new Air Quality Management Areas need to be declared for the city at this time.

8.2 Conclusions relating to New Local Developments

Of the planning applications received and reviewed in 2019, it was concluded that 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 detailed consideration. It is therefore not considered necessary to proceed to a 'Detailed Assessment' based on new local developments or potential sources.

8.3 Proposed Actions

In conclusion, the 2019 Progress Report has not identified the need to proceed to a Detailed Assessment for any pollutant under consideration.

However, the council is aware of the recent evidence from national studies showing that domestic solid fuel burning contributes more than previously thought to particulate emissions. Belfast City Council has therefore decided to undertake a detailed assessment for the city, for fine particulate matter $PM_{2.5}$ and nitrogen dioxide pollutants. It is anticipated that this project will commence later in 2020.

Furthermore, Belfast City Council has already highlighted that it operates an expansive air quality monitoring network across the city, predominantly for nitrogen dioxide. 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.

Moreover, to ensure that we continue to collect high quality data, Belfast City Council has replaced its ageing API NOx analysers at three monitoring sites; the Upper Newtownards Road, Stockman's Lane and Ormeau Road. The non-heated Met One Instruments BAM 1020 PM_{10} particulate matter analyser, located at the Stockman's Lane site, has also been upgraded to a new heated inlet instrument. The only analyser, which has not been replaced since the last 2019 Progress Report, is the API 200E NOx analyser, located at Westlink/Roden street site, which still continues to perform satisfactorily and remains supported by the manufacturer.

With regard to our four Air Quality Management Areas, a review of the monitoring data for these Air Quality Management Areas indicates that there have been some recent improvements in annual mean nitrogen dioxide levels across the city. As a result, Belfast City Council will reconsider revocation of the Ormeau Road and Upper Newtownards Road AQMAs, where monitored data demonstrates sustained improvements in annual mean nitrogen dioxide concentrations, with levels now significantly below the Air Quality Objective. Accordingly, the council will liaise with the Department for Agriculture, Environment and Rural Affairs, Department for Infrastructure and other relevant authority partners regarding these potential revocations.

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Environment (Northern Ireland) Order 2002.
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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

In previous years, Belfast City council has 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.

However, in 2019 due to low data capture (51%), the Belfast Centre site did not meet the criteria to be considered an adequate collocation study site. (9 valid periods of data with the analyser's data capture >=75%)

Belfast City Council also carried out triplicate collocation studies at three roadside automatic monitoring stations Ballyhackamore, Westlink/Roden Street and Stockman's Lane during 2019.

Precision calculations undertaken for all the above sites in the co-location study indicated a "good" precision rating for all measurement periods. Automatic monitoring data capture rates were considered "good" at all sites with more than 95% data capture for all measurement periods.

Therefore, the Belfast local bias adjustment factor for 2019 was calculated based on all three roadside collocation studies and in accordance to *LAQM Technical Guidance (TG16)* sections 7.191-7.197. The overall bias factor was calculated as 0.91.

The local bias adjustment factor was calculated 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 spreadsheets 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	08/01/2019	06/02/2019	39.9	36.5	36.1	37	2.1	6	5.2	38.5	99.86	Good	Good
2	06/02/2019	05/03/2019	32.4	29.7		31	1.9	6	17.5	27.6	93.75	Good	Good
3	05/03/2019	04/04/2019	28.5	30.3		29	1.3	4	11.9	26.1	94.64	Good	Good
4	04/04/2019	01/05/2019	23.8	22.7	22.8	23	0.6	3	1.5	25.5	99.85	Good	Good
5	01/05/2019	06/06/2019	26.8	26.0	25.9	26	0.5	2	1.3	24.1	99.89	Good	Good
6	06/06/2019	03/07/2019	24.6	24.2	25.4	25	0.6	3	1.6	21.2	100.00	Good	Good
7	03/07/2019	07/08/2019	19.6	19.5	21.3	20	1.0	5	2.5	18.2	99.88	Good	Good
8	08/08/2019	04/09/2019	21.4	22.2	21.5	22	0.5	2	1.1	15.5	99.85	Good	Good
9	04/09/2019	02/10/2019	25.6	26.8	26.7	26	0.7	3	1.7	25.6	99.71	Good	Good
10	02/10/2019	05/11/2019	26.2	28.2	27.6	27	1.0	4	2.5	30.6	99.88	Good	Good
11	05/11/2019	05/12/2019	38.5	39.9	35.2	38	2.4	6	6.0	38.3	99.87	Good	Good
12	05/12/2019	08/01/2020	31.2	28.5	29.0	30	1.4	5	3.6	26.9	99.88	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

