# Belfast City Council

# 2023 Air Quality Progress Report

In fulfilment of the Environment (Northern Ireland) Order 2002

Local Air Quality Management

Date: 8th August 2023

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# Executive Summary

Belfast City Council has completed this 2023 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, council Air Quality Officers 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 those locations where ambient air quality has improved and exceedances are no longer occurring.

Belfast City Council has declared four Air Quality Management Areas (AQMAs) across the city for a combination of exceedances of the nitrogen dioxide ($NO_2$) annual and hourly mean Air Quality Strategy objectives. A review of the monitoring data for these Air Quality Management Areas and for the city generally indicates that there have been further improvements in ambient nitrogen dioxide concentrations across Belfast over recent years, notwithstanding the impact of the Covid-19 pandemic on transport and other emissions. As a result, Belfast City Council considers that there may be an opportunity for potential revocation of the Air Quality Management Areas along the Ormeau Road and Upper Newtownards Road, where monitoring data demonstrates sustained improved annual mean nitrogen dioxide concentrations, with levels consistently below the annual mean objective since 2014.

This report additionally contains summary details of the outcome of a Detailed Assessment project which was requested by the council's People and Communities Committee for the Belfast City Council area. The Detailed Assessment was principally commissioned to address the emerging pollutant of concern, fine particulate matter ($PM_{2.5}$) but it has also considered nitrogen dioxide ($NO_2$) and particulate matter ($PM_{10}$) concentrations, all in terms of national and European air quality standards and objectives, and the World Health Organisation (WHO) Air Quality Guideline values (September 2021).

The conclusions of the Detailed Assessment project confirm that based on predicted/modelled annual mean nitrogen dioxide ($NO_2$) and particulate matter ($PM_{10}$)

concentrations for a pre Covid-19 2019 base year and for a 2028 forward projection year, all annual mean and shorter-term average concentrations are predicted to be below the UK AQOs for nitrogen dioxide ($NO_2$) and particulate matter ($PM_{10}$) at locations of relevant human health exposure within the Belfast City Council area. The Detailed Assessment's conclusion is therefore that consideration should be given to revocation of the Ormeau Road and Upper Newtownards Road AQMAs. More information concerning the detailed assessment is contained within Section 1.5 Summary of the 2023 Detailed Assessment.

The council also notes DAERA's recommendations, included within the appraisal letter (dated 28th October 2022), in relation to the council's previous 2022 Progress Report. The Department recommended that the council should also '*consider the revocation of the Cromac Street and Albertbridge Road AQMA due to continual compliance with the $NO_2$ annual mean objective. Additionally, the M1-Westlink AQMA could be amended to revoke the designation of the 1-hour mean $NO_2$ objective as compliance has been achieved for the past 5 years.*'

However, we are aware that recent years' (2020 and 2021) ambient air pollution levels have been very much impacted by the Covid-19 pandemic restrictions, which have caused significant changes in emissions of some ambient pollutants, especially from the road transport sector; this has notably impacted nitrogen dioxide concentrations at roadside locations.

Consequently, we have treated 2020 and 2021 nitrogen dioxide annual mean monitoring results with caution and have applied Defra guidance, including the Defra Covid-19 Supplementary Guidance for LAQM Reporting in 2021, when undertaking any future year projections that have incorporated this atypical data.

Moreover, we are also awaiting any Defra's advice in relation to the treatment of 2022 monitoring data (without Covid-19 restrictions) in order to determine whether recent improvements in ambient air quality are still considered to be as a result of the Covid-19 pandemic, and to establish if air pollution levels have reverted to their 2019 pre-pandemic levels.

We will then establish if compelling evidence exists to support the decision to potentially revoke any of our Air Quality Management Areas. This decision will be based on robust

monitoring evidence, it will incorporate the outcomes of the recently finalised Detailed Assessment and it will be in accordance with the government's Local Air Quality Management Technical Guidance LAQM.TG(22).

Accordingly, the council will liaise with the Department of Agriculture, Environment and Rural Affairs, Department for Infrastructure and other relevant competent authority partners regarding the potential revocation process later this year.

In relation to other monitored pollutants, 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 that would have the potential to change this position. No other air quality pollutants will therefore be considered within this 2022 Progress Report, with the exception of references to $PM_{10}$ and $PM_{2.5}$, in connection with the outworkings for the 2023 Detailed Assessment.

Numerous new developments have commenced throughout Belfast since the 2022 Progress Report and 2021 Updating and Screening Assessment were published. These developments were identified during the Planning Application process and where necessary, Air Quality Impact Assessments were requested. The air quality impacts of these developments were then assessed, and any necessary development specific air quality mitigation measures were identified and requested by way of planning conditions, as part of the planning process.

Moreover, and as reported within the 2022 Progress Report, the council, its competent authority partners, Translink, Belfast Harbour and other significant transport organisations and partners from across the city have developed a new 2021-2026 Air Quality Action Plan (AQAP) for Belfast.

The aim of the new AQAP is to continue to reduce nitrogen dioxide ($NO_2$) emissions from transport sources and to promote and enable a shift towards more sustainable modes of transport in order to achieve compliance with UK Air Quality Strategy objectives for $NO_2$. Where necessary, an additional aim of this Action Plan is to identify, develop and

implement mitigation measures to address concentrations of fine particulate matter ($PM_{2.5}$) across the city.

Chapter 8 (Table 8.1) provides information on progress with the 2021-2026 Belfast Air Quality Action Plan since its launch.

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# 1  Introduction

## 1.1  Description of Local Authority Area

Belfast is the capital city 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 345,418. 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 the 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 have 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. This guide (updated in April 2022) 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 from solid fuel combustion to fine particulate matter ($PM_{2.5}$) concentrations has been also recognised within the UK Clean Air Strategy 2019 and the Clean Air Strategy NI (Public Discussion Document, DAERA November 2020). Therefore, Belfast City Council decided to undertake a detailed assessment for the city, for particulate matter ($PM_{10}$), fine particulate matter ($PM_{2.5}$) and nitrogen dioxide ($NO_2$) pollutants. This project commenced in February 2021, was concluded earlier this year (March 2023), and included additional ambient air quality monitoring (using Zephyr small sensor air quality monitors), development of an emissions inventory database for the city and detailed atmospheric dispersion modelling. The outcomes of this detailed assessment are presented and referred to within this Progress Report.

Over 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.

In order to address the remaining '*hot spot'* areas of elevated nitrogen dioxide, the council along with relevant partners developed a 2015-2020 Air Quality Action Plan (AQAP) for the city that contained a manageable number of proven air quality mitigation measures. This AQAP concluded at the end of 2020. A final review of the implementation of the various mitigation measures included within 2015-2020 AQAP was undertaken and reported by the council to the Department of Agriculture Environment and Rural Affairs (DAERA) as part of the council's 2020 Action Plan Progress Report, submitted to DAERA in June 2020.

Whilst previous AQAPs have delivered further improvements in ambient air quality across the city, a limited number of nitrogen dioxide ($NO_2$) hotspots still remain. Moreover, fine particulate matter ($PM_{2.5}$) has emerged as an additional ambient air pollutant of concern for the city.

Accordingly, in 2021, the council, competent authorities and other partner organisations developed a new Air Quality Action Plan for the city; the Plan was approved by DAERA and Defra's independent technical appraisers in February 2022 and can be viewed on the Belfast City Council website: https://www.belfastcity.gov.uk/Documents/Belfast-City-Air-Quality-Action-Plan-2021-2026

The aim of the new Air Quality Action Plan 2021-2026 is to continue to reduce nitrogen dioxide emissions from transport sources and to promote and enable a shift towards more sustainable modes of transport in order to achieve compliance with UK Air Quality objectives for nitrogen dioxide. Where necessary, an additional aim of this Action Plan is to identify, develop and implement mitigation measures to address concentrations of fine particulate matter ($PM_{2.5}$) across 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 the air quality objectives are likely to be achieved. Where exceedances are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

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

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of

exceedance of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

Although, there was no risk of exceedance of any Air Quality Objective identified within the previous 2022 Progress Report, Belfast City Council has elected to undertake a Detailed Assessment for the city, for particulate matter ($PM_{10}$), fine particulate matter ($PM_{2.5}$) and nitrogen dioxide ($NO_2$) pollutants. This consultant led project, commenced in February 2021 and was concluded earlier this year (March 2023). The outcomes of this detailed assessment for particulate matter ($PM_{10}$), fine particulate matter ($PM_{2.5}$) and nitrogen dioxide ($NO_2$) are variously presented and referred to within this 2023 Progress Report.

## 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 microgrammes per cubic metre - $\mu g/m^3$ (milligrammes per cubic metre, $mg/m^3$ for carbon monoxide) with the number of exceedances in each year that are permitted (where applicable).

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

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

## 1.4  Summary of Previous Review and Assessments

As part of the continuing 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 of 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 31st December 2005 Air Quality Strategy objectives. In addition, particulate matter annual and 24-hour mean concentrations were predicted also to exceed relevant objectives at 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 each of the Air Quality Management Areas, indicated that the principal source 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 pink and has been set to take account of dispersion modelling uncertainties. This AQMA was revoked for exceedances of particulate matter objectives in September 2015, but currently continues to exceed the annual mean air quality objective 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 AQMA 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 AQMA 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.

Please note that the Belfast City Council boundary was revised in 2015 as a consequence of the reform of local government in Northern Ireland. The above-mentioned AQMAs were declared on the basis of the previous council boundary.

**Figure 1.1 - Map of AQMA Boundaries**



Map labels:
- M1 Motorway / A12 Westlink Corridor AQMA
- Ormeau Road AQMA
- Cromac Street / East Bridge Street / Ravenhill / Albertbridge AQMA
- Upper Newtownards Road AQMA

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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 conclusion was accepted by DAERA.

Ambient air quality monitoring results, as presented in previous annual progress and updating and screening assessment reports, had 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 ($PM_{10}$) 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 (Round 8) of the Review and Assessment process requires that a Progress Report be completed for submission by 30th June 2023. This report therefore addresses the requirements of the August 2022 Defra LAQM.TG(22) technical guidance publication in identifying any significant changes that have occurred since the previous round of Review and Assessment and which may have the potential to adversely affect local air quality.

This report additionally informs on the outcome of 2021-2023 Detailed Assessment, undertaken for particulate matter ($PM_{10}$), fine particulate matter ($PM_{2.5}$) and nitrogen dioxide ($NO_2$) pollutants.

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 via the follow weblink https://www.airqualityni.co.uk/laqm/district-council-reports#511

## Table 1.1 - Historical Belfast City Council Air Quality Reports

- **Belfast City Council 2022 Air Quality Progress Report - Published: 15th February 2023**
- **2021 Updating and Screening Assessment for Belfast City Council - Published: 1st October 2021**
- **Belfast - Progress Report - 2020 - Published: 11th November 2020**
- **Belfast - Progress Report - 2019 - Published: 11th November 2020**
- **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**

## 1.5  Summary of 2023 Detailed Assessment

Fine particulate matter ($PM_{2.5}$) is not in regulation for the purposes of the NI LAQM process but has emerged recently as a pollutant of concern due to adverse human health impacts.

Consequently at the meeting of the People and Communities Committee of 8th October 2019, and upon considering a 'Local Air Quality Management Update for Belfast' report, the Committee instructed to  undertake a detailed assessment for nitrogen dioxide ($NO_2$) and fine particulate matter ($PM_{2.5}$).

A competitive tender exercise was undertaken by the Council in September 2020 in order to appoint an appropriately experienced environmental consultancy to deliver the detailed assessment project.

Aecom consultants were subsequently appointed by the Council in early 2021 to deliver the detailed assessment project over an approximate 2-year period, with a final project report to be provided by the end of March 2023.

The Aecom detailed assessment has therefore considered nitrogen dioxide ($NO_2$), particulate matter ($PM_{10}$) and fine particulate matter ($PM_{2.5}$) for the city and has been undertaken in accordance with the Department for Environment, Food and Rural Affairs (Defra) Local Air Quality Management Technical Guidance (LAQM.TG22), published in August 2022.

The project comprised the following key components:
   o *Additional monitoring by Zephyr (near reference grade) small sensor air quality analyser for $PM_{10}$, $PM_{2.5}$ and $NO_2$.*
   o *Development of emissions inventory for the Belfast City Council area.*
   o *ANPR surveys to calibrate Defra EFT emission data to the Belfast vehicle fleet.*
   o *Detailed atmospheric dispersion modelling to provide spatial and temporal air pollution data for the Belfast City council area for a 2019 base year (pre-Covid) and for a forward year of 2028.*
   o *Source apportionment studies in areas of exceedance in order to help inform the development of remedial actions.*

The detailed assessment project was completed at the end of March 2023 in accordance with the project timeline. The following text provides a brief overview of the key outworkings and conclusions of this assessment, which are as follow:

### Additional Ambient Monitoring

Belfast City Council already undertakes a significant range of ambient air quality monitoring across the city using a combination of automatic and passive diffusion type monitoring equipment. For the purposes of the detailed assessment, additional ambient monitoring was undertaken during 2021 by Aecom consultants using Zephyr air quality monitors situated at locations representative of key nitrogen dioxide and particulate matter emission sources, located throughout the Belfast City Council area, i.e. at the A2 Sydenham By-Pass adjacent to George Best Belfast City Airport; at the A55 Upper Knockbreda Road; at Clara Street in east Belfast; at Lombard Street in the city centre; at the A12 Westlink at Henry Place; and at Mount Eagles Glen in southwest of the city. The 2021 monitoring data was scaled using co-location data from reference grade analysers located at the Belfast Centre AURN site at Lombard Street and then corrected to a 2019 base year using Defra annual adjustment factors. 2019 was chosen as a base year as it is considered to be the last typical monitoring year prior to Covid 19 pandemic.

There were no monitored exceedances of the nitrogen dioxide 40 μg/m$^3$ annual mean objective during 2019 at any Zephyr monitoring site, with the exception of the A12 Westlink site situated adjacent to Henry Place (50.3 μg/m$^3$). This site falls within the existing M1 Motorway / A12 Westlink Air Quality Management Area and a similar nitrogen dioxide annual mean concentration was recorded for 2019 at the nearby council nitrogen dioxide diffusion tube monitoring site (53 μg/m$^3$). There were no monitored exceedances of the nitrogen dioxide 200 μg/m$^3$ 1-hour mean objective (18 exceedances permitted per annum).

There were no monitored exceedances of the PM$_{10}$ 40 μg/m$^3$ annual mean objective at any Zephyr monitoring site during 2019 and no monitored exceedances of the PM$_{10}$ 50 μg/m$^3$ 24-hour mean objective (35 exceedances permitted per annum).

There were no monitored exceedances of the PM$_{2.5}$ 20 μg/m$^3$ annual mean objective / limit value at any Zephyr monitoring site during 2019.

### Emissions Inventory

An emissions inventory for Belfast was compiled by Aecom consultants covering nitrogen dioxide and particulate matter emission sources, including George Best Belfast City Airport, Belfast Harbour, railways, domestic and industrial combustion sources and the local road network. Road fleet emissions were additionally informed by a series of Automatic Number Plate Recognition (ANPR) surveys. Data from the emissions inventory was employed in the various atmospheric dispersion modelling studies for the city.

### Atmospheric Dispersion Modelling for the Belfast City Council Area

Atmospheric dispersion modelling was undertaken by Aecom consultants for $NO_2$, $PM_{10}$ and $PM_{2.5}$ for the Belfast City Council area for a 2019 base year and for a forward projection year of 2028. In addition to the citywide modelled grids for 2019 and 2028, modelling was also undertaken at 1,797 discrete receptor locations, representative of residential properties, health care facilities, hospitals, education facilities and other locations considered sensitive to air pollution. The atmospheric dispersion modelling data has been validated, verified and adjusted using ratified Belfast City Council ambient monitoring data, together with calibrated and ratified monitoring data from the six Zephyr air quality monitors, to ensure that it is reflective of ambient conditions in the 2019 base year and the forward projection year of 2028.

Modelled ambient concentrations were compared with air quality objectives detailed within the Air Quality Strategy for England, Scotland, Wales and Northern Ireland and with the September 2021 World Health Organization (WHO) Global Air Quality Guidelines in order to identify any areas of exceedance across the city.

### 2019 City-Wide Modelled Nitrogen Dioxide ($NO_2$) Concentrations

Annual mean nitrogen dioxide concentrations for 2019 were predicted to be above the UK AQO level of 40 µg/m$^3$ at 24 discrete sensitive receptor locations. All of these receptors are within or near to the boundaries of the existing Air Quality Management Areas (AQMAs) along the M1 Motorway / A12 Westlink corridor (AQMA 1) and East Bridge Street / Cromac Street (AQMA 2). Within the uncertainties of the modelling, Aecom have concluded that the exceedances do not warrant any amendment to the boundaries of AQMA 1 and AQMA 2 at this time. Predicted 2019 annual mean $NO_2$ concentrations within AQMA 3, which covers a section of Upper Newtownards Road, Knock Road and Hawthornden Way, and AQMA 4 which covers the Ormeau Road from the junction with

Donegall Pass to the Belfast City boundary at Galwally, were below the UK AQO level at all locations of relevant exposure. Aecom have therefore advised that the results of recent years' monitoring at locations within AQMA 3 and AQMA 4 indicate that the AQO is now being met. Aecom have consequently advised that consideration should be given to the revocation of AQMA 3 and AQMA 4, subject to a continuation of monitored $NO_2$ concentrations below the AQO in these AQMAs. Aecom's conclusions are consistent with those of the council concerning AQMAs 3 and 4, as detailed within our 2022 Air Quality Progress Report.

With the exception of the rural areas in the western part of the council's administrative area, predicted 2019 annual mean $NO_2$ concentrations throughout the city exceeded the much more stringent WHO AQG of 10 µg/m$^3$. For the nitrogen dioxide 24-hour mean AQG of 25 µg/m$^3$ (99th percentile, 3-4 exceedances per annum), Aecom have noted that monitoring results would suggest that the 24-hour mean $NO_2$ WHO AQG is likely to be exceeded across much of the Council's administrative area, particularly in the city centre area and near busy roads.

### 2028 City-Wide Modelled Nitrogen Dioxide ($NO_2$) Concentrations

For the future assessment year of 2028, predicted annual mean $NO_2$ concentrations are below the UK AQO of 40 µg/m$^3$ at all locations of relevant exposure throughout the city, the highest annual mean concentration being around 31 µg/m$^3$ in the vicinity of Stockmans Lane.

In comparison to the much more stringent WHO AQG for annual mean $NO_2$ concentrations of 10 µg/m$^3$, most of the city centre and surrounding areas, particularly close to the major road network, are predicted to exceed this AQG in 2028. Previous comments about the 24-hour mean AQG of 25 µg/m$^3$ (99th percentile, 3-4 exceedances per annum), are likely to continue to apply during 2028.

### 2019 City-Wide Modelled PM$_{10}$ Concentrations

Annual mean PM$_{10}$ concentrations in 2019 were predicted to be well below the UK AQO level of 40 µg/m$^3$ at all locations of relevant exposure throughout the city. Similarly, the number of exceedances of the PM$_{10}$ 24-hour mean (50 µg/m$^3$) were predicted to be well below the 35 permitted per annum.

Annual mean PM$_{10}$ concentrations in 2019 exceeded the much more stringent WHO AQG for PM$_{10}$ of 15 μg/m$^3$ at 1,100 of the 1,797 modelled discrete receptors and the contour plots indicated that the AQG was exceeded across most of the city centre area. In many areas, background PM$_{10}$ concentrations alone were found to approach or exceed the WHO AQG level.

The WHO short-term PM$_{10}$ AQG level (99th percentile of daily mean PM$_{10}$ concentrations not to exceed 45 μg/m$^3$) was not predicted to be exceeded at any modelled sensitive receptor location during 2019.

### 2028 City-Wide Modelled PM$_{10}$ Concentrations

For the future assessment year of 2028, predicted annual mean PM$_{10}$ concentrations are well below the UK AQO of 40 μg/m$^3$ at locations of relevant exposure throughout the city. As previously, there are no predicted exceedances of the PM$_{10}$ 24-hour mean (50 μg/m$^3$).

Annual mean PM$_{10}$ concentrations in 2028 are predicted to exceed the much more stringent WHO AQG for PM$_{10}$ of 15 μg/m$^3$ at 645 of the 1,797 modelled discrete receptors, and the contour plots indicate that the AQG is exceeded across a large part of the city centre area. In many areas, background PM$_{10}$ concentrations alone are found to approach or exceed the AQG level.

As during 2019, the WHO short-term PM$_{10}$ AQG level (99th percentile of daily mean PM$_{10}$ concentrations not to exceed 45 μg/m$^3$) is not predicted to be exceeded at any modelled sensitive receptor locations during 2028.

### 2019 City-Wide Modelled PM$_{2.5}$ Concentrations

There are no sensitive receptor locations where predicted 2019 annual mean PM$_{2.5}$ concentrations were greater than the 20 μg/m$^3$ limit value / objective.