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

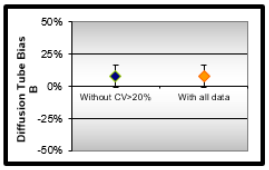
Site Name/ ID:	Ballyhackamore 23,24,32

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

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.95 (0.88 - 1.03)
Bias B	5% (-3% - 14%)
Diffusion Tubes Mean:	28 µgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	26 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	27 (25 - 29) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.95 (0.88 - 1.03)
Bias B	5% (-3% - 14%)
Diffusion Tubes Mean:	28 µgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	26 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	27 (25 - 29) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	09/01/2019	06/02/2019	44.9	46.4	45.7	46	0.7	2	1.8	40.1	100.00	Good	Good
2	06/02/2019	05/03/2019	33.2	32.5	31.0	32	1.1	4	2.8	28.3	96.58	Good	Good
3	05/03/2019	04/04/2019	35.7	32.3	35.8	35	2.0	6	5.0	28.5	98.39	Good	Good
4	04/04/2019	01/05/2019	58.3	51.3	53.9	54	3.5	6	8.8	46.4	99.70	Good	Good
5	01/05/2019	06/06/2019	38.5	49.8		44	8.0	18	72.0	39.6	99.66	Good	Good
6	06/06/2019	03/07/2019	47.7	45.1		46	1.9	4	16.9	33.3	99.85	Good	Good
7	03/07/2019	07/08/2019	32.9	32.9	32.0	33	0.5	2	1.3	22.4	99.65	Good	Good
8	07/08/2019	04/09/2019	29.3	26.7	26.9	28	1.5	5	3.6	18.1	98.68	Good	Good
9	04/09/2019	02/10/2019	37.1		39.2	38	1.5	4	13.3	28.3	99.86	Good	Good
10	02/10/2019	05/11/2019	35.7	37.8	37.0	37	1.1	3	2.7	38.2	99.88	Good	Good
11	05/11/2019	05/12/2019	59.7	68.1	58.0	62	5.4	9	13.4	50.2	99.87	Good	Good
12	05/12/2019	08/01/2020	31.9	27.9		30	2.8	9	25.2	27.0	99.88	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

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

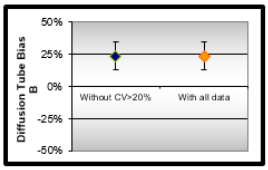
Site Name/ ID:	Westlink (65,66,67)

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

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.83 (0.76 - 0.9)
Bias B	21% (11% - 32%)
Diffusion Tubes Mean:	40 µgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	33 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	34 (31 - 36) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.83 (0.76 - 0.9)
Bias B	21% (11% - 32%)
Diffusion Tubes Mean:	40 µgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	33 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	34 (31 - 36) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

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
1	09/01/2019	06/02/2019	56.7	58.5	56.9	57	1.0	2	2.5
2	06/02/2019	05/03/2019	51.3	51.4	52.0	52	0.4	1	1.0
3	05/03/2019	04/04/2019	47.2	46.8	50.4	48	2.0	4	4.9
4	04/04/2019	01/05/2019	40.4	37.7	33.6	37	3.5	9	8.6
5	01/05/2019	06/06/2019	39.3	42.4	41.1	41	1.5	4	3.8
6	06/06/2019	03/07/2019	39.8	43.9	40.7	41	2.2	5	5.4
7	03/07/2019	07/08/2019	38.9	38.5	37.7	38	0.6	2	1.5
8	07/08/2019	04/09/2019	53.6	38.3	42.3	45	7.9	18	19.7
9	04/09/2019	02/10/2019	40.8	38.3	42.3	40	2.0	5	5.0
10	02/10/2019	05/11/2019	38.0	39.6	45.3	41	3.8	9	9.5
11	05/11/2019	05/12/2019	47.1	55.5	50.7	51	4.2	8	10.4
12	05/12/2019	08/01/2020	36.9	32.1	38.9	36	3.5	10	8.6
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
57.2	99.85	Good	Good
49.2	99.11	Good	Good
46.9	99.73	Good	Good
40.5	99.55	Good	Good
43.7	99.77	Good	Good
41.2	99.40	Good	Good
37.5	99.02	Good	Good
40.6	95.11	Good	Good
44.3	95.98	Good	Good
48.8	100.00	Good	Good
48.9	99.87	Good	Good
41.1	99.76	Good	Good
Overall survey -->		Good precision	Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: **Stockman's Lane (21,22,56)**

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

Accuracy (with 95% confidence interval) without periods with CV larger than 20%

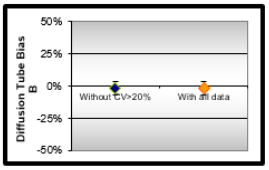
Bias calculated using 12 periods of data

Bias factor A	1.02 (0.97 - 1.08)
Bias B	-2% (-7% - 3%)
Diffusion Tubes Mean:	44 µgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	45 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	45 (43 - 48) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA

Bias calculated using 12 periods of data

Bias factor A	1.02 (0.97 - 1.08)
Bias B	-2% (-7% - 3%)
Diffusion Tubes Mean:	44 µgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	45 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	45 (43 - 48) 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 1	2	3	4	5	6	7	8	9	10	11	12	13	Raw Mean	Valid periods
1. RVH	30.3	31.1	21.6	22.8	17.6	19.5	14.5	17.2	21.1	21.5	35.9	26.3		23.3	12
2. Blacks Rd	55.8	55.2	46.7		44.5		36.7	45.2	41.4	39.4	53.5	41.4		46.0	10
3. 61 Cromac Str	41.4	43.7	33.6	39.4	35.1	36.9	29.5	28.0	42.5	51.9	53.7	38.6		39.5	12
4. Ravenhill Rd	39.1	32.7	28.5		30.9	31.4	22.3	23.4	29.3	28.1	43.8	30.3		30.9	11
5. Queens Bridge	36.7	31.0	31.0	32.4	30.7	27.8	17.8	19.0		25.9	47.5			30.0	10
6. North Road	25.9	16.7	15.3	13.1	12.1	10.7	10.0	10.0	14.3	15.9	25.0	18.0		15.6	12
7. Donegal Sq. South	38.6	39.8	33.7	39.1	34.0	36.4	28.4	30.6	34.3	33.1	46.3	34.1		35.7	12
9. Short Strand	57.7	55.2	47.0	40.3	43.7	46.6	31.9	32.6	40.8	38.0	53.0			44.3	11
10. 301 Ormeau Rd	43.2	39.5	33.0	30.9	29.3	32.6	25.9	26.5	35.0	29.7	37.1	33.6		33.0	12
12. Knock Rd	48.5	40.7	36.8	42.6	33.8	34.6	27.8	32.2	36.5		53.9	35.6		38.4	11
13. Gr Georges Str	55.4	54.0	43.2	68.1	35.4	55.2	42.5	38.9	35.5	51.4	67.3			49.7	11
14. Lisburn Rd	37.6	34.4	31.8	25.6	27.8	28.8	19.8	23.9	26.5	24.4	41.3	27.9		29.2	12
15. Shaftesbury Sq	43.9		30.0	39.5	24.3	33.5	27.4	25.9	36.0	30.4	48.6	34.4		34.0	11
17. Albert Clock	46.3	55.3	38.7	54.9	43.7	40.9	31.6	41.3	38.5	41.6	52.4	42.6		44.0	12
25. Whitewell Rd	26.7	32.2		44.0	27.6	23.9	18.5	17.6	23.5	24.3	37.3	21.9		27.0	11
26. Donegal Rd	42.1	34.4	33.9	36.1	35.3	32.5	24.4	30.0	28.5	33.0	46.5	31.6		34.0	12
28. Falls and Andytown		36.2	25.7	34.9	28.3	23.9	22.1		25.6		39.0	30.9		29.6	9
30. Station Rd	37.8	25.0		21.3	25.3	24.3	17.7	14.5	24.2	25.7	34.5	20.7		24.6	11
31 Malone Road	40.7	40.0	33.0	35.6		40.7	27.7	29.7	22.8		37.1	29.8		33.7	10
33 Great Victoria Street	47.7	45.6	45.2	35.2	36.5	36.5	31.6	36.5	36.2	29.5	47.9	40.2		39.0	12
34 College Square East	41.9		29.7	48.0	36.5	38.7	29.5	29.6	25.9	36.0	52.5	32.2		36.4	11
35 Chichester Street	59.2	50.1	30.0	52.2	45.7	49.2	34.8	32.8	37.8	35.1	53.2	41.5		43.4	12
36 Cromac/Ormeau Avenue	40.9				30.9		26.8	28.6	31.6	34.4	45.7	35.8		34.3	8
37 Westlink/Glenmachan Str	53.2	50.1	45.2	35.3	38.7		29.2	37.9	39.8	35.6	50.9	38.2		41.3	11
38 Creche on M1	32.2	34.0	22.1	53.1	29.6	27.0	22.6	16.2	24.6	30.4	45.4	26.5		30.3	12