Compared with the much more stringent WHO annual mean PM$_{2.5}$ AQG level of 5 μg/m$^3$, all modelled receptors have predicted PM$_{2.5}$ concentrations of 5 μg/m$^3$ or higher. It should be noted that the lowest PM$_{2.5}$ background concentration at any location across the city in 2019 was 6.6 μg/m$^3$, which itself exceeds the AQG level of 5 μg/m$^3$.

The WHO short-term $PM_{2.5}$ AQG level (99th percentile of daily mean $PM_{2.5}$ concentrations not to exceed 15 µg/m$^3$) was predicted to be exceeded at all except one of the modelled sensitive receptor locations. It should be noted however, that the background $PM_{2.5}$ contribution to the 99th percentile of daily mean $PM_{2.5}$ concentrations alone was greater than the WHO AQG level at most modelled locations.

## 2028 City-Wide Modelled $PM_{2.5}$ Concentrations

There are no predicted 2028 annual mean $PM_{2.5}$ concentrations greater than 20 µg/m$^3$ and therefore unlikely to be any locations of exceedance of the UK annual mean $PM_{2.5}$ AQO.

Compared with the much more stringent WHO annual mean $PM_{2.5}$ Air Quality Guideline level of 5 µg/m$^3$, all 1,797 sensitive receptor locations have predicted concentrations of 5 µg/m$^3$ or higher. It should be noted that the lowest $PM_{2.5}$ background concentration at any location across the city in 2028 is 5.9 µg/m$^3$, which itself exceeds the AQG level of 5 µg/m$^3$.

The WHO short-term $PM_{2.5}$ AQG level (99th percentile of daily mean $PM_{2.5}$ concentrations not to exceed 15 µg/m$^3$) is predicted to be exceeded at 1,785 out of the 1,797 modelled sensitive receptor locations. It should be noted that the background $PM_{2.5}$ contribution to the 99th percentile of daily mean $PM_{2.5}$ concentrations alone is greater than or approaching the WHO AQG level at most modelled locations.

## 2019 Source Apportionment

Source apportionment studies for nitrogen dioxide ($NO_2$) for 2019 indicated that within our AQMAs, the predominant contributor to 2019 annual mean nitrogen dioxide concentrations was road traffic emissions, accounting for between approximately 56% and 77% depending on receptor location.

For $PM_{10}$, the regional background sector was the predominant contributor to 2019 annual mean $PM_{10}$ concentrations, accounting for more than 53% of the total modelled $PM_{10}$ concentrations. The regional background includes sources from outside of Belfast that the council has no control over, including natural sources such as windblown dust and sea salt, and secondary particulates. Domestic background sources (which include domestic, commercial, and institutional space heating) were estimated to typically account for 15% to 19% of the total modelled $PM_{10}$ concentrations in 2019.

In 2019, the source apportionment for $PM_{2.5}$ followed a similar pattern to $PM_{10}$. The regional background sector was the predominant contributor to 2019 annual mean $PM_{2.5}$ concentrations, accounting for around 47% to 50% of the total modelled $PM_{2.5}$ concentrations. The regional background includes sources from outside of Belfast that the Council has no control over, including natural sources such as windblown dust and sea salt and secondary particulates. The domestic background was estimated to account for approximately 22% to 34% of the total modelled 2019 $PM_{2.5}$ concentrations, indicating that this is a significant contributor to ambient $PM_{2.5}$ concentrations.

## 2028 Source Apportionment

For nitrogen dioxide, the predominant source sector contribution to 2028 annual mean $NO_2$ concentrations at most of the selected receptors remains road traffic emissions, accounting for between approximately 27% and 66% depending on location. However, the domestic background is also an important contributor in 2028 at some receptor locations, the source apportionment results indicating that in certain areas of the city, the domestic background sector is an important secondary contributor, after road traffic, and may become the dominant sector of NOx emissions in some localities.

For $PM_{10}$, the primary contribution to 2028 annual mean $PM_{10}$ concentration for the receptors considered comes from the regional background, accounting for more than 50% of the total modelled $PM_{10}$ concentrations. Domestic background, which includes domestic, commercial and institutional space heating, is estimated to typically account for 15% to 20% of the total modelled $PM_{10}$ concentrations. The 'other background' sector, which includes all other local background sources of air pollution, accounts for approximately 11% to 12%.

The 2028 source apportionment for $PM_{2.5}$ follows a similar pattern to that for $PM_{10}$. The primary contribution to 2028 annual mean $PM_{2.5}$ concentration for receptors considered comes from regional background, accounting for around 44% to 48% of the total modelled $PM_{2.5}$ concentrations. The domestic background is estimated to account for approximately 23% to 36% of the total modelled $PM_{2.5}$ concentrations, indicating that this is a significant contributor to ambient $PM_{2.5}$ concentrations in 2028. The other background sector accounts for an estimated 8% to 11%.

## 2023 Detailed Assessment Conclusions

With regard to nitrogen dioxide, Aecom have recommended that local actions aimed at road traffic are likely to remain the most effective action for reducing ambient concentrations at nitrogen dioxide hotspot locations in the city. Fleet projections indicate that the next few years will see accelerated uptake of low-emissions / zero-emissions vehicles and efforts should continue to be made to support the improvement of the vehicle fleet alongside the continued incentivisation of other transport modes and active travel options. These recommendations are consistent with the objectives of the Belfast City Air Quality Action Plan 2021-2026.

For $PM_{10}$ and $PM_{2.5}$, Aecom have recommended that targeted actions to reduce public exposure to $PM_{10}$ and $PM_{2.5}$ should focus on the sources that contribute to the domestic background sector, as source apportionment has indicated that this sector is accountable for more than 25% of the total modelled particulate matter concentrations across the city.

A Detailed Assessment summary will be made available via the council's website, once reviewed and accepted by the People and Communities Committee.

# 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 (DAERA) and is reported on the 'Northern Ireland Air' website in near real time (https://www.airqualityni.co.uk/). Under the current LAQM regime, and for the purpose of LAQM reporting, concentrations should be reported to 1 decimal place; monitoring data in this required format are not currently available from the 'Northern Ireland Air' website. Consequently all 2022 automatic monitoring data reported in this progress report have been obtained from the Defra *UK AIR (Air Information Resourc*e) website (https://uk-air.defra.gov.uk). Automatic monitoring data presented in this report relate to the calendar year (i.e. January – December). 2022 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, the UK Environment Agency and DAERA operate an AURN urban background monitoring site at Lombard Street in Belfast City Centre. 2022 data capture levels at the Belfast Centre site were also above the Department's 75% data capture threshold; air quality monitoring data from this site are referenced within this report.

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 a 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 factors need to be applied to this monitoring data.

The Stockman's Lane site is equipped with a Beta Attenuation Monitor (BAM) with a heated inlet for monitoring particulate matter ($PM_{10}$). Government technical guidance highlights that a BAM, equipped with a heated inlet, also 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 1.035. It should be noted that the data presented on the Defra UK-Air, Northern Ireland Air website and in this report have 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. In 2020 the council also replaced a further API M200 NOx analyser at the Ormeau Road site.

During 2022, we progressed with the upgrade of our communication system (including modems) at our four monitoring sites. AQMSs were consequently updated from GSM modems to 4G IP Routers and the T200 analysers were converted over to NumaView software.

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 - Map of Automatic Monitoring Sites**
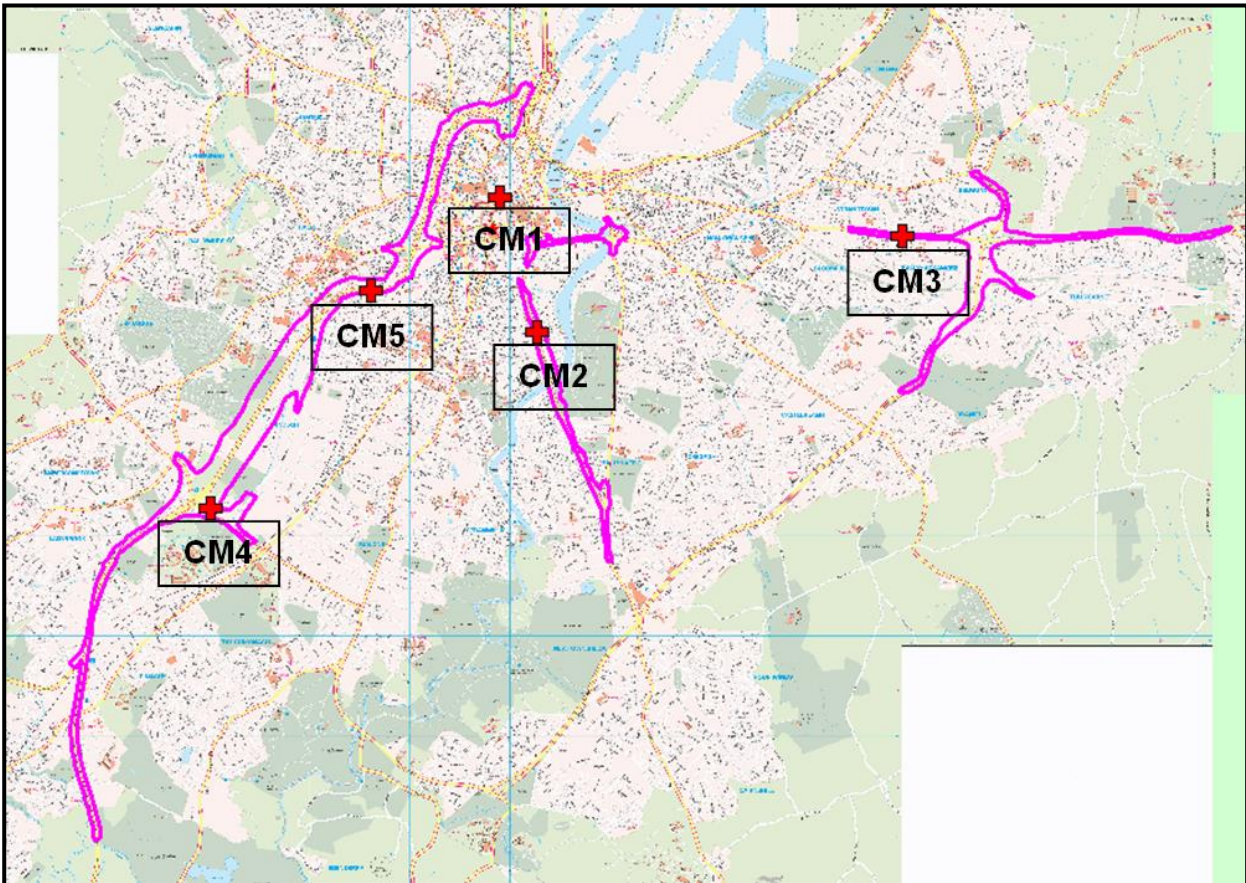


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**Table 2.1 - Details of Automatic Monitoring Sites**

| Site ID | Site Name | Site Type | X OS Grid Reference | Y OS Grid Reference | Inlet Height (m) | Pollutants Monitored | In AQMA? | Monitoring Technique | Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure) | Distance to Kerb of Nearest Road (m) (N/A if not applicable) | Does this Location Represent Worst-Case Exposure? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CM1 | Belfast Centre AURN site Lombard Street | Urban 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, Light-Scattering Monitor (Palas Fidas 200) | 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 Upper Newtownards Road | Roadside | 337911 | 373972 | 1.3 | Nitrogen dioxide | Y | Chemiluminescence | Y (7 m) | 2 m | Y |
| CM4 | Belfast Stockman's Lane | Roadside | 331010 | 371252 | 3.0 | Nitrogen dioxide and particulate matter (PM$_{10}$) | Y | Chemiluminescence Beta Attenuation Monitor | Y (12 m) | 3 m | Y |
| CM5 | Belfast Westlink Roden Street | Roadside | 332609 | 373434 | 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 ($NO_2$) 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 diffusion tube monitoring network has changed considerably since the declaration of the Air Quality Management Areas in 2004. The extensive council monitoring network currently comprises 76 diffusion tubes throughout the city at 68 locations, which provide annual mean $NO_2$ data to assist in the review and assessment process and to aid developers in conducting air quality impact assessments, where deemed necessary. Since the 2022 Progress Report, we have added an additional 5 tubes to the network; 1 located within the M1/Westlink AQMA and 4 outside the AQMA. We have also relocated two tubes (Nos 37 and 90) to 'worst case scenario' locations. 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 absorb 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 International Ltd. 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, Upper 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 local bias adjustment factor derived from the above-mentioned four co-location studies (Lombard Street, Upper Newtownards Road, Westlink/Roden Street and Stockman's Lane monitoring sites). The bias calculation and data scaling were undertaken using Defra's new Diffusion Tube Data Processing Tool. Outputs from the spreadsheet for treatment of Belfast City Council's 2022 data are included in Appendix A to this report.

**Figure 2.2 - Maps of Non-Automatic Monitoring Sites**
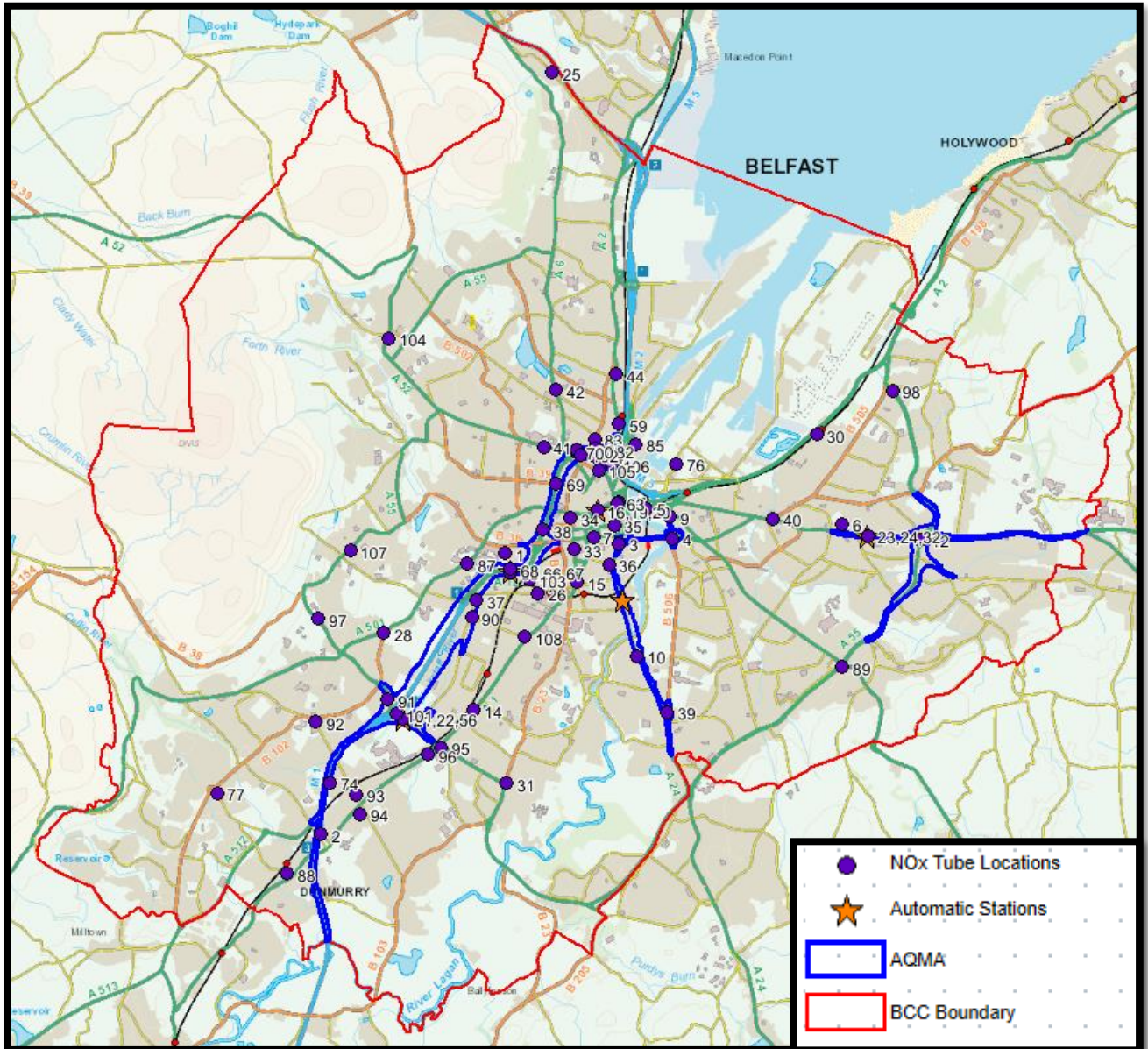
**Belfast City Council Boundary**



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## Belfast City Centre
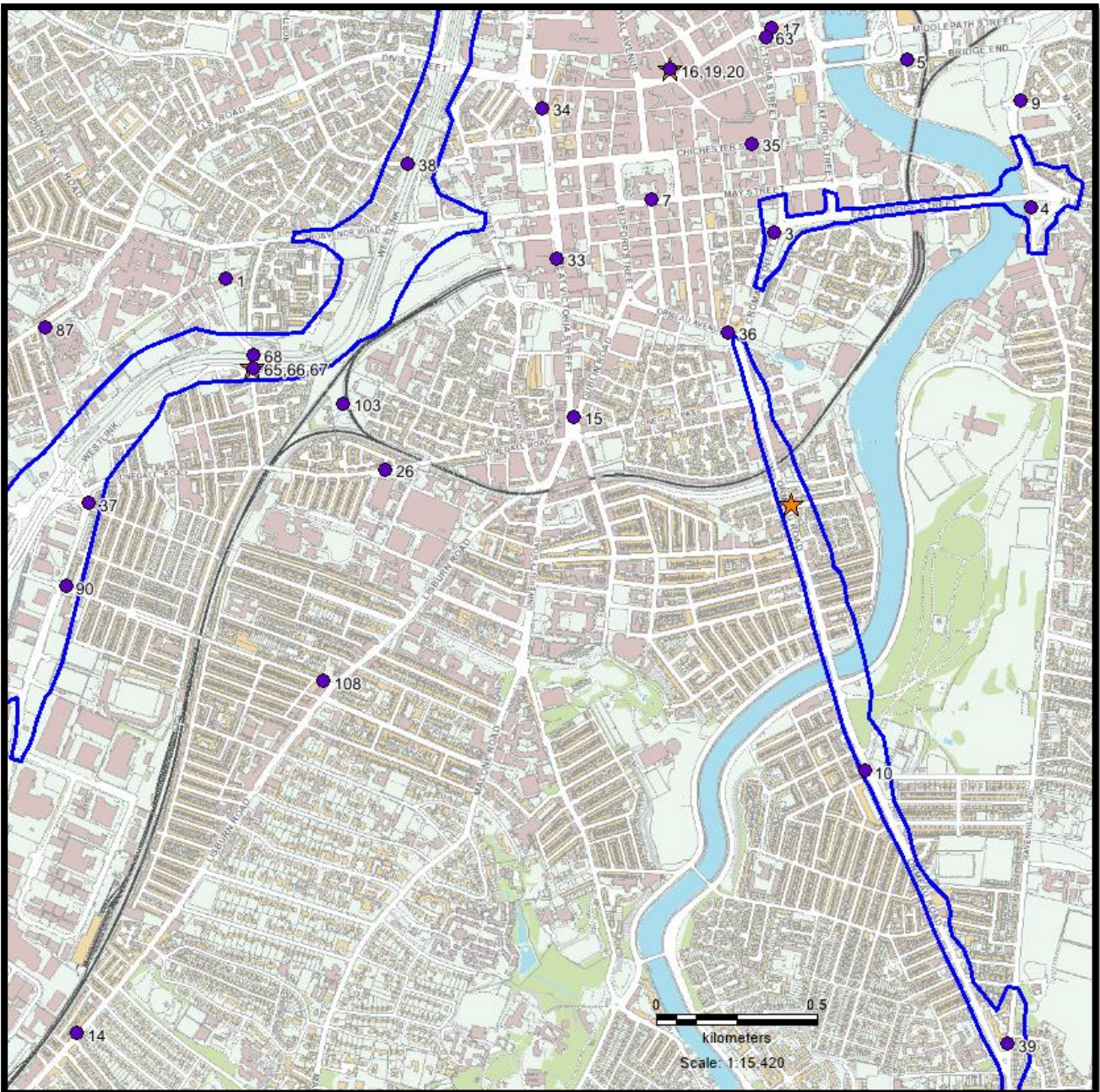


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## North Belfast



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## South and West Belfast
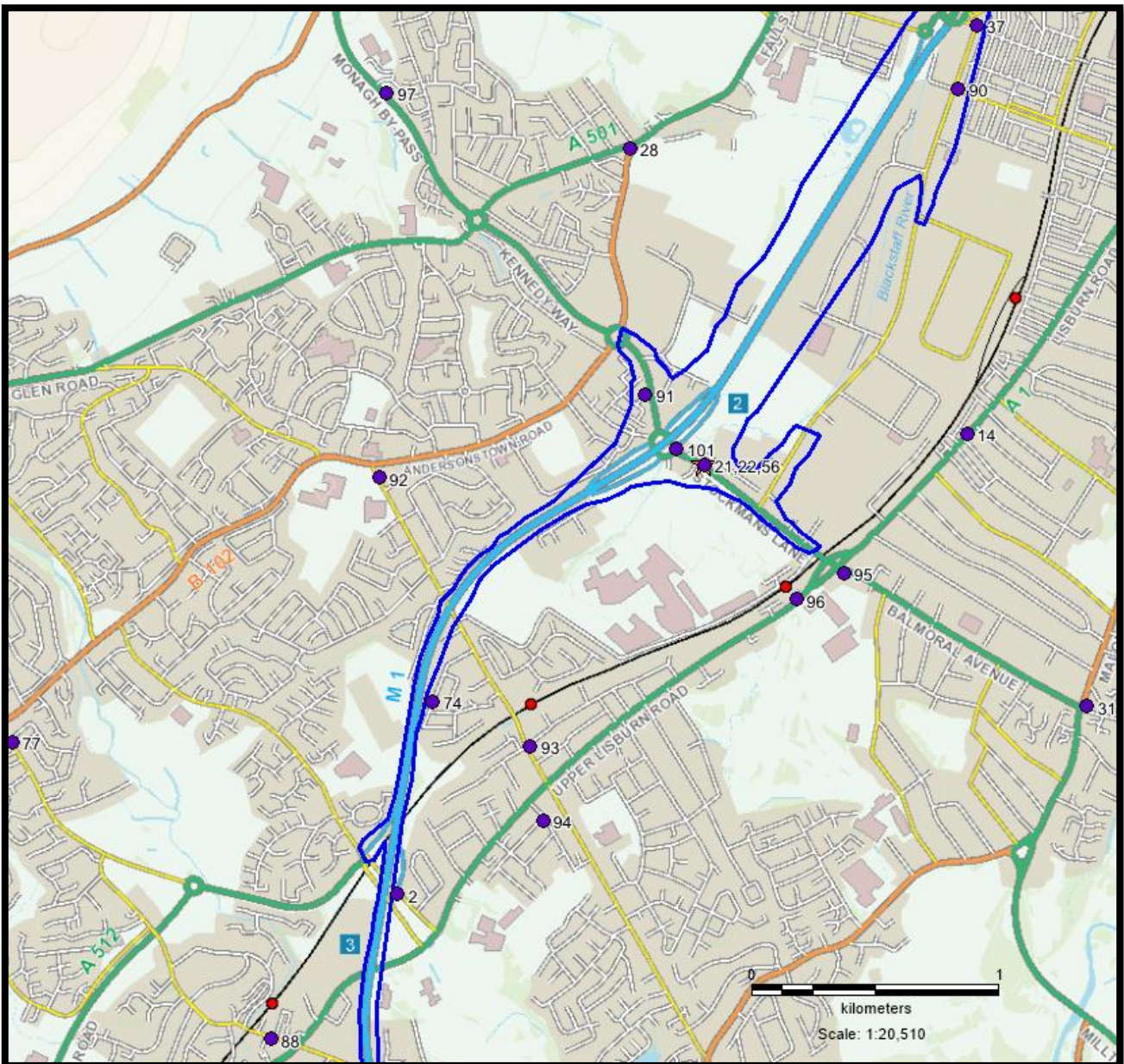


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## East Belfast
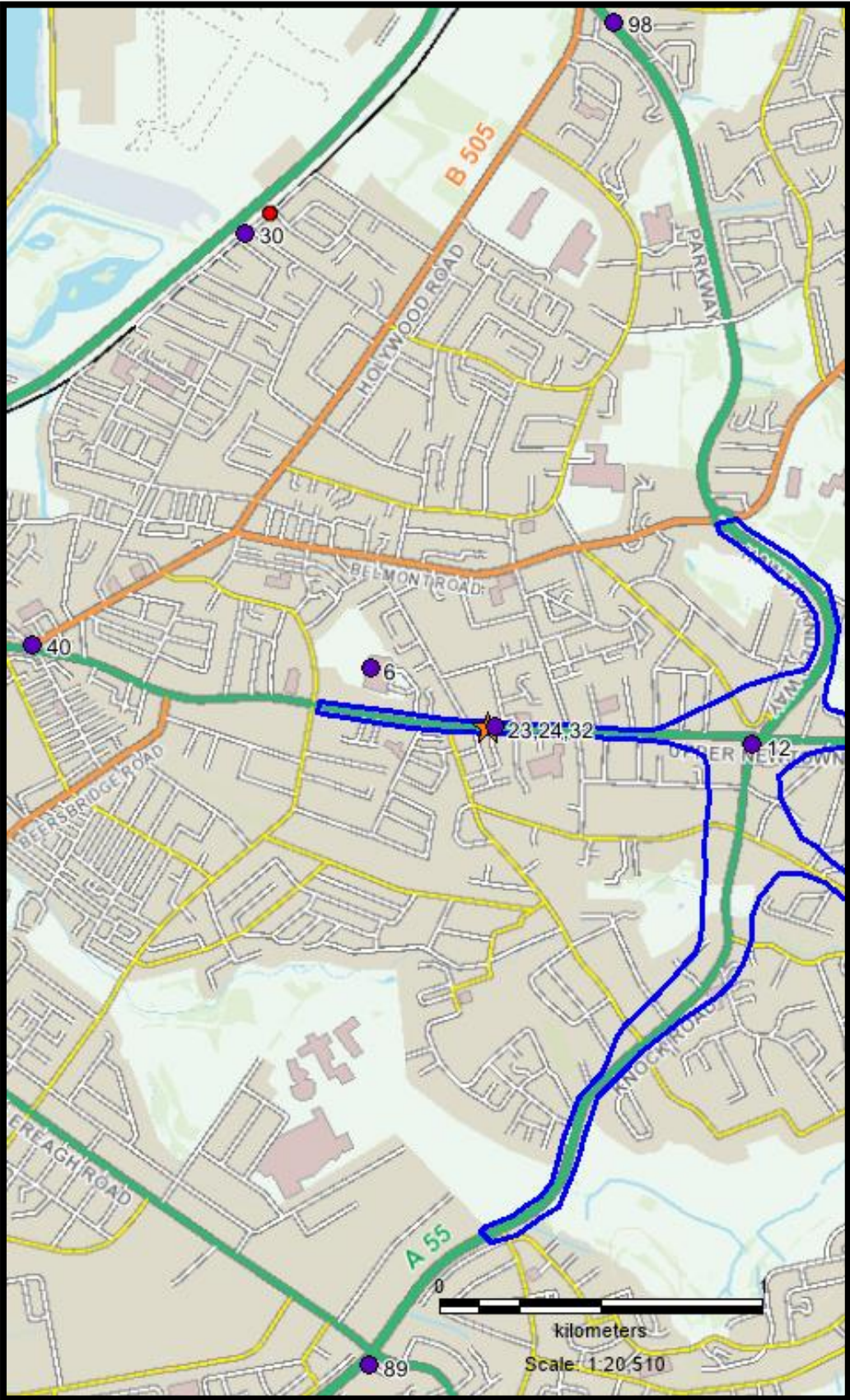
## Table 2.2 - Details of Non-Automatic Monitoring Sites

| 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 | 3.2 | NO$_2$ | N | N | Y (70) | 80 | N/A |
| 2 | Black's Road | Roadside | 329780 | 369528 | 2.7 | NO$_2$ | Y | N | Y (27) | 2 | Y |
| 3 | 61 Cromac Street | Roadside | 334220 | 373853 | 3.0 | NO$_2$ | Y | N | Y (10) | 3 | Y |
| 4 | Ravenhill Road | Roadside | 335013 | 373932 | 3.0 | NO$_2$ | Y | N | Y (50) | 3 | Y |
| 5 | Queen's Bridge | Roadside | 334630 | 374385 | 3.0 | NO$_2$ | N | N | Y (15) | 2 | Y |
| 6 | North Road | Urban Background | 337549 | 374151 | 3.0 | NO$_2$ | N | N | On School Wall | 135 | N/A |
| 7 | Donegall Square South | Roadside | 333840 | 373956 | 3.0 | NO$_2$ | N | N | N | 5 | Y |
| 9 | Short Strand | Kerbside | 334983 | 374260 | 3.2 | NO$_2$ | N | N | Y (21) | 1 | Y |
| 10 | 301 Ormeau Road | Roadside | 334499 | 372186 | 3.0 | NO$_2$ | Y | N | Y (1) | 7 | Y |
| 12 | Knock Road | Roadside | 338718 | 373918 | 2.5 | NO$_2$ | Y | N | Y (17) | 1.5 | Y |
| 13 | Great George's Street | Kerbside | 333981 | 375102 | 3.0 | NO$_2$ | Y | N | Y (9) | 0.5 | Y |
| 14 | Lisburn Road | Roadside | 332063 | 371376 | 2.7 | NO$_2$ | N | N | Y (4) | 3 | 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? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | Shaftesbury Square | Kerbside | 333600 | 373283 | 2.7 | NO$_2$ | N | N | N | 1 | Y |
| 16,19,20 | Lombard Street AQMS | Urban Background | 333898 | 374358 | 4.0 | NO$_2$ | N | Y | N | 30 | Y |
| 17 | Albert Clock | Roadside | 334213 | 374485 | 3.1 | NO$_2$ | N | N | Y (3.5) | 2.5 | Y |
| 21,22,56 | Stockman's Lane AQMS | Roadside | 331009 | 371251 | 3.0 | NO$_2$ | Y | Y | Y (15) | 2 | Y |
| 23,24,32 | Upper Newtownards Road AQMS | Roadside | 337930 | 373972 | 3.0 | NO$_2$ | Y | Y | Y (32) | 2.5 | Y |
| 25 | Whitewell Road | Roadside | 333230 | 380877 | 2.7 | NO$_2$ | N | N | Y (9) | 2 | Y |
| 26 | Donegall Road | Kerbside | 333018 | 373120 | 2.7 | NO$_2$ | N | N | Y (2.5) | 1 | Y |
| 28 | Falls Road and Andersonstown | Roadside | 330711 | 372520 | 3.0 | NO$_2$ | N | N | Y (30) | 3.5 | Y |
| 30 | Station Road | Roadside | 337168 | 375485 | 2.7 | NO$_2$ | N | N | Y (20) | 2 | Y |
| 31 | Malone Road | Roadside | 332544 | 370283 | 3.0 | NO$_2$ | N | N | Y (18) | 2 | Y |
| 33 | Great Victoria Street | Roadside | 333548 | 373772 | 3.2 | NO$_2$ | N | N | N | 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? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 34 | College Square East | Roadside | 333501 | 374236 | 3.0 | NO$_2$ | N | N | Y (3) | 1.5 | Y |
| 35 | Chichester Street | Roadside | 334140 | 374126 | 3.5 | NO$_2$ | N | N | Y (3) | 3 | Y |
| 36 | Cromac & Ormeau Avenue | Kerbside | 334044 | 373556 | 2.5 | NO$_2$ | N | N | Y (3) | 0.5 | Y |
| 37 | Glenmachan Street | Roadside | 332104 | 373005 | 3.0 | NO$_2$ | Y | N | Y (7) | 1 | Y |
| 38 | Albert Street | Roadside | 333085 | 374065 | 3.0 | NO$_2$ | Y | N | Y (10) | 1.5 | Y |
| 39 | Ormeau Road (junction with Ravenhill Road) | Roadside | 334943 | 371342 | 3.0 | NO$_2$ | Y | N | Y (4) | 4 | Y |
| 40 | Upper Newtownards Road & Holywood Road | Roadside | 336516 | 374226 | 3.0 | NO$_2$ | N | N | Y (35) | 2 | Y |
| 41 | Crumlin Road | Roadside | 333101 | 375295 | 3.0 | NO$_2$ | N | N | Y (25) | 3 | Y |
| 42 | 228 Antrim Road | Roadside | 333288 | 376150 | 2.7 | NO$_2$ | N | N | Y (20) | 2 | Y |
| 44 | Shore Road (Ivan Street end) | Roadside | 334177 | 376375 | 3.0 | NO$_2$ | N | N | Y (3) | 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? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 59 | York Street | Roadside | 334214 | 375638 | 2.7 | NO$_2$ | Y | N | Y (5) | 2 | Y |
| 63 | Queens Square | Roadside | 334193 | 374457 | 2.7 | NO$_2$ | N | N | Building Façade | 7 | Y |
| 65,66,67 | Westlink AQMS | Roadside | 332610 | 373434 | 2.6 | NO$_2$ | Y | Y | Y (17) | 5 | Y |
| 68 | Opposite Westlink AQMS | Roadside | 332610 | 373474 | 2.5 | NO$_2$ | Y | N | Y (70) | 2 | Y |
| 69 | Peter's Hill | Kerbside | 333281 | 374755 | 3.5 (above the canyon) | NO$_2$ | Y | N | Y (48) | 1 | Y |
| 70 | Henry Place | Kerbside | 333588 | 375224 | 3.5 (above the canyon) | NO$_2$ | Y | N | Y (17) | 1 | Y |
| 74 | Ardmore Park | Roadside | 329923 | 370300 | 2.7 | NO$_2$ | N | N | Y (7) | 2 | Y |
| 76 | Titanic Quarter | Roadside | 335073 | 375049 | 2.7 | NO$_2$ | N | N | Y (39) | 2.5 | Y |
| 77 | Poleglass | Roadside | 328237 | 370138 | 2.7 | NO$_2$ | N | N | Y (5) | 3 | Y |
| 82 | Molyneaux Street | Roadside | 334023 | 375238 | 2.7 | NO$_2$ | Y | N | Y (2.5) | 11 | Y |
| 83 | North Queen Street | Roadside | 333857 | 375412 | 2.7 | NO$_2$ | N | N | Y (9.5) | 3 | Y |
| 84 | Portland Place | Roadside | 333866 | 375160 | 2.7 | NO$_2$ | Y | N | Y (5.5) | 4 | 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? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 85 | Sailortown | Roadside | 334469 | 375341 | 2.7 | $NO_2$ | N | N | Y (17) | 4 | Y |
| 86 | Little Georges Street | Roadside | 333876 | 375267 | 2.5 | $NO_2$ | Y | N | Y (6) | 2 | N |
| 87 | RVH Falls Road | Roadside | 331964 | 373558 | 2.7 | $NO_2$ | N | N | Y (1) | 3 | Y |
| 88 | Dunmurry Lane | Roadside | 329273 | 368947 | 2.7 | $NO_2$ | N | N | Y (5) | 2 | Y |
| 89 | Upper Knockbreda Rd | Kerbside | 337547 | 372019 | 2.5 | $NO_2$ | N | N | Y (25) | 1 | Y |
| 90 | Tates Avenue | Roadside | 332028 | 372759 | 2.5 | $NO_2$ | N | N | Y (8) | 2.5 | Y |
| 91 | Stockman's Crescent | Roadside | 330772 | 371534 | 3.0 | $NO_2$ | Y | N | Y (5) | 23 | N |
| 92 | Andersonstown Road | Roadside | 329707 | 371200 | 2.5 | $NO_2$ | N | N | Y (10) | 2 | Y |
| 93 | Diamond Gardens | Roadside | 330313 | 370121 | 2.5 | $NO_2$ | N | N | Y (3) | 2 | Y |
| 94 | Orpen Road | Roadside | 330364 | 369824 | 2.5 | $NO_2$ | N | N | Y (8) | 2 | Y |
| 95 | Balmoral Avenue | Roadside | 331568 | 370818 | 2.7 | $NO_2$ | N | N | Y (10) | 3 | Y |
| 96 | Upper Lisburn Road | Roadside | 331379 | 370712 | 2.7 | $NO_2$ | N | N | Y (4.5) | 5.5 | 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? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 97 | Monagh Bypass | Roadside | 329737 | 372743 | 2.7 | NO$_2$ | N | N | Y (6.5) | 3 | Y |
| 98 | Knocknagoney | Roadside | 338297 | 376131 | 2.7 | NO$_2$ | N | N | Y (7) | 2 | Y |
| 100 | Henry Place 2 | Roadside | 333589 | 375251 | 2.5 | NO$_2$ | Y | N | Y (2) | 27 | N |
| 101 | Stockman's Lane Roundabout | Roadside | 330900 | 371316 | 2.5 | NO$_2$ | Y | N | Y (10) | 3.5 | Y |
| 102 | North Queen Park | Roadside | 333650 | 375180 | 2.5 | NO$_2$ | Y | N | Y (7) | 24 | N |
| 103 | Blythefield Park | Urban Background | 332885 | 373323 | 2.5 | NO$_2$ | N | N | Y (40) | 15 | N |
| 104 | Legoniel Crossroads | Roadside | 330799 | 376918 | 3.0 | NO$_2$ | N | N | Y (13) | 1.5 | Y |
| 105 | Ulster University | Kerbside | 333918 | 374952 | 2.5 | NO$_2$ | Y | N | Y (6.5) | 1.0 | Y |
| 106 | M3 | Kerbside | 334120 | 375033 | 2.5 | NO$_2$ | N | N | Y (15) | 0.5 | Y |
| 107 | Springfield Road | Roadside | 330220 | 373746 | 2.5 | NO$_2$ | N | N | Y (5) | 3.5 | Y |
| 108 | Lisburn Road and Tates Avenue Junction | Roadside | 332825 | 372465 | 2.5 | NO$_2$ | N | N | Y (2.7) | 2.5 | Y |

### 2.1.3 Additional non-LAQM Monitoring

During 2022, Belfast City Council has also carried out nitrogen dioxide monitoring using Zephyr samplers at six locations; at the A2 Sydenham By-Pass adjacent to George Best Belfast City Airport; at the A55 Upper Knockbreda Road; at Clara Street in east Belfast; at Lombard Street in the city centre; at the A12 Westlink at Henry Place; and at Mount Eagles Glen in southwest of the city.

### Figure 2.3 - Map of Zephyr Locations
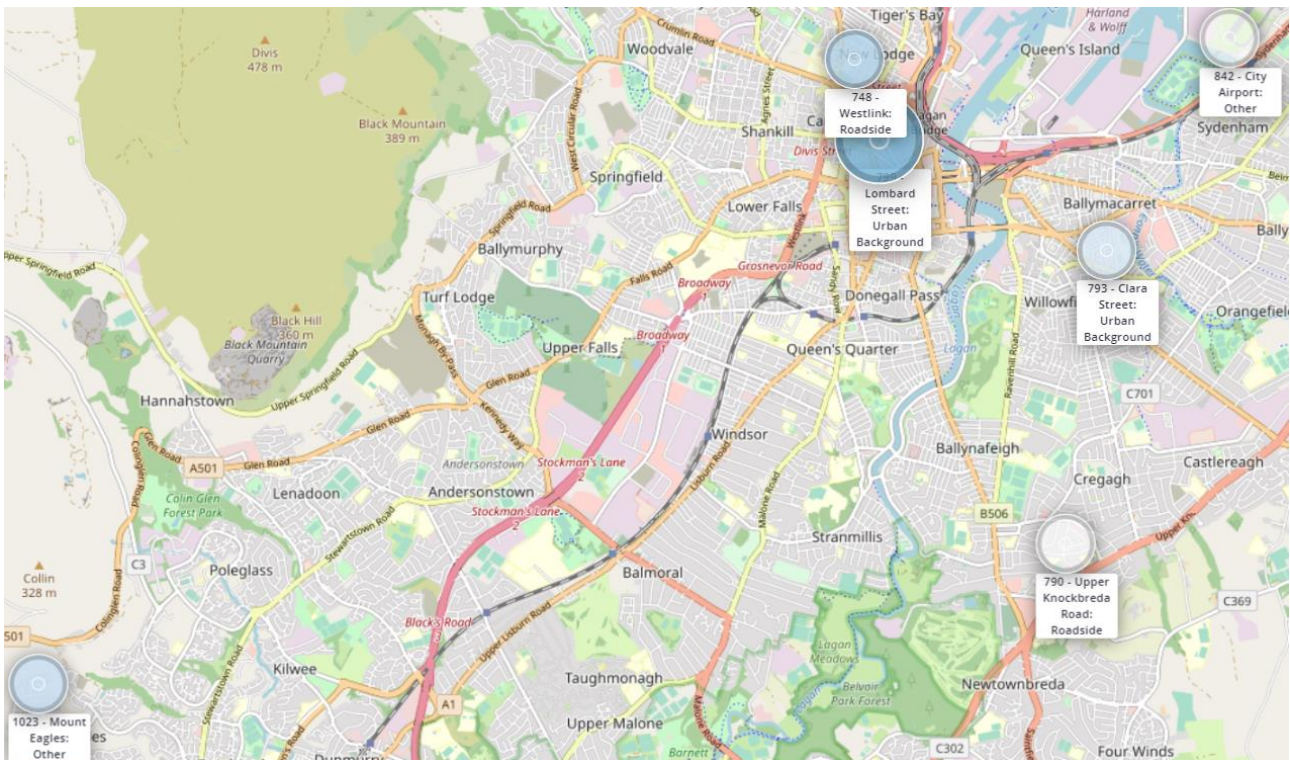


Taken from Earthsense MyAir Portal: [EarthSense](#).

The Zephyr analyser is an active indicative grade analyser and is used to monitor $NO_2$ using electrochemical sensors, and $PM_{10}$ and $PM_{2.5}$ using optical particle counting sensors giving real-time results every minute. Prior to installation, the monitoring unit is tested by the manufacturer against EU reference analyser standards. Moreover, the Zephyr monitors recently obtained MCERTS Performance Standards as an Indicative Ambient Particulate Monitor, which gives additional confidence in the performance of the monitors.