Adjusted measurement (95% confidence interval) with all the data 12 periods used in this calcuations	
Bias Factor A 1.02 (0.97 - 1.08) Bias B -2% (-7% - 3%)	
Tube Precision: 6	Automatic DC: 99%
Adjusted with 95% CI	24 (23 - 25)
Adjusted with 95% CI	47 (45 - 50)
Adjusted with 95% CI	40 (38 - 43)
Adjusted with 95% CI	31 (30 - 33)
Adjusted with 95% CI	31 (29 - 32)
Adjusted with 95% CI	16 (15 - 17)
Adjusted with 95% CI	36 (35 - 39)
Adjusted with 95% CI	45 (43 - 48)
Adjusted with 95% CI	34 (32 - 36)
Adjusted with 95% CI	39 (37 - 42)
Adjusted with 95% CI	51 (48 - 54)
Adjusted with 95% CI	30 (28 - 31)
Adjusted with 95% CI	35 (33 - 37)
Adjusted with 95% CI	45 (43 - 48)
Adjusted with 95% CI	28 (26 - 29)
Adjusted with 95% CI	35 (33 - 37)
Adjusted with 95% CI	30 (29 - 32)
Adjusted with 95% CI	25 (24 - 27)
Adjusted with 95% CI	34 (33 - 36)
Adjusted with 95% CI	40 (38 - 42)
Adjusted with 95% CI	37 (35 - 39)
Adjusted with 95% CI	44 (42 - 47)
Adjusted with 95% CI	35 (33 - 37)
Adjusted with 95% CI	42 (40 - 45)
Adjusted with 95% CI	31 (29 - 33)