The council is aware that *Defra is funding the development of a Publicly Available Specification to standardise the use of low-cost sensors as standalone units or as part of a network and thus improve the reliability of their application, account for uncertainties and enable better integration with other measurements* (LAQM Technical Guidance (TG22)).

In the absence of the standardised QA/QC methodology, council officers have followed the US Environment Protection Agency guidance *The Enhanced Air Sensor Guidebook* available on Defra's website https://uk-ir.defra.gov.uk/research/aqeg/pollution-sensors.php

A two-stage data scaling process has been undertaken in the calculation of an annual mean. First, to account for any bias in the monitoring method, data were compared between the co-located Zephyr unit and the AURN Belfast Centre monitoring station, and an adjustment factor was applied. Then, to account for any variation in sensor cartridge response between monitoring locations, a second sensor cartridge was periodically moved between each of the sites to provide a second adjustment for sensor performance. Further details of the applied adjustments are presented within Appendix A. Annual scaled 2022 results are presented in Table 2.3 and Figure 2.4 below.

**Table 2.3 - 2022 Annual Scaled Zephyrs Results**

| Site ID | Site Name | $NO_2$ ($\mu g/m^3$) | $PM_{10}$ ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) |
|---|---|---|---|---|
| **ZAURN** | AURN (Lombard Street) | 20.5 | 13.4 | 7.5 |
| **N1** | Upper Knockbreda Road (A55) | 15.6 | 13.6 | 6.8 |
| **N6** | Clara Street | 14.4 | 13.0 | 7.2 |
| **N8** | Sydenham By-Pass (A2) / City Airport | 18.7 | 14.3 | 6.9 |
| **N10** | Westlink (A12) | 42.4 | 14.1 | 7.3 |
| **N12** | Mount Eagles Glen | 8.5 | 12.8 | 5.9 |

**Figure 2.4 - 2022 Annual Scaled Zephyr Results**
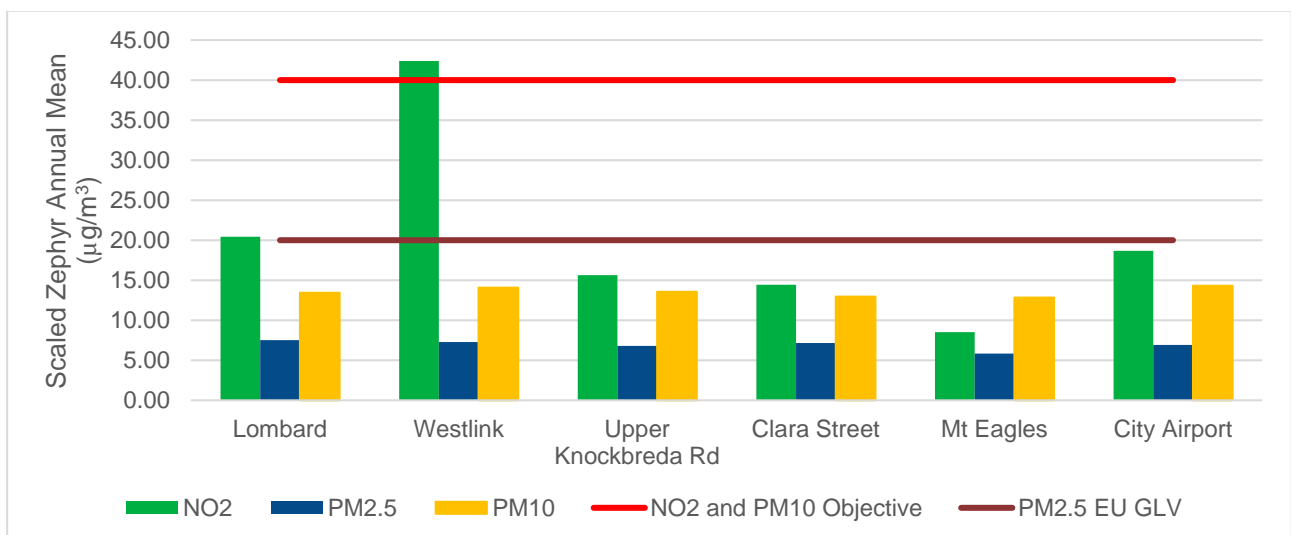
Overall, there were no monitored exceedances of the statutory AQS objectives during 2022 at any Zephyr monitoring site, with the exception of the N10 Westlink site, where monitored $NO_2$ concentrations were in excess of 40 µg/m$^3$ annual mean objective: 42 µg/m$^3$

## 2.2 Comparison of Monitoring Results with Air Quality Objectives

### 2.2.1 Nitrogen Dioxide (NO$_2$)

#### Automatic Monitoring Data

Tables 2.4 and 2.5 summarise recent monitoring data from the council's nitrogen dioxide automatic analysers for 2022 and preceding years from 2018. 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 2.5.

All automatic monitoring sites in Belfast measured NO$_2$ annual mean concentration below 40 µg/m$^3$ during 2022. Moreover, there were no NO$_2$ 1-hour means above 200 µg/m$^3$ recorded in Belfast during 2022.

It is unclear at this stage what impact behavioural changes associated with the Covid pandemic have had on 2022 monitoring data, but it is assumed that changing working habits and working locations may have contributed to the continued reduction of annual mean nitrogen dioxide concentrations.

#### Belfast Centre (Lombard Street) AQMS

The Belfast Centre AURN site is an urban centre / urban background site situated in a substantially pedestrianised area of Belfast City Centre. Urban background sites are located such that the pollution levels monitored are not influenced significantly by any single source or street, but rather by the integrated contribution from all sources upwind of the station e.g. by all traffic, combustion sources etc. upwind of the station in the city. Accordingly, there were no exceedances of any nitrogen dioxide air quality objectives recorded at the Belfast Centre AURN during 2022, with the annual mean being 21 µg/m$^3$; around half of the 40 µg/m$^3$ objective value. The annual mean in 2021 was also 21 µg/m$^3$. The highest nitrogen dioxide hourly mean in 2022 was 130 µg/m$^3$; substantially less than the 200 µg/m$^3$ AQO value (18 exceedances permitted per annum).

### Ormeau Road AQMS

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 established trends. Following the site upgrade however, the annual mean concentration has remained reasonably constant at 27 µg/m$^3$ in 2014, 27 µg/m$^3$ in 2015, 28 µg/m$^3$ in 2016, 25 µg/m$^3$ in 2017, 26 µg/m$^3$ in 2018 and 24 µg/m$^3$ in 2019.  Although the annual mean results for 2020 and 2021 at this location are markedly lower when compared to previous years (17 µg/m$^3$ – 18 µg/m$^3$), they still appear to be representative, given that all monitoring sites have followed a similar downward trend, due to behavioural changes caused by the Covid-19 pandemic. 2022 annual mean results (18.8 µg/m$^3$) are slightly higher than the last two years' monitoring data.

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

Formerly, the council had liaised with the Department of Agriculture, Environment and Rural Affairs (DAERA) regarding the potential for revocation, but it was agreed that since nitrogen dioxide annual mean monitoring data from the Ormeau Road site contributes to derivation of the Draft Programme for Government Framework 2016 – 2021 Indicator 37: Improve air quality, the AQMA and monitor should remain in place.

However, after a detailed review and assessment of 2022 data (post Covid-19) and in view of continuing compliance with the nitrogen dioxide annual mean objective, the council is planning to revisit the option to potentially revoke the Ormeau Road AQMA later this year.

Moreover, a detailed assessment for the city, for particulate matter (PM$_{10}$), fine particulate matter (PM$_{2.5}$) and nitrogen dioxide (NO$_2$) pollutants was concluded earlier this year (March 2023). It is considered that the detailed atmospheric dispersion modelling, in

addition to monitoring data, provides further appropriate evidence to help inform a decision on potential revocation of our Air Quality Management Areas along the Ormeau Road and the Upper Newtownards Road.

### Upper Newtownards Road AQMS

From the data in Table 2.4, it can be seen that annual mean concentrations of nitrogen dioxide along the Upper Newtownards Road have remained in the range 20 – 29 µg/m$^3$ since 2018, meaning that the nitrogen dioxide annual mean objective is being consistently achieved along the Upper Newtownards Road. As noted above, the 2020 and 2021 annual means show a drop to 20 and 21 µg/m$^3$ respectively, again due to significant reductions in traffic numbers, as a result of the Covid-19 pandemic restrictions. 2022 annual mean results (22.2 µg/m$^3$) are only slightly higher than the last two year's annual mean data but significantly below the objective level.

The Knock Road non-automatic roadside diffusion tube, located at the junction of the Upper Newtownards Road, Hawthornden Way and the Knock Road (Upper Newtownards Road AQMA worst case location) has recorded exceedances of the annual mean objective in previous years up until 2016. The 2017 calendar year was the first year when the annual mean concentration at the Knock Road junction fell below the air quality objective (36 µg/m$^3$), which was still the case in 2022 (25.2 µg/m$^3$). Consequently, there have not been any exceedances of air quality objectives for NO$_2$ identified within this AQMA for the last six years.

Considering the above monitoring data for this location, and the outcome of the recently concluded detailed assessment, which also confirms that the annual mean objective for nitrogen dioxide is consistently being achieved, we will liaise with DAERA in relation to the potential revocation of this Upper Newtownards Road AQMA.

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 was established on the Upper Newtownards Road, Albertbridge Road and East Bridge Street, which operates from 07.00 to 19.00, Monday to Saturday inclusive. Glider operations together with introduction of the bus lane are likely to have had a beneficial impact on traffic movements and pollution levels along the Upper Newtownards Road, Albertbridge Road and East Bridge Street.

### Stockman's Lane AQMS

Unfortunately, despite the completion of significant structural improvements to the M1 Motorway and A12 Westlink corridor, nitrogen dioxide concentrations at Stockman's Lane have remained high. 2020 was the first year however, when the annual mean concentration (33 µg/m$^3$) fell below the objective level of 40 µg/m$^3$, likely due to Covid-19 travel restrictions. Whilst reductions in nitrogen dioxide annual mean concentrations at the Stockman's Lane site had been following a relatively consistent declining trend over recent years (the 2019 nitrogen dioxide annual mean was 45 µg/m$^3$, which is a ~8% reduction from the 2018 annual mean of 49 µg/m$^3$), the Covid-19 pandemic has had an obvious impact on the 2021 and 2022 annual means. The 2021 annual mean (36 µg/m$^3$) was about 20% lower than the 2019 (pre-pandemic) levels. The 2022 annual mean (36.4 µg/m$^3$), the same as the 2021-year mean, although lower than 40 µg/m$^3$ is still considered elevated (within 10% of the annual mean $NO_2$ objective). Moreover, one roadside diffusion tube, located near to the Stockman's Lane AQMS, recorded a 2022 $NO_2$ annual mean concentration closer to the objective level (Stockman's Lane Roundabout - 39.2 µg/m$^3$).

Furthermore, results from the council's Detailed Assessment also suggest elevated nitrogen dioxide levels at this location. Therefore, the council will continue its monitoring at this location (within the Westlink Corridor / M1 Air Quality Management Area) to identify any potential further exceedances and nitrogen dioxide concentrations and trends.

There were, no $NO_2$ 1-hour means above 200 µg/m$^3$ recorded at this AQMS location during 2022.

### Westlink/Roden Street AQMS

The 2022 nitrogen dioxide annual mean (27.9 µg/m$^3$) monitored at the Westlink Roden Street is the same as the 2021-year mean. Although slightly higher than in 2020 (24 µg/m$^3$) it is still noticeably lower than the 2019 pre-pandemic level (34 µg/m$^3$) and comfortably below the annual mean objective of 40 mg/m$^3$. Also, there were no $NO_2$ 1-hour means above 200 µg/m$^3$ recorded at this AQMS location during 2022.

The nitrogen dioxide annual mean air quality objective has not been exceeded at the Westlink Roden Street since 2011. However, one roadside diffusion tube, located at Henry Place, further along the Westlink corridor, recorded exceedances of the annual mean objective over the last four years including in 2022 (42.0 µg/m$^3$). Moreover, results from

the council's Detailed Assessment also suggest monitored (by small sensor air quality monitor) and modelled exceedances of the annual mean objective at this location. Therefore, the council will continue its monitoring within the Westlink Corridor / M1 Air Quality Management Area to identify any continuing or further 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 the Stockman's Lane and Westlink/Roden Street monitoring sites, as summarised in Table 2.5, it can be seen that the number of exceedances of the hourly objective has substantially decreased over recent years, both now demonstrating compliance with the 200 µg/m$^3$ objective, not to be exceeded more than 18 times per year - since 2013. In fact, there have been no recorded 1-hour mean concentrations greater than 200 µg/m$^3$ at either monitoring site since 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 of the 1-hour mean objective and to establish trends.

**Table 2.4 - Results of Automatic Monitoring for NO₂: Comparison with Annual Mean Objective**

| Site ID | Site Type | Within AQMA? | Valid Data Capture for Monitoring Period % [a] | Valid Data Capture 2022 % [b] | Annual Mean Concentration ($\mu g/m^3$) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2018* [c] | 2019* [c] | 2020* [c] | 2021 [c] | 2022 [c] |
| Belfast Centre (Lombard Street) | Urban Background | N | 84.1% | 84.1% | 27 | 26[c] | 19[c] | 21 | 21.1 |
| Belfast Ormeau Road | Roadside | Y (CM2) | 99.0% | 99.0% | 26 | 24 | 17 | 18 | 18.8 |
| Belfast Upper Newtownards Road | Roadside | Y (CM3) | 97.5% | 97.5% | 29 | 27 | 20 | 21 | 22.2 |
| Belfast Stockman's Lane | Roadside | Y (CM4) | 99.1% | 99.1% | **49** | **45** | 33 | 36 | 36.4 |
| Belfast Westlink / Roden Street | Roadside | Y (CM5) | 99.2% | 99.2% | 40 | 34 | 24 | 28 | 27.9 |

In **bold**, exceedance of the NO₂ annual mean AQS objective of 40 $\mu g/m^3$

[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.TG22, if valid data capture is less than 75%

* Annual mean concentrations for previous years are optional

**Figure 2.5 - Trends in Annual Mean NO₂ Concentrations Measured at Automatic Monitoring Sites**
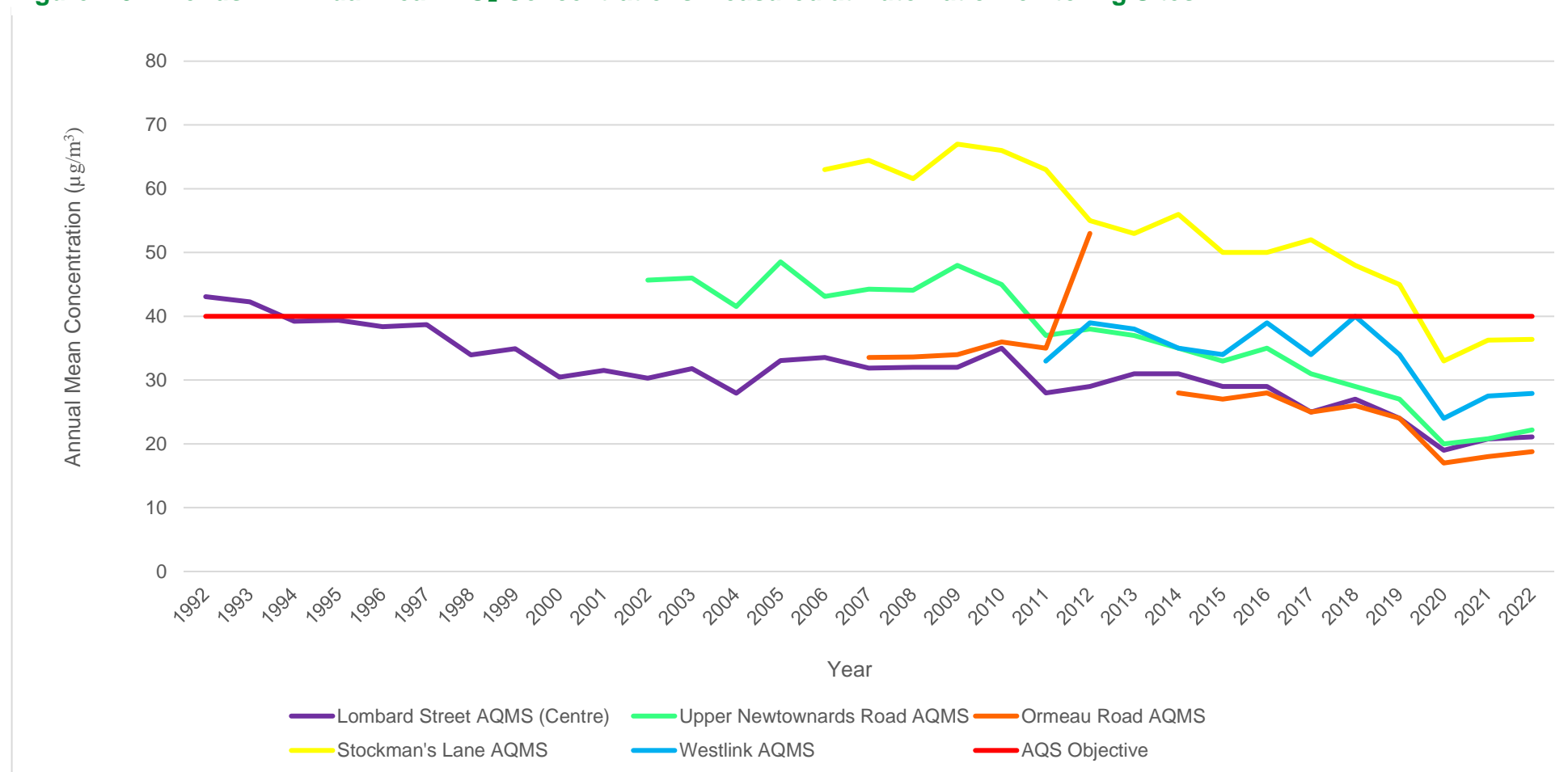
**Table 2.5 - Results of Automatic Monitoring for NO₂: Comparison with 1-hour Mean Objective**

| Site ID | Site Type | Within AQMA? | Valid Data Capture for Monitoring Period % [a] | Valid Data Capture 2022 % [b] | Number of Hourly Means > 200 µg/m³ | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2018* [c] | 2019* [c] | 2020* [c] | 2021 [c] | 2022 [c] |
| Belfast Centre (Lombard Street) | Urban Background | N | 84.1% | 84.1% | 0 | 0 (93) | 0 (86) | 0 | 0(93) |
| Belfast Ormeau Road | Roadside | Y (CM2) | 99.0% | 99.0% | 0 | 0 (86) | 0 | 0 | 0 |
| Belfast Upper Newtownards Road | Roadside | Y (CM3) | 97.5% | 97.5% | 0 | 0 | 0 | 0 | 0 |
| Belfast Stockman's Lane | Roadside | Y (CM4) | 99.1% | 99.1% | 3 | 0 | 0 | 0 | 0 |
| Belfast Westlink / Roden Street | Roadside | Y (CM5) | 99.2% | 99.2% | 0 | 0 | 0 | 0 | 0 |

**In bold**, exceedance of the NO₂ hourly mean AQS objective (200 µg/m³ – 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 85%, 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 76 diffusion tubes at 68 relevant locations across the city. Data from these tubes for 2022 has been summarised in Table 2.6 alongside historical data, where it is available, in Table 2.7.

In terms of the outcome of the 2022 nitrogen dioxide diffusion tube monitoring, it is noted that concentrations at most locations are comparable to 2021 results; however, they are still significantly lower than 2019 pre-pandemic levels.

Since the 2022 Progress Report, the council officers have added an additional 5 tubes to the network; 1 located within the M1/Westlink AQMA and 4 outside the AQMA. We have also relocated two tubes (Nos 37 and 90) to 'worst case scenario' locations. These locations are detailed in Figure 2.2 and Table 2.2.

Only two annual mean air quality objective exceedances occurred during 2022, Henry Place (42.0 µg/m$^3$) and at a location next to the junctions of the M3 Motorway / M2 Motorway and the A12 Westlink (45.8 µg/m$^3$). Both tubes are located at kerbside locations adjacent to busy Motorways. The Henry Place tube is located within the existing M1 Motorway / A12 Westlink Air Quality Management Area and has been the subject of mitigation measures for some time.

The M3 Motorway tube was added to the councils' monitoring network due to the introduction of new relevant human health exposure; a new residential development located adjacent to the junction of the M3 Motorway / M2 Motorway and the A12 Westlink. The new monitoring site is located immediately next to the dominant road transport NO$_2$ pollution source and at a worst-case location. It is anticipated that when all construction works at the residential development are finalised later this year, the monitoring site can be relocated from its current kerbside location to a building facade location more representative of public exposure at the residential development.

Nevertheless, Defra NO$_2$ distance calculations have been provided for the above locations to estimate concentrations at relevant human health receptor locations.

The Diffusion Tube Processing Tool has predicted an annual mean concentration of 30.3 µg/m$^3$ at Henry Place and 31.3 µg/m$^3$ at the M3, which indicates that no exceedances are likely at both relevant receptor locations; the distance adjustment has been calculated using the Diffusion Tube Data Processing Tool (Appendix A).

Overall, in 2022 there were only four diffusion tube sites (Henry Place, M3, Stockman's Lane AQMS and Stockman's Lane Roundabout) located at roadside/kerbside locations where concentrations were above 36 µg/m$^3$ (within 10% of the annual mean objective of 40 µg/m$^3$).

### Table 2.6 - Results of NO$_2$ Diffusion Tubes 2022

| Site ID | Location | Site Type | Within AQMA? | Triplicate or Co-located Tube | Full Calendar Year Data Capture 2022 (Number of Months or %) [a] | 2022 Annual Mean Concentration (µg/m$^3$) - Bias Adjustment factor = 0.81 [b] |
|---|---|---|---|---|---|---|
| 1 | Royal Victoria Hospital | Urban Background | N | N | 100.0% | 16.6 |
| 2 | Black's Road | Roadside | Y (Westlink) | N | 100.0% | 31.5 |
| 3 | 61 Cromac Street | Roadside | Y (Cromac Street & Albertbridge Rd) | N | 92.1% | 26.2 |
| 4 | Ravenhill Road | Roadside | Y (Cromac Street & Albertbridge Rd) | N | 90.7% | 21.0 |
| 5 | Queen's Bridge | Roadside | N | N | 100.0% | 24.4 |
| 6 | North Road | Urban Background | N | N | 100.0% | 10.7 |
| 7 | Donegall Square South | Roadside | N | N | 100.0% | 25.5 |
| 9 | Short Strand | Roadside | N | N | 100.0% | 31.7 |
| 10 | 301 Ormeau Road | Roadside | Y (Ormeau Rd) | N | 100.0% | 23.2 |
| 12 | Knock Road | Roadside | Y (Upper Newtownards Rd) | N | 100.0% | 25.2 |
| 13 | Great George's Street | Kerbside | Y (Westlink) | N | 100.0% | 35.1 |
| 14 | Lisburn Road | Roadside | N | N | 81.1% | 23.1 |
| 15 | Shaftesbury Square | Kerbside | N | N | 100.0% | 26.7 |
| 16,19,20 | Lombard Street AQMS | Urban Centre | N | Triplicate and Co-located | 100.0% | 21.0 |
| 17 | Albert Clock | Roadside | N | N | 100.0% | 28.7 |
| 21,22,56 | Stockman's Lane AQMS | Roadside | Y (Westlink) | Triplicate and Co-located | 100.0% | 37.8 |
| 23,24,32 | Upper Newtownards Road AQMS | Roadside | Y (Upper Newtownards Rd) | Triplicate and Co-located | 100.0% | 19.8 |
| 25 | Whitewell Road | Roadside | N | N | 100.0% | 18.6 |
| 26 | Donegall Road | Kerbside | N | N | 100.0% | 24.0 |
| 28 | Falls Road and Andersonstown | Roadside | N | N | 100.0% | 21.2 |
| 30 | Station Road | Roadside | N | N | 100.0% | 17.1 |
| 31 | Malone Road | Roadside | N | N | 90.7% | 23.9 |
| 33 | Great Victoria Street | Roadside | N | N | 100.0% | 29.5 |

| Site ID | Location | Site Type | Within AQMA? | Triplicate or Co-located Tube | Full Calendar Year Data Capture 2022 (Number of Months or %) [a] | 2022 Annual Mean Concentration (µg/m³) - Bias Adjustment factor = 0.81 [b] |
|---|---|---|---|---|---|---|
| 34 | College Square East | Roadside | N | N | 100.0% | 27.9 |
| 35 | Chichester Street | Roadside | N | N | 100.0% | 33.2 |
| 36 | Cromac & Ormeau Avenue | Kerbside | N | N | 100.0% | 24.1 |
| 37 | Glenmachan Street | Roadside | Y (Westlink) | N | 82.7% | 33.1 |
| 38 | Albert Street | Roadside | Y (Westlink) | N | 84.4% | 24.5 |
| 39 | Ormeau Road (junction with Ravenhill Road) | Roadside | Y (Ormeau Rd) | N | 82.7% | 27.1 |
| 40 | Upper Newtownards Road & Holywood Road | Roadside | N | N | 100.0% | 20.0 |
| 41 | Crumlin Road | Roadside | N | N | 100.0% | 22.7 |
| 42 | 228 Antrim Road | Roadside | N | N | 92.3% | 25.9 |
| 44 | Shore Road (Ivan Street end) | Roadside | N | N | 100.0% | 23.2 |
| 59 | York Street | Roadside | Y (Westlink) | N | 100.0% | 30.8 |
| 63 | Queens Square | Kerbside | N | N | 92.1% | 32.4 |
| 65,66,67 | Westlink AQMS | Roadside | Y (Westlink) | Triplicate and Co-located | 100.0% | 28.8 |
| 68 | Opposite Westlink AQMS | Roadside | Y (Westlink) | N | 100.0% | 36.0 |
| 69 | Peter's Hill | Kerbside | Y (Westlink) | N | 82.7% | 30.5 |
| 70 | Henry Place | Kerbside | Y (Westlink) | N | 90.7% | **42.0** |
| 74 | Ardmore Park | Roadside | N | N | 90.7% | 25.7 |
| 76 | Titanic Quarter | Roadside | N | N | 92.1% | 18.3 |
| 77 | Poleglass | Roadside | N | N | 100.0% | 19.3 |
| 82 | Molyneux Street | Roadside | Y (Westlink) | N | 90.7% | 29.6 |
| 83 | North Queen Street | Roadside | N | N | 92.1% | 26.7 |
| 84 | Portland Place | Roadside | Y (Westlink) | N | 100.0% | 26.7 |
| 85 | Sailortown | Roadside | N | N | 100.0% | 23.2 |
| 86 | Little Georges Street | Roadside | Y (Westlink) | N | 100.0% | 27.5 |
| 87 | RVH Falls Road | Roadside | N | N | 92.1% | 27.2 |
| 88 | Dunmurry Lane | Roadside | N | N | 100.0% | 18.8 |

| Site ID | Location | Site Type | Within AQMA? | Triplicate or Co-located Tube | Full Calendar Year Data Capture 2022 (Number of Months or %) [a] | 2022 Annual Mean Concentration (µg/m³) - Bias Adjustment factor = 0.81 [b] |
|---|---|---|---|---|---|---|
| 89 | Upper Knockbreda Rd | Kerbside | N | N | 100.0% | 24.3 |
| 90 | Tates Avenue | Roadside | N | N | 83.0% | 27.8 |
| 91 | Stockman's Crescent | Roadside | Y (Westlink) | N | 100.0% | 18.5 |
| 92 | Andersonstown Road | Roadside | N | N | 100.0% | 22.8 |
| 93 | Diamond Gardens | Roadside | N | N | 100.0% | 18.3 |
| 94 | Orpen Road | Roadside | N | N | 100.0% | 13.2 |
| 95 | Balmoral Avenue | Roadside | N | N | 100.0% | 28.9 |
| 96 | Upper Lisburn Road | Roadside | N | N | 90.7% | 19.5 |
| 97 | Monagh Bypass | Roadside | N | N | 71.2% | 18.4 |
| 98 | Knocknagoney | Roadside | N | N | 100.0% | 32.0 |
| 100 | Henry Place 2 | Roadside | Y | N | 82.7% | 28.8 |
| 101 | Stockman's Lane Roundabout | Roadside | Y | N | 100.0% | 39.2 |
| 102 | North Queen Park | Roadside | Y | N | 100.0% | 25.4 |
| 103 | Blythefield Park | Urban Background | N | N | 100.0% | 19.8 |
| 104 | Legoniel Crossroads | Roadside | N | No | 100.0% | 13.5 |
| 105 | Ulster University | Kerbside | Y (Westlink) | No | 67.4% | 29.8 |
| 106 | M3 Motorway | Kerbside | N | No | 67.4% | **45.8** |
| 107 | Springfield Road | Roadside | N | No | 67.4% | 20.8 |
| 108 | Lisburn Rd and Tates Av Junction | Roadside | N | No | 67.4% | 31.7 |

**In bold**, exceedance of the NO$_2$ annual mean AQS objective of 40 µg/m³

Underlined, annual mean > 60 µg/m³, 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.TG22, 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, and results should be discussed in a specific section. The procedure is also explained in paragraphs 7.82 to 7.85 of LAQM.TG22.

**Table 2.7 - Results of NO$_2$ Diffusion Tubes (2018 to 2022)**

| Site ID | Site Name | Within AQMA? | Annual Mean Concentration (µg/m$^3$) - Adjusted for Bias [a] | | | | |
|---------|-----------|--------------|-----------|-----------|-----------|-----------|-----------|
| | | | **2018** (Bias Adjustment Factor = **0.86**) | **2019** (Bias Adjustment Factor = **0.91**) | **2020** (Bias Adjustment Factor = **0.79**) | **2021** (Bias Adjustment Factor = **0.79**) | **2022** (Bias Adjustment Factor = **0.81**) |
| 1 | Royal Victoria Hospital | N | 20 | 21 | 17.6 | 18.1 | 16.6 |
| 2 | Black's Road | Y (Westlink) | 36 | **42** | 33.3 | 30.7 | 31.5 |
| 3 | 61 Cromac Street | Y (Cromac Street & Albertbridge Rd) | 30 | 36 | 22.4 | 24.5 | 26.2 |
| 4 | Ravenhill Road | Y (Cromac Street & Albertbridge Rd) | 27 | 28 | 20.5 | 20.8 | 21.0 |
| 5 | Queen's Bridge | N | 26 | 27 | 20.7 | 23.1 | 24.4 |
| 6 | North Road | N | 12 | 14 | 10.8 | 12.3 | 10.7 |
| 7 | Donegall Square South | N | 31 | 32 | 22.8 | 23.4 | 25.5 |
| 9 | Short Strand | N | 40 | 40 | 30.5 | 32.8 | 31.7 |
| 10 | 301 Ormeau Road | Y (Ormeau Rd) | 28 | 30 | 21.6 | 23.5 | 23.2 |
| 12 | Knock Road | Y (Upper Newtownards Rd) | 35 | 35 | 24.8 | 26.0 | 25.2 |
| 13 | Great George's Street | Y (Westlink) | **44** | **45** | 32.8 | 36.3 | 35.1 |
| 14 | Lisburn Road | N | 26 | 27 | 23.5 | 22.4 | 23.1 |
| 15 | Shaftesbury Square | N | 32 | 31 | 25.1 | 26.4 | 26.7 |
| 16,19,20 | Lombard Street AQMS | N | 25 | 26 | 19.5 | 21.1 | 21.0 |
| 17 | Albert Clock | N | 39 | 40 | 26.5 | 28.1 | 28.7 |
| 21,22,56 | Stockman's Lane AQMS | Y (Westlink) | **48** | **45** | 29.9 | 33.4 | 37.8 |
| 23,24,32 | Upper Newtownards Road AQMS | Y (Upper Newtownards Rd) | 24 | 27 | 18.9 | 19.8 | 19.8 |
| 25 | Whitewell Road | N | 23 | 25 | 16.1 | 19.0 | 18.6 |
| 26 | Donegall Road | N | 31 | 31 | 21.9 | 24.8 | 24.0 |
| 28 | Falls Road and Andersonstown | N | 27 | 27 | 19.3 | 22.3 | 21.2 |
| 30 | Station Road | N | 26 | 22 | 16.6 | 17.2 | 17.1 |
| 31 | Malone Road | N | 33 | 31 | 22.8 | 26.3 | 23.9 |

| Site ID | Site Name | Within AQMA? | Annual Mean Concentration (µg/m³) - Adjusted for Bias [a] | | | | |
|---|---|---|---|---|---|---|---|
| | | | **2018** (Bias Adjustment Factor = **0.86**) | **2019** (Bias Adjustment Factor = **0.91**) | **2020** (Bias Adjustment Factor = **0.79**) | **2021** (Bias Adjustment Factor = **0.79**) | **2022** (Bias Adjustment Factor = **0.81**) |
| 33 | Great Victoria Street | N | 35 | 36 | 24.9 | 28.3 | 29.5 |
| 34 | College Square East | N | 33 | 33 | 22.1 | 27.5 | 27.9 |
| 35 | Chichester Street | N | **41** | 40 | 27.8 | 32.1 | 33.2 |
| 36 | Cromac & Ormeau Avenue | N | 32 | 31 | 21.4 | 23.4 | 24.1 |
| 37 | Glenmachan Street | Y (Westlink) | 36 | 38 | 27.9 | 30.2 | 33.1 |
| 38 | Albert Street | Y (Westlink) | 27 | 28 | 20.8 | 22.8 | 24.5 |
| 39 | Ormeau Road (junction with Ravenhill Road) | Y (Ormeau Rd) | 31 | 36 | 26.0 | 26.7 | 27.1 |
| 40 | Upper Newtownards Road & Holywood Road | N | 26 | 27 | 18.9 | 20.2 | 20.0 |
| 41 | Crumlin Road | N | 28 | 27 | 20.6 | 23.2 | 22.7 |
| 42 | 228 Antrim Road | N | 33 | 31 | 25.1 | 26.5 | 25.9 |
| 44 | Shore Road (Ivan Street end) | N | 28 | 30 | 21.3 | 23.9 | 23.2 |
| 59 | York Street | Y (Westlink) | 38 | 36 | 26.8 | 29.7 | 30.8 |
| 63 | Queens Square | N | 35 | 34 | 25.3 | 34.3 | 32.4 |
| 65,66,67 | Westlink AQMS | Y (Westlink) | N/A | 34 | 27.8 | 30.1 | 28.8 |
| 68 | Opposite Westlink AQMS | Y (Westlink) | N/A | **45** | 33.6 | 31.8 | 36.0 |
| 69 | Peter's Hill | Y (Westlink) | N/A | 40 | 30.6 | 32.3 | 30.5 |
| 70 | Henry Place | Y (Westlink) | N/A | **53** | **41.1** | **45.7** | **42.0** |
| 74 | Ardmore Park | N | 32 | 30 | 24.3 | 23.3 | 25.7 |
| 76 | Titanic Quarter | N | 24 | 22 | 18.1 | 17.2 | 18.3 |
| 77 | Poleglass | N | 26 | 24 | 18.3 | 18.1 | 19.3 |
| 82 | Molyneux Street | Y (Westlink) | N/A | 36 | 26.7 | 28.3 | 29.6 |
| 83 | North Queen Street | N | N/A | 33 | 26.5 | 28.8 | 26.7 |
| 84 | Portland Place | Y (Westlink) | N/A | 30 | 25.5 | 26.9 | 26.7 |
| 85 | Sailortown | N | N/A | 28 | 22.9 | 23.9 | 23.2 |
| 86 | Little Georges Street | Y (Westlink) | N/A | 33 | 26.4 | 27.3 | 27.5 |

| Site ID | Site Name | Within AQMA? | Annual Mean Concentration (µg/m³) - Adjusted for Bias [a] | | | | |
|---|---|---|---|---|---|---|---|
| | | | **2018** (Bias Adjustment Factor = **0.86**) | **2019** (Bias Adjustment Factor = **0.91**) | **2020** (Bias Adjustment Factor = **0.79**) | **2021** (Bias Adjustment Factor = **0.79**) | **2022** (Bias Adjustment Factor = **0.81**) |
| 87 | RVH Falls Road | N | 35 | 33 | 24.1 | 28.1 | 27.2 |
| 88 | Dunmurry Lane | N | 25 | 26 | 17.7 | 19.2 | 18.8 |
| 89 | Upper Knockbreda Rd | N | 33 | 34 | 23.0 | 24.2 | 24.3 |
| 90 | Tates Avenue | N | N/A | 27 | 20.5 | 21.0 | 27.8 |
| 91 | Stockman's Crescent | Y (Westlink) | N/A | 24 | 17.7 | 19.5 | 18.5 |
| 92 | Andersonstown Road | N | N/A | N/A | 22.5 | 25.0 | 22.8 |
| 93 | Diamond Gardens | N | N/A | 24 | 17.8 | 18.8 | 18.3 |
| 94 | Orpen Road | N | N/A | 18 | 13.3 | 13.3 | 13.2 |
| 95 | Balmoral Avenue | N | N/A | 39 | 25.5 | 28.1 | 28.9 |
| 96 | Upper Lisburn Road | N | N/A | N/A | 20.1 | 20.3 | 19.5 |
| 97 | Monagh Bypass | N | N/A | N/A | 16.4 | 18.0 | 18.4 |
| 98 | Knocknagoney | N | N/A | N/A | 31.4 | 33.5 | 32.0 |
| 100 | Henry Place 2 | Y | N/A | N/A | N/A | 26.9 | 28.8 |
| 101 | Stockman's Lane Roundabout | Y | N/A | N/A | N/A | 32.6 | 39.2 |
| 102 | North Queen Park | Y | N/A | N/A | N/A | 28.3 | 25.4 |
| 103 | Blythefield Park | N | N/A | N/A | N/A | 20.2 | 19.8 |
| 104 | Legoniel Crossroads | N | N/A | N/A | N/A | N/A | 13.5 |
| 105 | Ulster University | N | N/A | N/A | N/A | N/A | 29.8 |
| 106 | M3 Motorway | N | N/A | N/A | N/A | N/A | **45.8** |
| 107 | Springfield Road | N | N/A | N/A | N/A | N/A | 20.8 |
| 108 | Lisburn Rd and Tates Av Junction | N | N/A | N/A | N/A | N/A | 31.7 |

**In bold**, exceedance of the $NO_2$ annual mean AQS objective of 40 µg/m³

Underlined, annual mean > 60 µg/m³, 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.TG22, if full calendar year data capture is less than 75%