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
	1	2	3	4	5	6	7	8	9	10	11	12	13		
39 Ormeau Rd/Ravenhill Rd	54.4	52.7	40.6	33.0	34.7	35.6	32.0	35.0	35.5	35.9	38.1	41.6		39.1	12
40 Hollywood Rd Arches	37.4	34.9	28.1	35.0	23.0	23.7		23.5	25.6		33.6			29.4	9
41 Crumlin Rd	35.0	32.8		32.7	26.0	27.3	23.4	22.8	27.5	28.6	41.3	28.1		29.6	11
42 228 AntrimRd	37.3			45.0	30.1	31.2	25.7	27.9	31.9	33.8	49.8	30.4		34.3	10
44 Shore Rd (Ivan St. End)	32.9	43.4		43.0	27.1	27.9	23.7	24.5		30.8	46.3			33.3	9
59 York Street	41.7	47.6	34.3			38.4	34.9	36.7	32.9	36.4	51.3	37.1		39.1	10
63 Queen's Sq	37.6	38.9	30.9	50.5	37.5	36.4	30.5	28.8	34.9	34.7	47.7	36.8		37.1	12
68 Opposite Westlink AQMS	60.6	65.3	55.5	55.3	47.4	44.2	42.1	49.6	42.2	42.6	44.7	48.4		49.8	12
69 Peters Hill	42.6	51.0	37.9	66.8	47.6	49.3	23.0	29.2	40.4	41.4	58.9	34.8		43.6	12
70 Henry Street	67.1	87.1	66.8	69.2	43.6	35.5	48.2	54.3	48.7	56.6		64.5		58.3	11
74 Ardmore Park	40.2	38.9	44.9	22.9	30.7	24.8	25.2	30.0	31.5	31.0	40.0	39.0		33.3	12
76 Titanic Quarter	32.1	26.7		19.2	22.7	21.8	19.8	18.0	23.5	24.9	30.2	27.6		24.2	11
77 Poleglass	24.6	29.5	25.1		28.4	28.1	20.8	21.3	27.8			27.0		25.8	9
82 Molyneux street	39.9	50.8	30.8	34.1	28.7	29.7	32.8	30.6	42.9	38.6	41.9	30.8		36.0	12
83 North Queen Street	38.3	43.9	31.6	48.7			24.5	20.6	35.5	42.9	50.8	36.2		37.3	10
84 Great George's Street/Portla	39.8	36.1	36.9	25.5	30.8	33.6	29.0	26.5	29.4	29.7		32.0		31.7	11
85 Sailors Town	42.3	31.2	38.2	41.3	32.7	32.2	25.2	28.8	30.3	34.5	39.1	29.0		33.7	12
86 Little Georges Street	37.5	52.6	32.8	40.9	34.2		30.9	31.8	35.0	35.5		37.0		36.8	10
87 RVH Falls Road	41.0	43.8	25.8	32.3	23.4		32.9	19.9	25.2	27.9	38.8			31.1	10
88 Dunmurry Line	29.3	26.1	34.7	31.7	32.3	35.4	22.3	30.1	37.8	31.4	84.6	27.1		35.2	12
89 Upper Knockbreda Rd	43.4	34.4	27.3	32.7	27.0	26.0	27.8	21.1	26.1	31.9	44.1	31.4		31.1	12
90 Tates Avenue	34.6	29.3	21.0	35.8	26.6	23.9	20.2	18.3	22.8	25.1	40.4			27.1	11
91 Stockans Crescent	28.8	27.4	33.2			30.2	16.9	24.62	31.9	34.2	36.9	25.1		29.4	9
93 Diamond Gardens	34.1	28.9	28.0	29.4		22.3	17.5	20.4	17.6	27.6	37.4	25.6		26.2	11
94 Orpen Road	26.9	20.9	19.1	19.2	16.8	16.0	11.2	11.3	23.7	23.0	30.4	19.2		19.8	12

Adjusted measurement (95% confidence interval)
with all the data
12 periods used in this calcuations

Bias Factor A 1.02 (0.97 - 1.08)
Bias B -2% (-7% - 3%)
Tube Precision: 6 Automatic DC: 99%

Adjusted with 95% CI	40 (38 - 42)
Adjusted with 95% CI	30 (29 - 32)
Adjusted with 95% CI	30 (29 - 32)
Adjusted with 95% CI	35 (33 - 37)
Adjusted with 95% CI	34 (32 - 36)
Adjusted with 95% CI	40 (38 - 42)
Adjusted with 95% CI	38 (36 - 40)
Adjusted with 95% CI	51 (48 - 54)
Adjusted with 95% CI	44 (42 - 47)
Adjusted with 95% CI	59 (57 - 63)
Adjusted with 95% CI	34 (32 - 36)
Adjusted with 95% CI	25 (23 - 26)
Adjusted with 95% CI	26 (25 - 28)
Adjusted with 95% CI	37 (35 - 39)
Adjusted with 95% CI	38 (36 - 40)
Adjusted with 95% CI	32 (31 - 34)
Adjusted with 95% CI	34 (33 - 36)
Adjusted with 95% CI	38 (36 - 40)
Adjusted with 95% CI	32 (30 - 34)
Adjusted with 95% CI	36 (34 - 38)
Adjusted with 95% CI	32 (30 - 34)
Adjusted with 95% CI	28 (26 - 29)
Adjusted with 95% CI	30 (29 - 32)
Adjusted with 95% CI	27 (25 - 28)
Adjusted with 95% CI	20 (19 - 21)