**Figure 2.6 - Trends in Annual Mean NO₂ Concentrations Measured at Diffusion Tube Monitoring Sites**
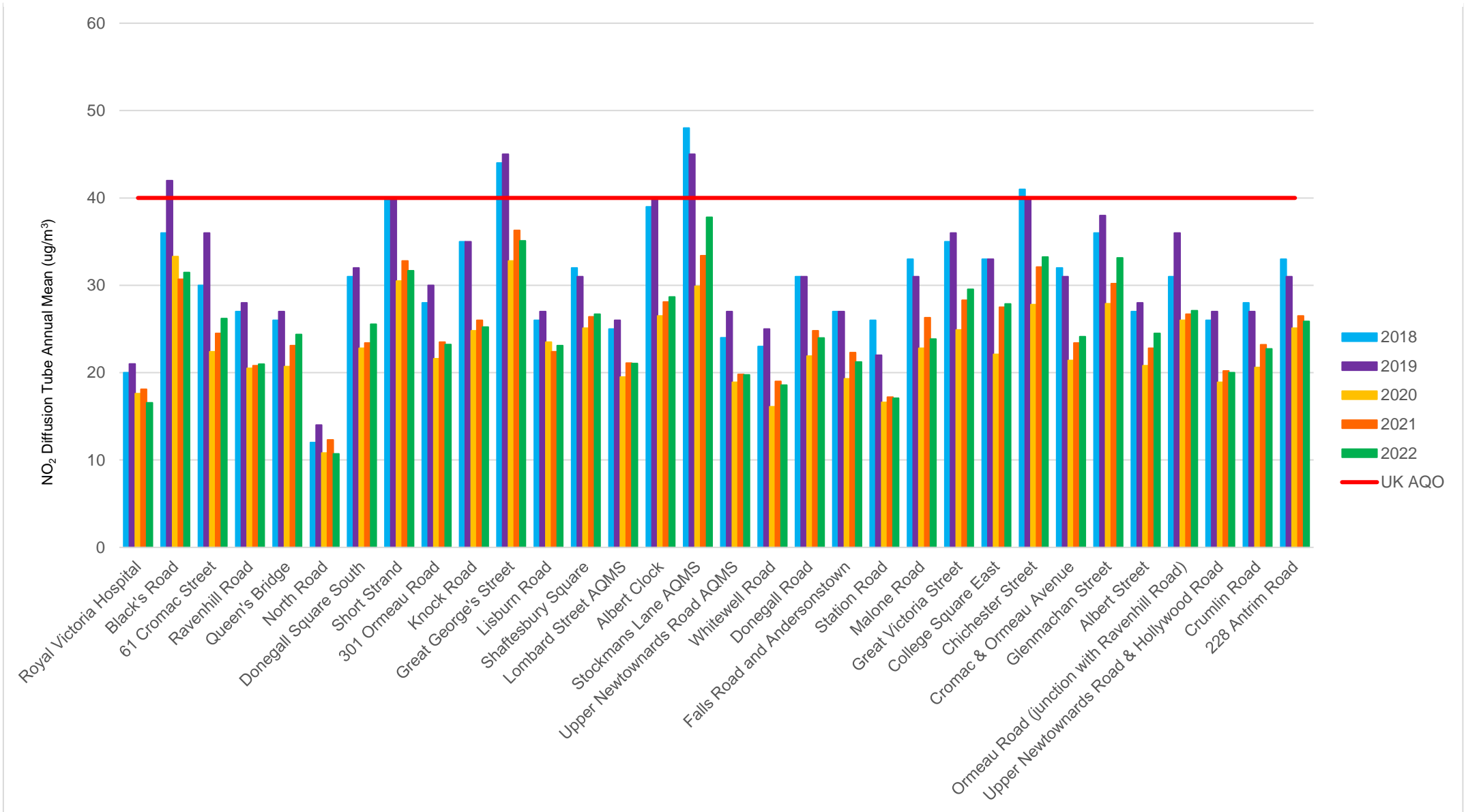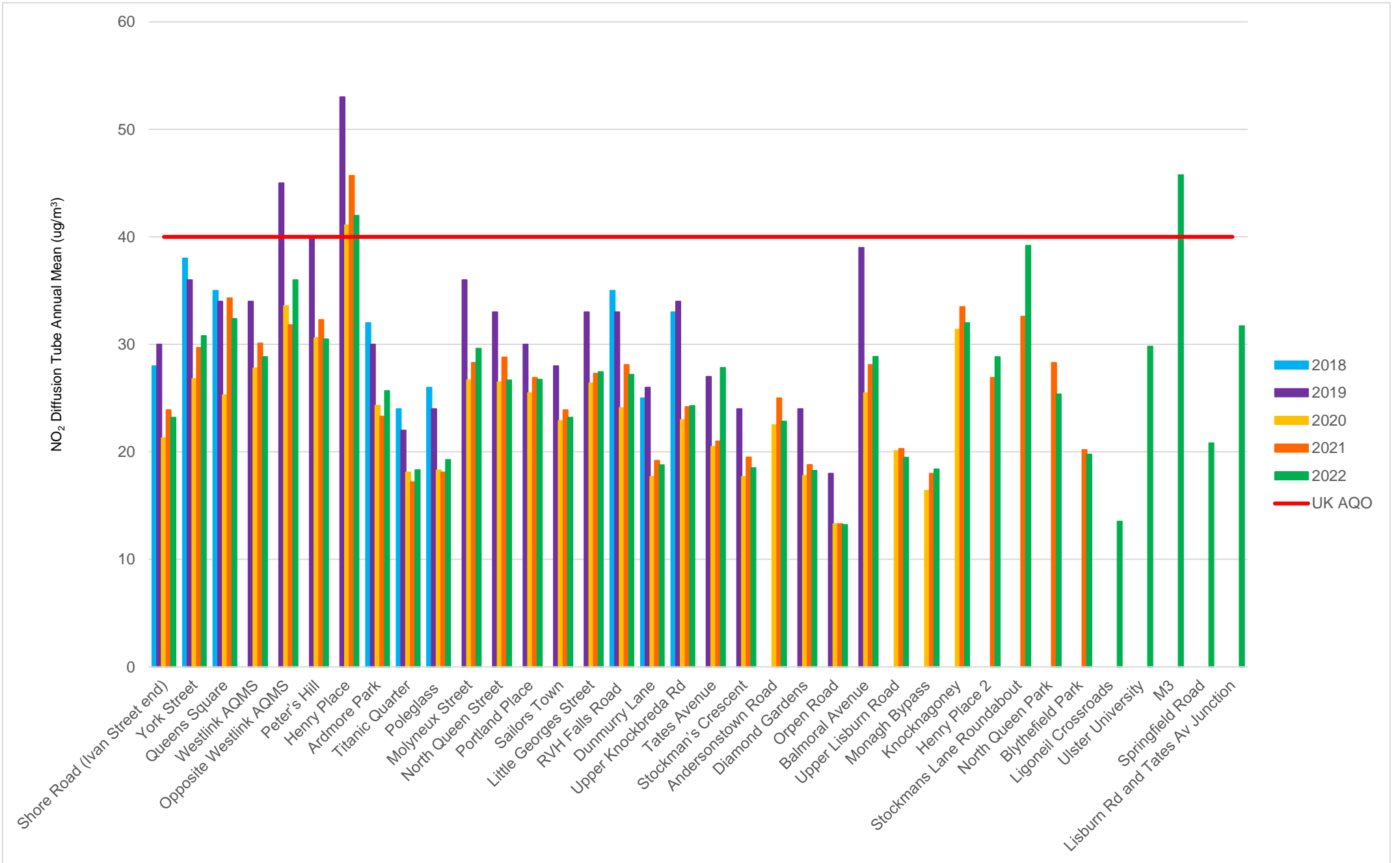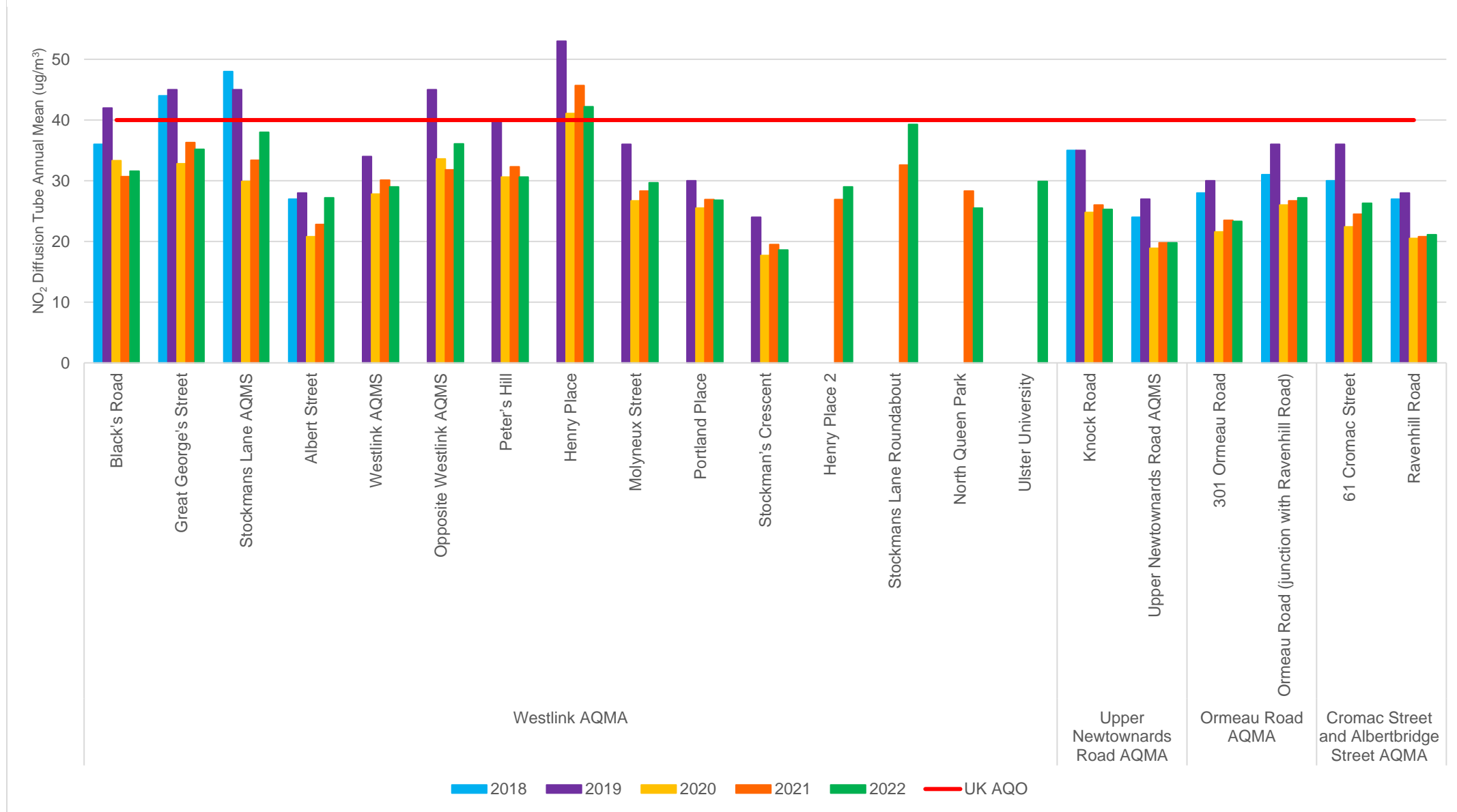
**Figure 2.7 - Trends in Annual Mean NO₂ Concentrations Measured at Diffusion Tube Monitoring Sites by AQMA**

### 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 highlighted 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 the following Tables 2.8, 2.9 and in Figure 2.8.

In terms of exceedances of the 40 µg/m$^3$ 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 at this site. Particulate matter monitoring continues however at the Stockman's Lane site.

Reflecting upon the particulate matter 24-hour mean objective data, as summarised in Table 2.9, 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.

2022 results, with an annual mean of 18.2 μg/m$^3$ recorded at the Stockman's Lane site are similar to previous years' results - with and without Covid-19 restrictions. It is considered that more information is required to accurately investigate the impact of the Covid-19 lockdowns on particulate matter concentrations; the consistency in annual means recorded at the Stockman's Lane could be due to increased levels of 'working from home' during the pandemic, which may have resulted in increased domestic combustion processes, replacing commercial combustion particulate matter emissions, which are likely to have been reduced due to Covid-19 restrictions. Nevertheless Figure 2.8 shows that the 2022 levels of $PM_{10}$ are similar to previous several years. Overall there were no exceedances of the 24-hour and annual mean objectives for particulate matter ($PM_{10}$).

Moreover, Belfast City Council has recently completed a Detailed Assessment for the city, for $PM_{10}$, $PM_{2.5}$ and $NO_2$ pollutants. This project was commenced in February 2021 and concluded at the end of March 2023. Detailed atmospheric dispersion modelling was undertaken for a 2019 base year and for a 2028 forward projection year for $PM_{10}$. The dispersion modelling was validated, verified and adjusted using data from Belfast City Council's various automatic particulate monitors as well as additional $PM_{10}$ monitoring undertaken by the Zephyr small sensor air quality monitors.

During 2019, detailed atmospheric dispersion modelling indicated that there were no sensitive receptor locations within the city, where predicted annual mean $PM_{10}$ concentrations were greater than 40 μg/m$^3$. In actuality, the highest predicted annual mean $PM_{10}$ concentration in 2019 was around 21 μg/m$^3$, and at a non-residential location. It is unlikely therefore that there were any areas of exceedance of the UK annual mean $PM_{10}$ AQO during 2019. Similarly, city-wide gridded predicted annual mean $PM_{10}$ concentrations for 2019 were all well below the UK AQO throughout the city. For 2028, there are no predicted annual mean $PM_{10}$ concentrations greater than 40 μg/m$^3$ and therefore unlikely to be any locations of exceedance of the UK annual mean $PM_{10}$ AQO. City wide gridded predicted annual mean $PM_{10}$ concentrations for 2028 are predicted to be well below the UK AQO throughout the city. There are no anticipated exceedances of the

$PM_{10}$ 50 $\mu$g/m$^3$ 24-hour mean objective (35 exceedances allowed per annum) in either 2019 or 2028.

The outcome of the detailed assessment for $PM_{10}$ therefore indicates that there are no predicted exceedances of the relevant $PM_{10}$ AQOs in either the 2019 base year or 2028 forward projection year. This outcome is in accordance with the conclusions of previous Updating and Screening Assessments, Progress Reports and Detailed Assessments undertaken by the council in respect of $PM_{10}$.

**Table 2.8 - Results of Automatic Monitoring for PM₁₀: Comparison with Annual Mean Objective**

| Site ID | Site Type | Within AQMA? | Valid Data Capture for Monitoring Period % [a] | Valid Data Capture 2022 % [b] | Confirm Gravimetric Equivalent (Y or N/A) | Annual Mean Concentration (µg/m³) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2018* [c] | 2019* [c] | 2020* [c] | 2021 [c] | 2022 [c] |
| CM1 Belfast Centre (Lombard Street) | Urban Background | N | 96.4% | 96.4% | Y | 16 | 15 | 12 | 13 | 13.9 |
| CM4 Belfast Stockman's Lane | Roadside | Y (Westlink) | 97.6% | 97.6% | Y | 15 | 18 | 17 | 19 | 18.2 |

**In bold**, exceedance of the PM₁₀ annual mean AQS objective of 40 µg/m³

[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.TG22, if valid data capture is less than 75%

* Annual mean concentrations for previous years are optional
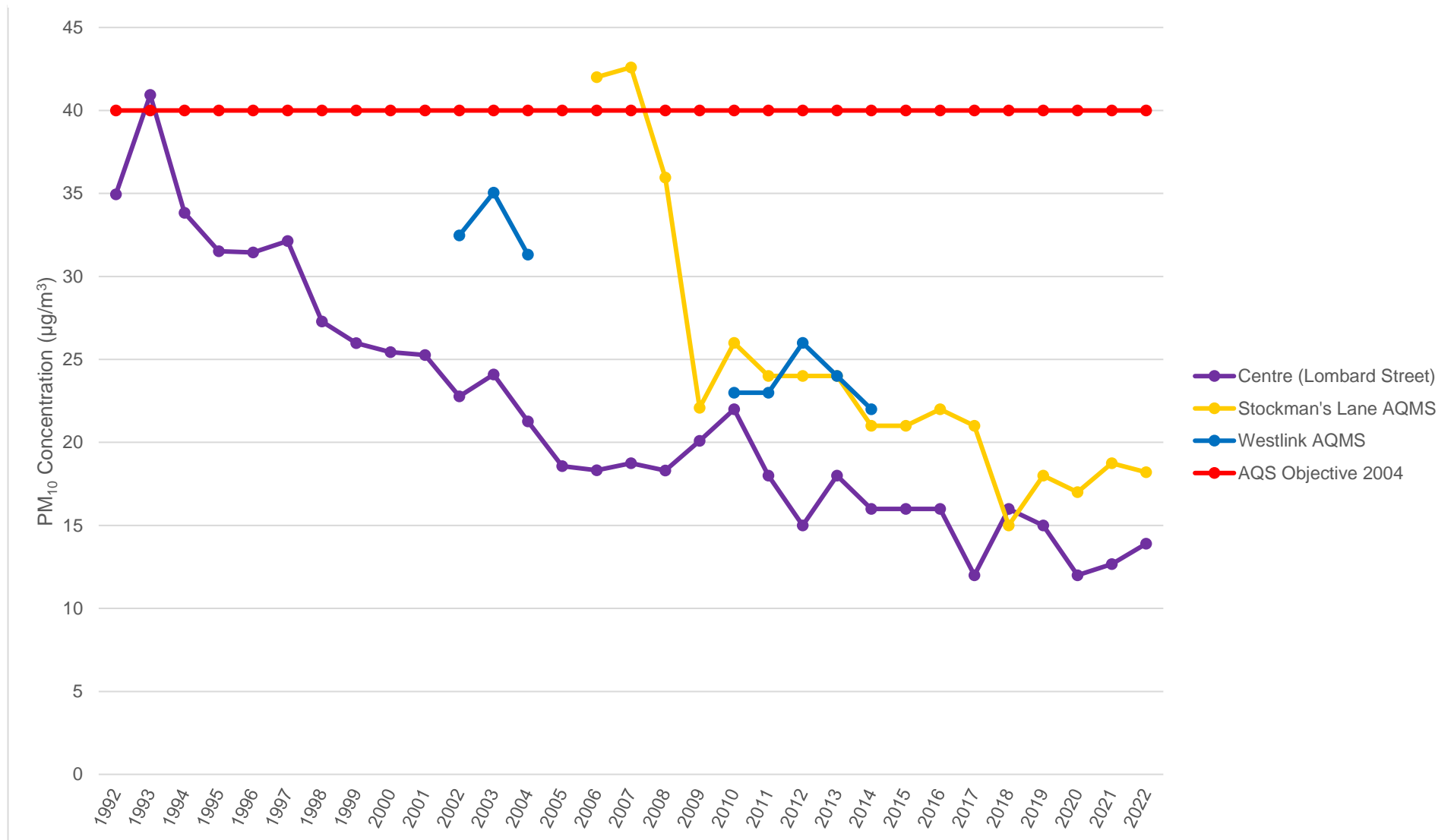
**Figure 2.8 - Trends in Annual Mean PM$_{10}$ Concentrations**

**Table 2.9 - 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 2022 % [b] | Confirm Gravimetric Equivalent (Y or N/A) | Number of Daily Means > 50 μg/m³ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2018* [c] | 2019* [c] | 2020* [c] | 2021 [c] | 2022 [c] |
| CM1 Belfast Centre (Lombard Street) | Urban Background | N | 96.4% | 96.4% | Y | 0 | 2 | 1 | 0 | 4 |
| CM4 Belfast Stockman's Lane | Roadside | Y (Westlink) | 97.6% | 97.6% | Y | 0 | 4 | 1 | 1 | 7 |

In bold, exceedance of the PM10 daily mean AQS objective (50 μg/m³ – 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 2.10. As indicated, no exceedance of any objective was observed during 2022.

### Table 2.10 - 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 2022 % [b] | Number of Exceedances: [c] | | |
|---|---|---|---|---|---|---|---|
| | | | | | 15-minute Means > 266 µg/m$^3$ | 1-hour Means > 350 µg/m$^3$ | 24-hour Means > 125 µg/m$^3$ |
| **Belfast Centre (Lombard Street)** | Urban Background | N | 96.7 | 96.7 | 0 | 0 | 0 |

**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 = 99.9[th] ; 1-hour mean = 99.7[th] ; 24-hour mean = 99.2[th] 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 on the Upper Newtownards Road. Whilst monitoring concluded at the Belfast Upper Newtownards Road site in October 2007, no exceedances of the 2010 Air Quality Strategy objective (3.25 µg/m$^3$ running 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 review and assessment and monitoring results going back to 2018, and provided in Table 2.11 below, confirm that there have been no exceedances of the running annual mean of 3.25 µg/m$^3$ for benzene within Belfast over recent years.

**Table 2.11 - Results of Monitoring for benzene: Annual Mean Concentrations for the Belfast Centre Site 2018 – 2022**

| Site ID | Site type | Within AQMA? Which AQMA? | Valid Data Capture 2022 % | Running annual mean concentrations (µg/m$^3$) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | **2018** | **2019** | **2020** | **2021** | **2022** |
| Belfast Centre (Lombard Street) | Urban Background | N | 100 | 0.45 | 0.44 | 0.37 | 0.39 | 0.38 |

### 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 2022 in this progress report - Table 2.12 and Figure 2.9 below.

The annual mean for this pollutant in 2022 was 7.9 µg/m$^3$, which is substantially below the UK air quality annual mean target of 25 µg/m$^3$ to be achieved by 2020. Moreover, PM$_{2.5}$ concentrations recorded at the Belfast Centre site are also substantially below the EU (stage 2) limit value of 20 µg/m$^3$, also to be achieved by 2020.

Although Belfast does not experience monitored exceedances of any air quality strategy objectives, or European Commission limit values for particulate matter, we are aware of growing concerns around the effects of the PM$_{2.5}$ fraction on human health. Therefore, although not included in Regulations at present for Northern Ireland councils, Belfast City Council has proactively opted to monitor and assess ambient PM$_{2.5}$ concentrations within Belfast.

Moreover, Belfast City Council has recently completed a Detailed Assessment for the city, for PM$_{10}$, PM$_{2.5}$ and NO$_2$ pollutants. Detailed atmospheric dispersion modelling was undertaken for a 2019 base year and for a 2028 forward projection year for PM$_{2.5}$. The dispersion modelling was validated, verified and adjusted using data from Belfast City Council various automatic particulate monitors as well as additional PM$_{2.5}$ monitoring undertaken by Zephyr small sensor air quality monitor.

During 2019, detailed atmospheric dispersion modelling indicated that there were no sensitive receptor locations where predicted 2019 annual mean PM$_{2.5}$ concentrations were greater than 20 µg/m$^3$ and therefore unlikely to be locations of exceedance of the UK annual mean PM$_{2.5}$ AQO. The highest predicted annual mean PM$_{2.5}$ concentration in 2019 was 14.1 µg/m$^3$, at a non-residential location. Similarly, city-wide gridded predicted annual mean PM$_{2.5}$ concentrations for 2019 were below the 20 µg/m$^3$ UK AQOs throughout the city. For 2028, there are no predicted annual mean PM$_{2.5}$ concentrations greater than 20

µg/m$^3$ and therefore unlikely to be locations of exceedance of the UK annual mean PM$_{2.5}$ AQO. City wide gridded predicted annual mean PM$_{10}$ concentrations for 2028 are predicted to be well below the UK AQOs throughout the city.

**Table 2.12 - Results of Monitoring PM$_{2.5}$: Annual Mean Levels for the Belfast Centre Lombard Street 2018-2022**

| Site ID | Site type | Within AQMA? Which AQMA? | Valid Data Capture 2022% | Annual mean concentrations (µg/m$^3$) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2018 | 2019 | 2020 | 2021 | 2022 |
| Belfast Centre (Lombard Street) | Urban Background | N | 96.4 | 10.0 | 11.0 | 7.0 | 7.0 | 7.9 |

**Figure 2.9 - Results of Monitoring PM$_{2.5}$: Annual Mean Levels for the Belfast Centre monitoring site.**
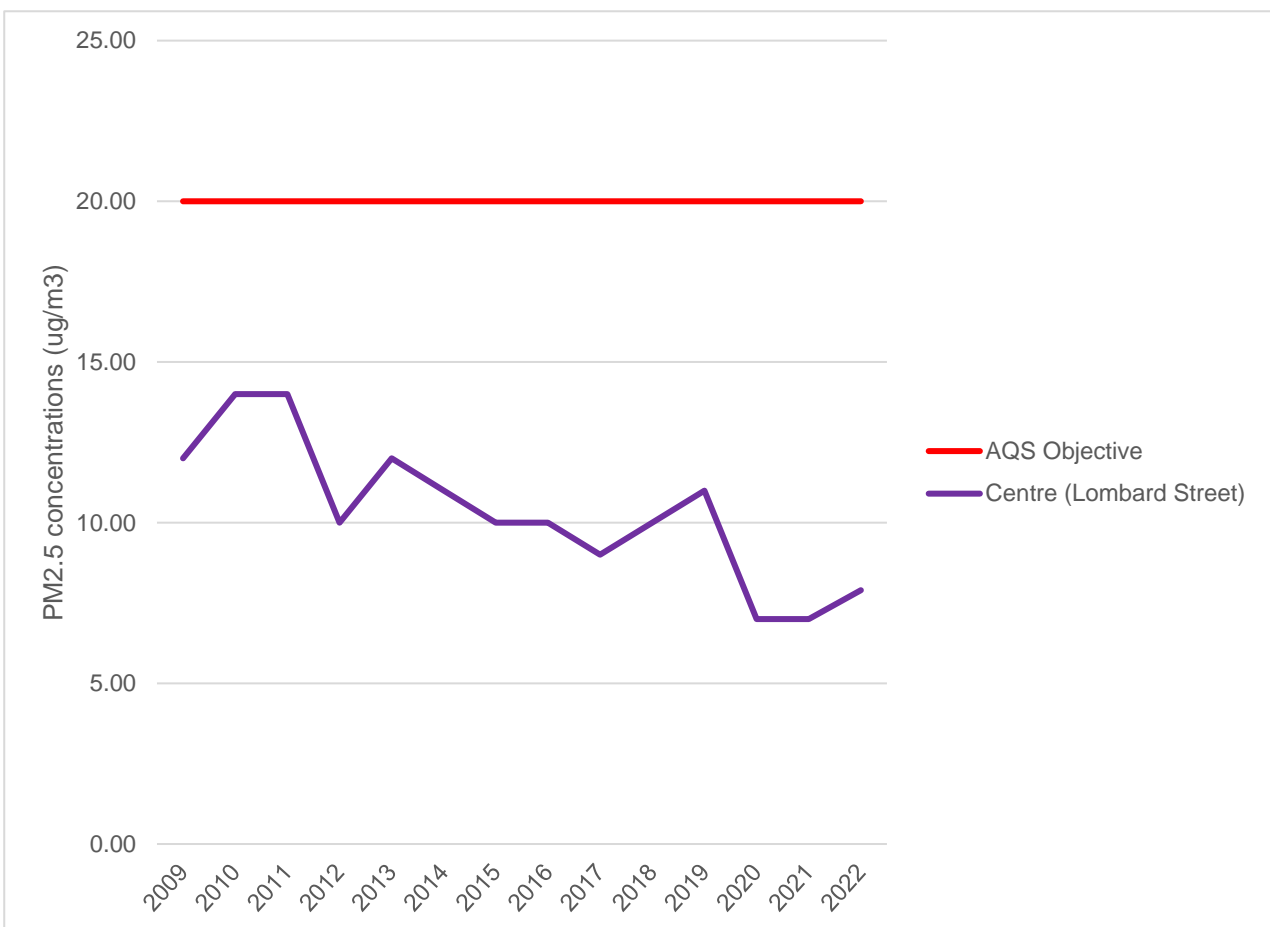
### 2.2.6  Summary of Compliance with AQS Objectives

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 respective 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.

Moreover, a Detailed Assessment for the city for $NO_2$, $PM_{10}$ and $PM_{2.5}$ was recently concluded in March 2023. The Detailed Assessment indicated that there were no predicted exceedances of any AQO in relation to particulate matter ($PM_{10}$ and $PM_{2.5}$) for the 2019 base year and 2028 future assessment year. In relation to $NO_2$, there were predicted exceedances of the nitrogen dioxide UK annual mean objective of 40 µg/m$^3$ at a number of sensitive receptor locations in 2019. However, all of these receptors are located within, or near to the boundaries of the existing Air Quality Management Areas (AQMAs) along the M1 Motorway / A12 Westlink corridor (AQMA 1) and East Bridge Street / Cromac Street (AQMA 2). For the future assessment year of 2028, predicted annual mean $NO_2$ concentrations are below the UK AQO of 40 µg/m$^3$ at all locations of relevant exposure throughout the city.

The council will therefore 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 poorer air quality persist are addressed.

### 2.2.7  WHO Global Air Quality Guidelines 2021: Particulate Matter ($PM_{2.5}$ and $PM_{10}$), Ozone, Nitrogen Dioxide, Sulphur Dioxide and Carbon Monoxide

During development of the council's new Air Quality Action Plan 2021-2026, the People and Communities Committee requested that council air quality officers consider monitored ambient air pollution concentrations across the city in terms of the 2021 World Health Organisation (WHO) global air quality guidelines in subsequent air quality reports. We have therefore added this section to the 2023 Progress Report that considers 2022 air quality monitoring data against the above-mentioned WHO guideline values.

In publishing these 2021 updated guideline values, WHO have advised that the overall objective of the guidelines is to offer quantitative health-based recommendations for air quality management, expressed as long- or short-term concentrations for a number of key

air pollutants. WHO have added that whilst the guidelines are not legally binding, they provide WHO Members States with an evidence-based tool to be used to help inform development of air quality legislation and policy.

WHO have therefore recommended the following 2021 air quality guideline values and interim targets:

**Table 2.13 - WHO Air Quality Guideline Values and Interim Targets**

| Pollutant | Averaging time | Interim Targets | | | | AQG level |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | |
| $PM_{2.5}$ $\mu g/m^3$ | Annual | 35 | 25 | 15 | 10 | 5 |
| | 24 hour | 75 | 50 | 37.5 | 25 | 15 |
| $PM_{10}$ $\mu g/m^3$ | Annual | 70 | 50 | 30 | 20 | 15 |
| | 24 hour | 150 | 100 | 75 | 50 | 45 |
| $O_3$ $\mu g/m^3$ | Peak season | 100 | 70 | - | - | 60 |
| | 8 hour | 160 | 120 | - | - | 100 |
| $NO_2$ $\mu g/m^3$ | Annual | 40 | 30 | 20 | - | 10 |
| | 24 hour | 120 | 50 | - | - | 25 |
| $SO_2$ $\mu g/m^3$ | 24 hour | 125 | 50 | - | - | 40 |
| CO $mg/m^3$ | 24 hour | 7 | - | - | - | 4 |

It should be noted that 24-hour mean guideline values are to be assessed as the 99th percentile of 24 hour means, i.e. there is an allowance for 3-4 exceedance days per year within these guideline values before the guideline value is considered to be breached.

Moreover, the ozone ($O_3$) peak season guideline value is to be assessed as the average of daily maximum 8-hour mean of $O_3$ concentrations in the six consecutive months with the highest six-month running-average $O_3$ concentration. Ozone is not however, in regulations at present for local authority air quality management.

It should be additionally noted that some of the values and averaging periods of the 2021 WHO guideline values are not comparable to the averaging periods that have been established for the various air quality objectives detailed in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland, the Air Quality Regulations (Northern Ireland) 2003 and Table 1.1 of this Progress Report. Accordingly, annual statistical data and exceedances of objectives are not currently calculated or reported by DAERA or Defra for the $PM_{2.5}$ 24-hour mean guideline value, the ozone peak season guideline value, the $NO_2$ 24-hour mean guideline value, or the CO 24-hour mean guideline value.

WHO have added that it is important to note that the air quality guidelines recommended in previous WHO air quality reports for those pollutants and those averaging times not covered in the 2021 update report remain valid, i.e. nitrogen dioxide (1 hour) 200 $\mu g/m^3$; sulphur dioxide (10 minute) 500 $\mu g/m^3$ and carbon monoxide (8 hour) 10 $mg/m^3$, (1 hour) 35 $mg/m^3$ and (15 minute) 100 $mg/m^3$. However, as highlighted previously, it is again important to note that some of the values and averaging periods of previous WHO guideline values are not comparable to the averaging periods that have been established for the air quality objectives detailed in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland, the Air Quality Regulations (Northern Ireland) 2003 and Table 1.1 of this Progress Report, i.e. there is no (10 minute) 500 $\mu g /m^3$ objective for sulphur dioxide ($SO_2$) and no (1 hour) 35 $mg/m^3$ and (15 minute) 100 $mg/m^3$ objectives for carbon monoxide (CO). Accordingly, annual statistical data and exceedances of objectives are not currently calculated or reported in these formats by DAERA or Defra.

2022 Belfast monitoring data, obtained from the DAERA Northern Ireland Air, Air Quality in Northern Ireland website (https://www.airqualityni.co.uk/), has therefore been compared to the 2021 WHO Air Quality Guideline values as follows, where current monitoring, data averaging periods and statistical reporting allows.

**Fine particulate matter ($PM_{2.5}$)**

As reported in Table 2.12, the 2022 annual mean concentration for $PM_{2.5}$ monitored at the Belfast Centre site, located at Lombard Street in Belfast City Centre was 7.9 $\mu g /m^3$; 2.9 $\mu g /m^3$ above the WHO annual mean air quality guideline of 5 $\mu g /m^3$. There is no current 24 hour mean objective for $PM_{2.5}$ but calculated from raw 2022 monitoring data, the 24 hour mean, assessed as the 99th percentile of 2022 24-hour means at Lombard Street was 30 $\mu g /m^3$; 15 $\mu g /m^3$ above the WHO air quality guideline value of 15 $\mu g /m^3$.

**Particulate matter (PM$_{10}$)**

As reported in Table 2.8, the 2022 annual mean concentration for PM$_{10}$ monitored at the Belfast Centre site, located at Lombard Street in Belfast City Centre was 13.9 µg /m$^3$; ~1 µg /m$^3$ below the WHO annual mean air quality guideline of 15 µg/m$^3$ and 18.2 µg/m$^3$ at the Stockman's Lane roadside monitoring site; ~3 µg/m$^3$ above the WHO annual mean air quality guideline value of 15 µg/m$^3$.

The 2022 24-hour mean, assessed as the 99th percentile at Lombard Street was 43 µg/m$^3$; 2 µg/m$^3$ below the WHO air quality guideline value of 45 µg /m$^3$. The 2022 24 hour mean, assessed as the 99th percentile at the Stockman's Lane site was 53 µg /m$^3$; 8 µg/m$^3$ above the WHO air quality guideline value of 45 µg/m$^3$.

**Nitrogen dioxide (NO$_2$)**

The WHO has established an annual mean air quality objective for nitrogen dioxide of 10 µg/m$^3$. By way of comparison, the UK Air Quality Strategy annual mean objective for nitrogen dioxide is 40 µg/m$^3$. This is the basis on which our AQMAs have been declared and our Action Plans have been subsequently developed. Referring to automatic and diffusion tube annual mean monitoring data for 2022, as reported in Tables 2.4 and 2.6, it is noted that the WHO annual mean air quality guideline value of 10 µg/m$^3$ was exceeded at all monitoring locations across Belfast during 2022, with the lowest annual mean concentration of 10.7 µg/m$^3$ monitored at the North Road background site and the highest annual mean of 45.8 µg /m$^3$ monitored at the junction of the M3 and M2 Motorway off slips and the A12 Westlink at York Street.

There is no current 24-hour mean objective for nitrogen dioxide but calculated from raw 2022 monitoring data, the 24-hour mean, assessed as the 99th percentile of 2022 24-hour means at Lombard Street was 57 µg /m$^3$; 32 µg /m$^3$ above the WHO air quality guideline value of 25 µg /m$^3$. The 24-hour mean, assessed as the 99th percentile of 2022 24-hour means for the Newtownards Road site was 57 µg /m$^3$; 32 µg /m$^3$ above the WHO air quality guideline value of 25 µg /m$^3$; 51 µg /m$^3$ for the Ormeau Road site; 26 µg /m$^3$ above the WHO air quality guideline value; 67 µg /m$^3$ for the Stockman's Lane site; 42 µg /m$^3$ above the WHO air quality guideline value; and 67 µg /m$^3$ for the Westlink site; 42 µg /m$^3$ above the WHO air quality guideline value.

The WHO 1-hour mean guideline value of 200 $\mu$g/m$^3$ is similar to the 200 µg /m$^3$ 1-hour mean objective, assessed as the 99.8th percentile of hour means contained within the UK Air Quality Strategy. During 2022, maximum monitored hourly means at the Belfast monitoring sites were as follows: - Stockman's Lane (133 µg /m$^3$), Westlink (131 µg /m$^3$), Ormeau Road (110 µg /m$^3$), Lombard Street (130 µg /m$^3$), and the Upper Newtownards Road (119 µg /m$^3$). Accordingly, the WHO 1-hour mean guideline value of 200 µg /m$^3$ was not breached at any Belfast monitoring site during 2022.

## Sulphur dioxide (SO$_2$)

The UK Air Quality Strategy includes a 24-hour mean objective of 125 µg /m$^3$ assessed as the 99.2nd percentile of annual 24 hour means; thereby providing for three 24-hour exceedances per annum before the objective is breached. It is noted that the WHO has introduced a 24-hour mean guideline value of 40 µg /m$^3$, assessed as the 99th percentile of annual 24 hour means; thereby providing for 3-4 24-hour exceedances per annum before the objective is breached. Referring to annual sulphur dioxide monitoring data for 2022 for the Belfast Centre site at Lombard Street, it is noted that the maximum daily mean was 5 µg /m$^3$. On this basis, the 40 µg /m$^3$ WHO guideline value, assessed as the 99th percentile of 24-hour means was not breached at the Belfast Centre monitoring site during 2022.

The WHO have introduced a 10-minute mean guideline value of 500 µg /m$^3$ for sulphur dioxide. The closest objective within the UK air Quality Strategy is the 15-minute mean objective, assessed as the 99.9th percentile of annual 15 mean concentrations. Referring to 2022 daily maximum 15-minute mean sulphur dioxide monitoring data for the Belfast Centre site at Lombard Street, it is noted that the highest daily maximum 15-minute mean sulphur dioxide concentration in 2022 was 38 µg /m$^3$; substantially below the WHO 10-minute mean guideline value of 500 µg /m$^3$.

## Carbon monoxide (CO)

There is no 24-hour mean objective for carbon monoxide within the UK Air Quality Strategy. However, calculated from raw 2022 monitoring data, the 24 hour mean, assessed as the 99th percentile of 24 hour means at the Belfast Centre Lombard Street site was 0.3 mg/m$^3$; 3.7 mg/m$^3$ below the WHO air quality guideline value of 4 mg/m$^3$.

The UK Air Strategy does contain a maximum daily running 8-hour mean objective of 10 mg/m$^3$ whereas the WHO has introduced a similar 8-hour mean air quality guideline value

of 10 mg/m$^3$. The UK Air Strategy was not breached at the Belfast Centre site in 2022 and so the WHO 8-hour mean air quality guideline value would similarly not have been breached.

There is no 1-hour mean objective for carbon monoxide within the UK Air Quality Strategy. However, calculated from raw 2022 monitoring data, the maximum 1-hour mean carbon monoxide concentration monitored at the Belfast Centre Lombard Street site was 1.2 mg/m$^3$; 33.8 mg/m$^3$ below the WHO air quality guideline value of 35 mg/m$^3$.

There is no 15-minute mean objective for carbon monoxide within the UK Air Quality Strategy. Carbon monoxide monitoring data from the Belfast Centre Lombard Street site is presented at an hourly resolution and so comparison with the WHO 15-minute mean air quality guideline value of 100 mg/m$^3$ is not possible.

# 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 Updating and Screening Assessment:

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

Belfast City Council confirms that as there have been no significant changes to any of the above-mentioned sources since the 2021 Updating and Screening Assessment, 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 Updating and Screening Assessment:

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

Belfast City Council confirms that as there have been no significant changes to any of the above-mentioned sources since the 2021 Updating and Screening Assessment, 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 Updating and Screening Assessment:

- 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 one industrial installation (development of new, replacement Animal Health Sciences Building with General Stores Building, Post-Mortem Suite and Carcass Incineration Facility, and associated works – LA04/2022/0915/F) was considered through the planning process in 2022. A preliminary Air Quality Impact Assessment (AQIA) was submitted and reviewed, and subsequently, an updated AQIA confirming compliance with the respective air quality objectives at relevant human health receptor locations was requested prior to the installation of the combustion plant.  Further information on this installation is provided in Section 4 of this Progress Report under Planning Applications.

Belfast City Council confirms that as there have been no other changes to any of the above-mentioned sources since the 2021 Updating and Screening Assessment, 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 unacceptable adverse impact on localised air quality or relevant human health receptors. Further information on planning applications, which have required an Air Quality Impact Assessment, is provided in Section 4 of this report.

The Assessments submitted to date have demonstrated that the proposed developments will not have a significant adverse impact on ambient 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 Updating and Screening Assessment:

- 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 have been no significant changes to any of the above-mentioned sources since the 2021 Updating and Screening Assessment, 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 2022, 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 human health receptors into an existing area of poor air quality. A summary of Planning Applications and Air Quality Impact Assessments (AQIA) submitted or requested during 2022, in support of larger developments is presented in Table 4.1.

**Table 4.1 - Major New Development Which Had Potential to Have a Negative Impact on Air Quality in the 2022 Period**

| Location | Development Description | Actions Taken |
|---|---|---|
| 21-29 Corporation Street & 18-24 Tomb Street, Belfast. | Demolition of existing multi-storey car park and the erection of 298 no. build for rent apartments (19 storey) including ground floor commercial unit (A1/A2), car/cycle parking provision along with associated development.<br><br>Ref: LA04/2021/2016/F | An AQIA was submitted and reviewed, with a response provided on NIPP on 04/03/2022, stating no concerns. The following conditions were applied to the response:<br>• **A final CEMP shall be submitted prior to commencement of the construction/demolition phase for approval in writing which should include a Dust Management Plan which should be based on the dust risk assessment and recommendations detailed by the AONA consultants within the Air Quality Impact Assessment, Corporation Street BTR, December 2021 and as outlined in the draft CEMP.**<br>The proposal is ongoing. |
| Lands at the Gasworks Northern Fringe site; bounded to the north by McAuley Street Stewart Street and Raphael Street; Cromac Street to the west; the River Lagan and Belfast-Newry railway line to the east; and the Gasworks Business Park to the south. | Outline planning permission (with no matters reserved) for the erection of 94 residential dwellings (social housing). Comprising of 44 residential units on Site A and 50 residential units on Site D/NIE. Access to be provided from Raphael Street and Stewart Street respectively. Along with the provision of landscaping, parking, public open space, pumping station and associated works.<br><br>Ref: LA04/2021/1672/O | An AQIA was submitted to address air quality queries raised by this Service in its previous consultation response dated 5th October 2021. A response provided on 06/01/2022, *'This Service is able to conclude that estimated road transport emissions, as a result of the proposed development, are likely to have a 'negligible' impact on nitrogen dioxide and particulate matter concentrations in the local area. Belfast City Council would however reiterate that road transport data is principally a matter for the Department for Infrastructure Roads. Accordingly, traffic information provided as part of this planning application (Transport Assessment, Air Quality Screening Reports, AECOM) will need to be considered and approved by the Department. Any amendments required by the Department to Gasworks Redevelopment may have to be reflected in the Air Quality Impact Assessment… there is no predicted risk of exceedances of air quality objectives as a result of railway emissions (stationary/moving diesel locomotives) … this Service has no concerns in relation to air quality impacts from domestic combustion sources… This Service would reiterate that in relation to the Phases 2 and 3 of the development (outline planning permission with all matters reserved), the applicant shall submit an air quality impact assessment at full planning application stage.'* The following condition was applied to the response:<br>• **Prior to the commencement of construction works on site, a final Dust Management Plan shall be submitted to and agreed by the Planning Authority. The Dust Management Plan shall be based on the dust risk assessment and recommendations detailed by AECOM Consultants within Chapter 6 of the Air Quality Screening Report (June 2021).**<br>The proposal was granted on 30/03/2023. |
| 150 Knock Road, Belfast, BT5 6QD. | Residential (social housing) development comprising of 2no. Apartment buildings containing 52no. apartments (housing mix of 5no. 3p/2b Wheelchair & 47no. 3p/2b CAT 1 apartments) with associated in curtilage parking and | An AQIA was submitted and reviewed, with a response provided on 26/01/2022 stating, *'Despite concerns regarding the air quality modelling procedure, at this occasion it is this Service's view that the assessment has sufficiently demonstrated that the proposed development will not have adverse impact on air quality in the vicinity of the site and that future occupants of the development and nearby receptors will not be exposed to air quality concentrations exceeding UK Air Quality Objectives.'* The following condition was applied to the response: |