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
	1	2	3	4	5	6	7	8	9	10	11	12	13		
95 Balmoral Avenue		46.4	39.0	50.4			32.2	34.2	39.3			35.8		39.6	7

Adjusted measurement (95% confidence interval)
with all the data
12 periods used in this calcuations

Bias Factor A 1.02 (0.97 - 1.08)
Bias B -2% (-7% - 3%)
Tube Precision: 6 Automatic DC: 99%

Adjusted with 95% CI	40 (38 - 43)

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 April 2020 and cover sampling periods up until the end of 2019. The latest government derived bias adjustment factor for Gradko Laboratories for a 20% solution of triethanolamine in water was 0.93. This factor compares well with the council's 2019 locally derived bias adjustment factor of 0.91.

Short-term to Long-term Data Adjustment

Diffusion Tubes

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.

Unfortunately, data capture for our only one background continuous monitoring site at Belfast Lombard Street did not meet required criteria of 85% for nitrogen dioxide. Therefore, two background diffusion tube sites, Royal Victoria Hospital and North Road, both with 12 months of data were used to complete the annualisation process. Individual adjustment factors have been calculated for two diffusion tube monitoring sites, commensurate with the diffusion tube exposure periods. The adjustment ratios for our sites with less than 9 months of data is summarised as follows:

Table: Annualising NO2 Diffusion Tube Monitoring Data - Tube 36, Cromac Street / Ormeau Avenue

Date	B1 (RVH NOx tube-background site)	D1(tube)	B1 when D1 is available
Jan	30.3	40.9	30.3
Feb	31.1		
Mar	21.6		
Apr	22.8		
May	17.6	30.9	17.6
Jun	19.5		
Jul	14.5	26.8	14.5
Aug	17.2	28.6	17.2
Sep	21.1	31.6	21.1
Oct	21.5	34.4	21.5
Nov	35.9	45.7	35.9
Dec	26.3	35.8	26.3
Average	**23.3**	**34.3**	23.1
		Am/Pm	**1.01**

Date	B1 (North Road NOx tube-background site)	D1(tube)	B1 when D1 is available
Jan	25.9	40.9	25.9
Feb	16.7		
Mar	15.3		
Apr	13.1		
May	12.1	30.9	12.1
Jun	10.7		
Jul	10.0	26.8	10.0
Aug	10.0	28.6	10.0
Sep	14.3	31.6	14.3
Oct	15.9	34.4	15.9
Nov	25.0	45.7	25.0
Dec	18.0	35.8	18.0
Average	**15.6**	**34.3**	16.4
		Am/Pm =	**0.95**

Average of ratios – 0.98
D1= 33.6336
D1 with Bias (0.91) = 30.61

Table: Annualising NO2 Diffusion Tube Monitoring Data - Tube 95, Balmoral Avenue (DC 58%).

Date	B1 (RVH NOx tube-background site)	D1(tube)	B1 when D1 is available
Jan	30.3		
Feb	31.1	46.4	31.1
Mar	21.6	39.0	21.6
Apr	22.8	50.4	22.8
May	17.6		
Jun	19.5		
Jul	14.5	32.2	14.5
Aug	17.2	34.2	17.2
Sep	21.1	39.3	21.1
Oct	21.5		
Nov	35.9		
Dec	26.3	35.8	26.3
Average	**23.3**	**39.6**	**22.1**
		Am/Pm =	1.05

Date	B1 (North Road NOx tube-background site)	D1(tube)	B1 when D1 is available
Jan	25.9		
Feb	16.7	46.4	16.7
Mar	15.3	39.0	15.3
Apr	13.1	50.4	13.1
May	12.1		
Jun	10.7		
Jul	10.0	32.2	10.0
Aug	10.0	34.2	10.0
Sep	14.3	39.3	14.3
Oct	15.9		
Nov	25.0		
Dec	18.0	35.8	18.0
Average	**15.6**	**39.6**	**13.9**
		Am/Pm = 0.94	1.12

Average of ratios – 1.08

D1 = 42.768

D1 with Bias (0.91) = 38.92

Annualising Belfast Centre Automatic Monitoring Site

As prescribed within chapter 2.2 (Table 2.3) automatic monitoring site data should be "annualised" in accordance to Boxes 7.9 and 7.10 of LAQM.TG16 if valid data capture is less than 75%.

Unfortunately, 2019 NO_2 data capture at the Lombard Street background continuous monitoring site was only 51%, considerably lower than the required 75%. Accordingly, and as described above, the annual mean concentration was adjusted (multiplied by an annualisation factor).

In order to complete the annualisation process, councils are required to identify two to four nearby, long-term background continuous monitoring sites for nitrogen dioxide. The data capture for each of these sites should ideally be at least 85%. Apart from Belfast Centre (Lombard Street site) there are only two other long-term, continuous, urban background monitoring sites in Northern Ireland, which measure nitrogen dioxide; namely Ballymena Ballykeel and Derry Rosemount. Both sites exceeded the required 85% data capture in 2019 and as the result were identified as acceptable sites to be used in ''annualising process'' for Belfast Centre site.

Two individual adjustment ratios and average ratios have been calculated and are summarised as follows:

Ballymena Ballykeel - Urban Background site

Period	Ballymena Ballykeel (Annual mean - Am)	Lombard Street	Ballymena Ballykeel (Period Mean - Pm)
Jan	24.0	35.0	24.0
Feb	19.0	29.0	19.0
Mar	11.0	23.0	11.0
Apr	17.0	27.0	17.0
May	12.0	22.0	12.0
Jun	10.0	22.0	10.0
Jul	7.0		
Aug	9.0	20.0	9.0
Sep	10.0	18.0	10.0
Oct	16.0		
Nov	21.0		
Dec	16.0		
Average	**14.3**		**14.0**
		Am/Pm (R) =	1.02

Derry Rosemount - Urban Background site

Period	Derry Rosemount (Annual mean - Am)	Lombard Street	Derry Rosemount (Period Mean - Pm)
Jan	13.0	35.0	13.0
Feb	12.0	29.0	12.0
Mar	8.0	23.0	8.0
Apr	14.0	27.0	14.0
May	9.0	22.0	9.0
Jun	6.0	22.0	6.0
Jul	5.0		
Aug	6.0	20.0	6.0
Sep	8.0	18.0	8.0
Oct	11.0		
Nov	22.0		
Dec	14.0		
Average	**10.7**		**9.5**
		Am/Pm (R) =	1.12

Average of ratios – 1.07

Adjusted NO_2 annual mean – 24 x1.07= 25.68

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 biweekly or four-weekly basis, in accordance with the requirements of the Defra Site Operators Manual for the Automatic Urban and Rural Network, published in 2009 (most updated version: *LSO Manual, Ricardo, May 2019*).

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 and BOC Ltd 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 *Enviro Technology*, who provided service and maintenance support for our equipment in 2019.

Finally, Belfast City Council appointed suitably qualified equipment engineers (NPL) to provide quality assurance and quality control support for the monitoring equipment to ensure compliance with the requirements of the National Air Quality Strategy as contained within the Defra Technical Guidance Document LAQM.TG(16). NPL staff visit our sites on a six-monthly basis and compare the performance of our analysers against a range of laboratory grade standards. NPL 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.

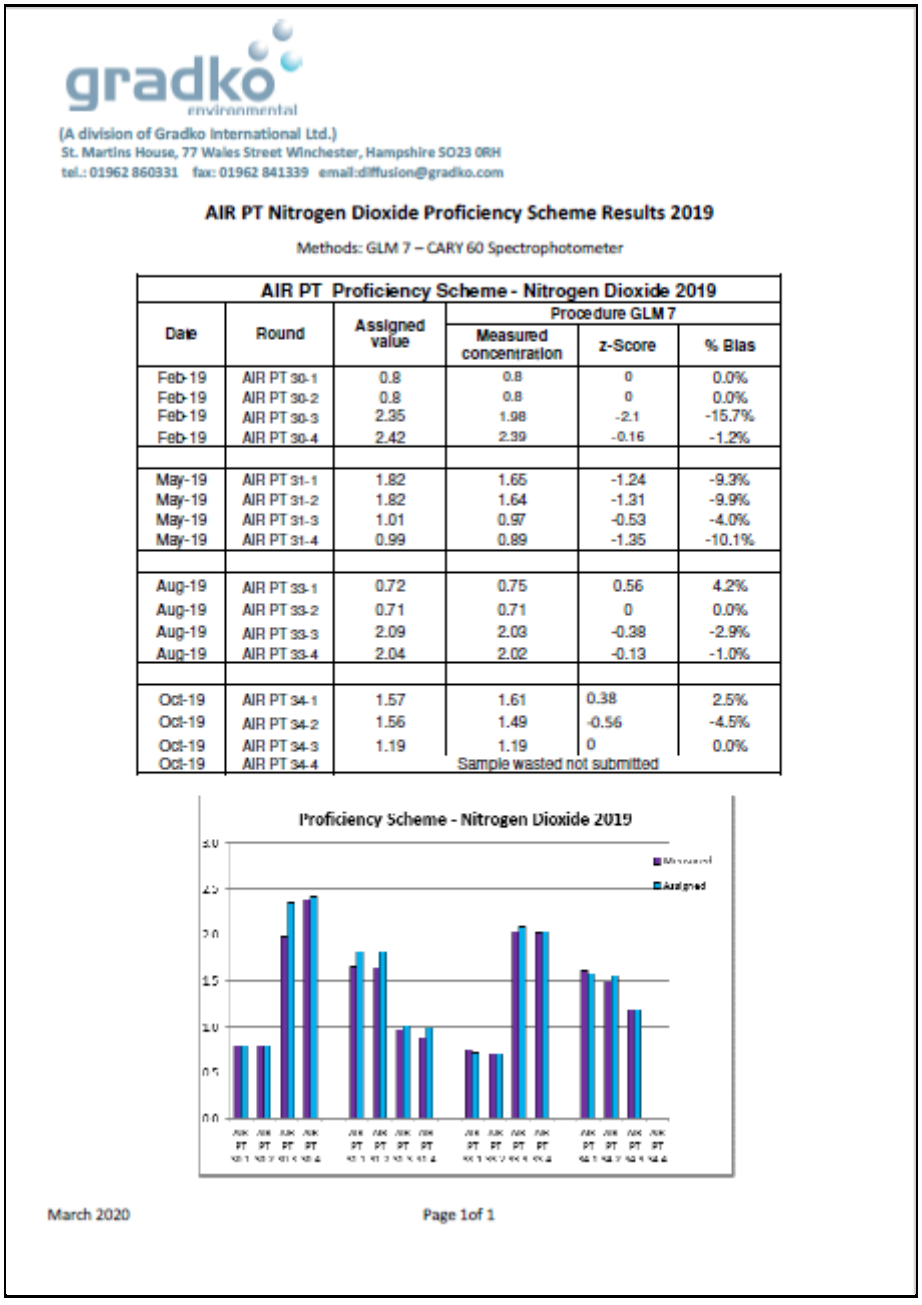
QA/QC of Diffusion Tube Monitoring

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 2019 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 2019

Methods: GLM 7 – CARY 60 Spectrophotometer

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

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Appendix B: Defra NO_2 Distance Calculator.

Enter data into the pink cells

Site Name/ID	Distance (m)		NO_2 Annual Mean Concentration ($\mu g/m^3$)			Comment
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site	Predicted at Receptor	
Black's Road	2.0	29.0	21.0	42.0	28.8	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.
Great Georges Street	0.5	30.0	24.0	45.0	29.8	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.
Stockman's Lane (R1)	2.0	14.0	21.0	45.0	34.1	
Stockman's Lane (R2)	2.0	6.0	21.0	45.0	38.8	Predicted concentration at Receptor within 10% the AQS objective.
Henry Place	1.0	20.0	24.0	53.1	35.5	
opposite Westlink AQMS	2.0	50.0	21.0	45.0	26.9	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.