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| | landscaping (change of design to extant planning permission ref: Z/2011/0426/F).<br><br>Ref: LA04/2021/2144/F | • **Dust management measures, as detailed within the Air Quality Impact Assessment, 150 Knock Road, Belfast, Irwin Carr (November 2021), shall be implemented throughout the duration of the construction phase of the development.**<br>The proposal was granted on 12/08/2022. |
| 3 Milner Street Belfast BT12 6GE. | Residential development for 87 no. apartments (1 no. and 2 no. bedroom), internal car park, landscaped gardens/ terraces and all associated site works.<br><br>Ref: LA04/2021/2687/F | An AQIA was submitted and reviewed, with a response provided on 18/02/2022 stating, *'The assessment has concluded that the changes in concentrations of the above pollutants would be of a negligible magnitude, and that any local air quality impact upon nearby receptors would not be significant. Despite the modelling errors noted above, this Service view that the assessment sufficiently demonstrated that the proposed development will not have adverse impact on air quality in the vicinity of the site and that future occupants of the development will not be exposed to air quality concentrations exceeding UK Air Quality objectives. Furthermore, the consultant has also considered the potential effects of dust emissions associated with the construction phase of the proposed development in accordance with the IAQM Guidance on the Assessment of Dust from Demolition and Construction 2014… with implementation of the mitigation measures proposed within Appendix B of the Air Quality Impact Assessment, AONA Environmental, there will be no significant adverse dust effects arising from the construction phase of the proposed development'.* The following condition was applied to the response:<br>• **Dust management measures, as detailed within Appendix B of the AONA Environmental, Air Quality Impact Assessment, Proposed Residential Apartment Development at Milner Street, Belfast (September 2021) shall be implemented throughout the duration of the construction phase of the development.**<br>The proposal is ongoing. |
| Lands north of 14 Mill Race and 15 Belfield Heights and south of 2-15 St Gerards Manor Ballymurphy Belfast Co. Antrim. | Amended Proposal: 2.4m wall to rear of all proposed properties backing onto Dermit Hill Housing Development.<br><br>Proposed social housing led mixed tenure residential development comprising 122 residential dwellings, pedestrian and cycle ways, public open space, children's play area, landscaping (including 8 metre landscaped buffer to western boundary), boundary treatments, parking, access (provision of a right turn lane) and ancillary site works.<br><br>Ref: LA04/2022/0129/F | An AQIA was submitted and reviewed, with a response provided on NIPP dated 09/03/2022 stating, *'this Service can conclude that estimated transport emissions, as a result of the proposed development, are likely to have a 'negligible' impact on nitrogen dioxide and particulate matter concentrations in the local area… However, this assessment has seemingly considered only the impact from road transport emissions on a series of human health receptors; This Service would advise that all air pollution sources, including any centralised combustion plants, should be considered when assessing the impact of the proposed development. However, as details of proposed heating systems were not confirmed at this stage; this Service would therefore advise that any combustion plant where the single or combined NOx emission rate is more than 5mg/sec could give rise to impacts… Furthermore, as part of this air quality assessment, Irwin Carr consultants have undertaken a construction impact assessment in accordance with Guidance on the assessment of dust from demolition and construction IAQM (2014) '.* The following conditions were applied to the response:<br>• **In the event that any centralised combustion sources (boilers, CHP or biomass) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017), this Service would request that an updated Air Quality Impact Assessment will be required.**<br>• **Dust management measures, as detailed within the Chapter 7 of the Irwin Carr Consulting, Air Quality Impact Assessment, Gort Na Mona Housing, Rp001AQ 2021193 (11 November 2021) shall be implemented throughout the duration of the construction phase of the development.**<br>The proposal is ongoing. |
| 100-116 Stewartstown Road (Lidl) and land to the immediate south and southeast bounded by Kells Avenue Oranmore Drive 37-55 Suffolk Crescent (odds) & 28 Suffolk Drive Belfast. | Demolition of existing discount supermarket, erection of replacement discount supermarket, car parking, landscaping and associated site works. Improvements to green space to enhance its usability and amenity involving new landscaping and the creation of pedestrian walkway and sitting areas.<br><br>Ref: LA04/2022/0002/F | An AQIA was submitted and reviewed, with a response provided on NIPP dated 11/05/2022 stating, *'Despite some omissions to the applied assessment methodology, this Service is able to accept Irwin Carr's stated conclusions that concentrations of NO2, PM10 and PM2.5 are predicted to be below the relevant long- and short-term air quality objectives at all receptor locations considered for this assessment and that the predicted impacts at each receptor are classified as negligible. However, this assessment has seemingly considered only the impact from road transport emissions on a series of human health receptors. This Service would advise that all relevant air pollution sources should be considered when assessing the impact of the proposed development… Furthermore, as part of this air quality assessment, Irwin Carr consultants have undertaken a construction impact assessment in accordance with Guidance on the assessment of dust from demolition and construction IAQM (2014).'* The following conditions were applied to the response:<br>• **In the event that any centralised combustion sources (boilers, CHP, biomass, generators) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017), this Service would request that an Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior to the installation of the plant. The assessment shall include details of the combustion plant to be installed, to include emission rates and flue termination heights of the proposed combustion systems and must demonstrate that there will be no exceedances of the Air Quality Strategy objectives at relevant human receptor locations.**<br>• **Dust management measures, as detailed within the Chapter 7 of the Irwin Carr Consulting, Air Quality Impact Assessment, Lidl Stewartstown Road, Belfast, (4th** |

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| | | **January 2022) shall be implemented throughout the duration of the construction phase of the development.**<br>The proposal is ongoing. |
| Site bounded by Little York Street Great George's Street and Nelson Street, Belfast. | Amended Description: Erection of 12 no. storey Purpose Built Managed Student Accommodation (PBMSA), with additional use of accommodation by further or higher education institutions outside term time, comprising 774 beds with shared sports and recreation facilities (amendment to previous permission LA04/2016/1252/F `Purpose built managed student accommodation (774 beds). Maximum height of 12 storeys and varied by LA04/2017/2112/F `Variation of condition 7 of LA04/2016/1252/F).<br><br>Ref: LA04/2021/2893/F | An AQIA was submitted and reviewed as part of LA04/2016/1252/F, stating no concerns at the time. The AQO was subsequently consulted in relation to linked application LA04/2021/2278/PAD, where additional information and clarification was sought through a revised AQIA. The consultants provided additional information and clarifications and concluded that a revised AQIA was not required. The AQO concluded that they were, *'able to accept AONA Environmental's October 2021 Air Quality Impact Assessment conclusions that ambient pollutant levels in proximity to the proposed development site are within UK and EU objective levels for nitrogen dioxide (NO2) and particulate matter (PM10) and as a consequence, no operational phase air quality mitigation measures are proposed. This Service would therefore have no ambient air quality concerns.'* The following condition was applied to the response:<br><br>• **In the event that any centralised combustion sources (boilers, CHP or biomass) are proposed and there is a risk of air quality impact at relevant human health receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017) or any version that succeeds it, this Service would request that an Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior to the installation of the plant. The assessment shall include a specification for the combustion plant to be installed, to include emission rates and flue termination locations and heights, of the proposed combustion systems. It must demonstrate that there will be no significant adverse air quality impact or exceedance of air quality objectives at relevant human health receptor locations, including at terraces and roof spaces, associated with operation of the proposed combustion plant as part of the overall development. The combustion plant shall be installed and maintained in accordance with the requirements of the Air Quality Impact Assessment.**<br>The proposal was granted on 19/08/2022. |
| Lands at 24-42 Corporation Street and Exchange Street Car Park, Belfast. BT1 2LU | Residential-led mixed-use development (units tbc).<br><br>Ref: LA04/2021/2860/PAD | All information provided was reviewed by the AQO and an AQIA was requested in response dated 18/03/2022.<br>Proposal outcome: unknown. |
| Lands to east of West Link (A12) and south of Grosvenor Road; Lands at Grosvenor Road and intersection of Grosvenor Road and Durham Street; Lands to the east of Durham Street and north of Glengall Street; Lands at Glengall Street; Lands between Glengall Street and Hope Street including Europa Bus Station Great Victoria Rail Station surface car parks at St Andrew's Square; Translink lands to west of Durham Street south of BT Exchange building and north of Murray's Tobacco Works. | Proposed mixed use regeneration development comprising office (Class B1), residential apartments (including affordable), retail (Class A1), hotel, leisure (Class D2), public realm, active travel uses, cafes, bars and restaurants, and community uses (Class D1), on lands surrounding the new Belfast Transport Hub and over the Transport Hub car park, to the east and west of Durham St and south of Grosvenor Rd.<br><br>Ref: LA04/2021/2856/O | An AQIA was submitted and reviewed, with a response dated 18/02/2022 stating, *'The assessment has demonstrated that there are no exceedances of air quality objectives at new residential receptors introduced as part of the Proposed Development and the impact is therefore predicted to be 'not significant'. Moreover, this Service is able to conclude that estimated road transport emissions, as a result of the proposed development, are likely to have a 'negligible' impact on nitrogen dioxide and particulate matter concentrations in the local area. However, the submitted air quality assessment has considered only the impact from road transport emissions on a series of human health receptors; no other air pollution sources have been considered… In relation to Rail Sources, this Service notes that in accordance with information provided as part of this application, there are no residential receptors proposed to be located in close proximity (30m) to stationary/moving trains. Therefore, this Service would conclude that there is no risk of exceedances of short- and long-term air quality objectives as a result of railway emissions… a detailed assessment for construction traffic has been carried out using dispersion modelling, based on a construction start date of 2025. Construction traffic data was provided by design engineers (ARUP). It has been demonstrated that the predicted nitrogen dioxide and particulate matter concentrations would both be below the annual mean air quality objective (40μg/m3) at all human health receptor locations. As a result, no new exceedances are predicted as a result of the construction traffic associated with the Proposed Development. Moreover, a slight adverse impact was predicted only at one receptor (Grosvenor Bridge); negligible impact was predicted at all other receptors. It is stated within the assessment that, 'Emissions from car parks and boilers have not been included in the assessment as there is currently insufficient detail available. This will be assessed when detailed design becomes available'… It is acknowledged that the Outline Construction Environmental Management Plan (CEMP) was submitted as part of this application (Appendix 3.1, Volume 6 ES) and that standard construction phase mitigation measures are included within this document.'* The following conditions were applied to the response:<br><br>• **In the event that any centralised combustion sources (boilers, CHP or biomass) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017), this Service would request that an updated Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior to the installation of the plant. The assessment shall include details of the combustion plant to be installed, to include emission rates and flue termination heights of the proposed combustion systems. Where the Air Quality Impact Assessment indicates exceedances of Air Quality Strategy objectives associated with the development are predicted at relevant human receptor locations, the Air Quality Impact Assessment shall include mitigation measures to ensure that the objectives are achieved in the year of occupation.** |

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| | | • In the event that any other pollution sources, including underground carparks with extraction systems, are proposed and there is a risk of air pollution impact at relevant human health receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017), this Service would request that an updated Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior to the commencement of any development on site . The assessment must demonstrate that there will be no significant adverse air quality impacts. Where exceedances of Air Quality Strategy objectives associated with the development are predicted at relevant human receptor locations, the Air Quality Impact Assessment shall include mitigation measures to ensure that the objectives are achieved in the year of occupation. <br> • In the event that residential properties, forming part of the City Fringe Campus (phase 4 - mixed use), are to be located in close proximity to the A12 Westlink road transport corridor, to major local roads or to rail lines, the applicant shall notify the Planning Authority in writing and an updated Air Quality Impact Assessment shall be required for this phase of the development. <br> • Dust management measures, as detailed within the Weavers Cross Environmental Statement, Volume 3, Chapter 6 (Air Quality), Section 6.10 (17 December 2021) shall be implemented throughout the duration of the demolition and construction phases of the development. <br> Proposal granted 01/05/2023 |
| Lands at existing surface level car park bound by Winetavern Street, Gresham Street and North Street, Belfast. | Proposed mixed use development to include 865sqm ground floor retail use with upper floors comprising of 230 No. built to rent apartment units. Development includes internal courtyard, amenity spaces, bin store, cycle parking, plant and all associated site works. <br><br> Ref: LA04/2022/0122/PAD | Air quality impact had previously been assessed and reviewed in relation to this application within linked applications LA04/2018/2470/O, LA04/2020/0325/F, LA04/2020/0865/RM. The AQO responded to the most recent consultation on 13/05/2022, stating that all previous 'comments and recommendations were made on the basis of the information submitted by the applicant in association with these proposals… This Service would therefore advise that a number of conditions previously recommended for individual proposals still would apply to this wider development site… However, this Service would advise that if this development is to cause a significant change in LDV (Light Duty Vehicles) flows of more than 500 AADT or a change of HDV (Heavy Duty Vehicles) flows of more than 100 AADT, from the extant proposals, then an Air Quality Impact Assessment will be requested. It is further noted that accordingly to drawings submitted as part of the previous planning applications (current approvals) on site there are numerous combustion plants/ generators proposed as part of the wider development.' The following guidance was applied to the response: <br> • Therefore this Service would advise that in the event that any centralised combustion sources (boilers, CHP, biomass or generators) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017), this Service would request that an Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior to the installation of the plant. The assessment shall include details of the combustion plant to be installed, to include emission rates and flue termination heights of the proposed combustion systems and must demonstrate that there will be no exceedances of the Air Quality Strategy objectives at relevant human receptor locations, associated with operation of the proposed combustion plant and with the overall development. <br> Proposal outcome: unknown. |
| Lands at Nos. 176-184 and No. 202 Woodstock Road and Nos. 2-20 Beersbridge Road Belfast. | Proposed development of 31No. social housing units comprising of 16No. apartments and 15No. townhouses, car parking, landscaping and all associated site and access works. <br><br> Ref: LA04/2022/0209/F | All submitted air quality information was submitted and reviewed, with a response provided on NIPP on 26/05/2022, stating no concerns. The following condition was applied to the response: <br> • The installed gas fired boilers for the proposed development shall meet the technical specification as detailed within the Air Quality Technical Note (Chapter 4.2 and Appendix A, Air Quality Technical Note, RPS, January 2022). <br> Proposal granted 15/11/2022 |
| 204 and 204B Knock Road, Carnamuck, Belfast. BT5 6QD | Demolition of existing buildings and construction of 30 no. dwellings (apartments), provision of open space, parking and associated development. <br><br> Ref: LA04/2022/0034/PAD | All information was submitted and reviewed, with a response provided on 19/05/2022, stating no concerns in relation to emissions from road transport, however combustion processes could not be fully assessed at this stage. The following condition was applied to the response: <br> • In the event that any centralised combustion sources (boilers, CHP, generators or biomass) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017), this Service would request that an Air Quality Impact Assessment will be required. <br> Proposal outcome: unknown |
| 538-542 Falls Road, Belfast. BT12 6EQ | The demolition of existing residential/ commercial building, structures and yards on site; Construction of a 4-storey plus set-back level over basement apartment building to | All information was submitted and reviewed, with a response provided on 26/05/2022, stating no concerns in relation to emissions from road transport, however combustion processes could not be fully assessed at this stage. The following condition was applied to the response: <br> • In the event that any centralised combustion sources (boilers/CHP/biomass), where the single or combined NOx emission rate is more than 5mg/sec are proposed as part of this development, this Service would request relevant |

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| | accommodate 25 no. apartments, comprising 18No. 2-bedroom/ 3-person, 5 no. 1-bedroom/ 2-person and 2 no. 1-bedroom/ 2-person wheelchair accessible units along with associated balconies; Revised/ relocated Vehicular and Pedestrian/ Cyclist entrance/ egress from Falls Road the north; Vehicle car parking off the access roadway to the south and east; & All site Landscaping, bicycle parking, refuse storage, boundary treatments and all associated site development works and services. <br><br> Ref: LA04/2022/0312/PAD | **technical information associated with the CHP/biomass/boiler proposed. Furthermore, we would require details of the termination location and height of any flues. This service would further advise that if the siting of the ventilation system in relation to the basement car park is within 20m of any sensitive receptor, and/or the proposed development is to include any centralised combustion plants (Biomass, CHP or gas boilers, etc.), an Air Quality Impact Assessment may be required for relevant human health receptors.** <br> Proposal outcome: unknown |
| 13-25 Castle Lane Belfast BT1 5DA; Castle Arcade Belfast BT1 5DF and 3-9 Cornmarket Belfast BT1 4DA | Physical development - re-cladding of the exterior of the building, creation of a new access point to the upper floors and central core on Castle Arcade, demolition of bridge link over Castle Arcade and erection of a new oversail section at the junction of Castle Lane and Castle Arcade. <br> Change of use - partial change of use of upper floors from storage and back of house facilities to a mixed use of Assembly and Leisure (class D2) and a sui-generis multifaceted leisure use combined with the sale of food and drink for the consumption on the premises. Reconfiguration of existing ground floor storage, associated public realm improvements and ancillary development. Net reduction in gross floorspace of approximately 331 sqm. <br><br> Ref: LA04/2022/0535/F | Air quality impact had previously been assessed and reviewed in relation to this application within linked application LA04/2021/1753/PAD. The AQO responded to the most recent consultation on NIPP dated 10/06/2022, confirming that no new information had been submitted. The following condition was applied to the response: <br> • **In the event that any centralised combustion sources (boilers, CHP, biomass or generators) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017), this Service would request that an Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior to the installation of the plant. The assessment shall include details of the combustion plant to be installed, to include emission rates and flue termination heights of the proposed combustion systems and must demonstrate that there will be no exceedances of the Air Quality Strategy objectives at relevant human receptor locations, associated with operation of the proposed combustion plant and with the overall development.** <br> Proposal granted 08/07/2022. |
| 21-23 Victoria Street & 41-51 Waring Street, Belfast, BT1 2DY. | Retention of 21-23 Victoria Street and 41-51 Waring Street, Belfast with minor alterations to facades and erection of a 3-storey extension to the buildings to facilitate a 164-bedroom hotel with ground floor bar/restaurant, meeting rooms and fitness centre, back of house facilities, and 7th floor bar. <br><br> Ref: LA04/2021/0859/F | Air quality impact had previously been assessed and reviewed in relation to this application within linked application LA04/2019/2789/PAD. All additional information was reviewed, with a response provided on NIPP dated 01/06/2022, stating no concerns in relation to emissions from road transport. However, emissions from combustion processes could not be assessed at this time. The following condition was applied to the response: <br> • **In the event that any centralised combustion sources (boilers, CHP, biomass or generators) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017), this Service would request that an Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior to the installation of the plant. As the proposed development is to include balconies this Service would advise that the termination points of flues or vents associated with any combustion plant should be so located as to safeguard recreation areas such as terraces/balconies/ and neighbouring receptors against exceedances of Air Quality Strategy objectives.** <br> Proposal granted 29/03/2023 |
| Lands directly south of Titanic Belfast and north-west of Hamilton Dock located off Queens Road Belfast. | Erection of hotel/aparthotel comprising 162 hotel beds and 94 aparthotel beds, conference facilities, restaurant /cafe/bar uses (including roof top bar), gym, landscaped public realm, car parking, cycle parking and associated site and road works. <br><br> Ref: LA04/2022/0293/F | Air quality impact had previously been assessed and reviewed in relation to this application within linked application LA04/2019/1636/F, with no concerns. A new AQIA was submitted and reviewed for the updated application, with a response dated 13/06/2022 stating, *'The new AQIA (RPS, February 2022) confirms no significant change in traffic volumes as a result of the development. Moreover, the RPS consultant has stated that the heating system and associated emissions for the proposed development are not likely to be significant. It is stated that the proposed heating system will be the same as proposed previously (LA04/2019/1636/F) and consist of the gas fired modular condensing boilers model GB162 by Worcester Bosch (or similar) the flue of which will terminate 1m above roof level. Based on the above information and current air quality levels in the vicinity of the development, this Service has no concerns regarding the air quality impacts of the development proposal.'* The following conditions were applied to the response: <br> • **Combustion plant shall meet the technical specification (low NOx technology) as indicated within chapter 5.1.4 Air Quality Impact Assessment (AQIA), Hamilton** |

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| | | Dock Hotel/Aparthotel, RPS (February 2022). Moreover, the flue of any combustion plant must terminate 1m above roof level.<br>• **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/Aparthotel, RPS (February 2022) shall be implemented during any demolition or construction works.**<br>Proposal granted 19/09/2022. |
| Lands at Holmes Street to the rear of 15-21 Bruce Street Belfast. | Site for 15 storey residential development, 32no. 1-bedroom apartments, 35no. 2-bedroom apartments and 1no. studio apartment.<br><br>Ref: LA04/2022/0023/O | Air quality impact had previously been assessed and reviewed in relation to this application within linked application LA04/2019/2048/PAD, which noted that *'in the event that the proposed development is to include any centralised combustion plant (Biomass, CHP or gas boilers, etc.), an Air Quality Impact Assessment may be required for relevant human health receptors and impact on local air quality'*. The response in relation to LA04/2022/0023/O noted, *'based on provided drawings (Proposed Holmes Street Elevation, Gregory Architects) that a roof plant is proposed at 50m hight which is above the roof level. However, there is no other information in relation to the proposed roof plant. This Service would advise that in accordance with the Environmental Protection UK and the Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017) typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. It is further noted that no information has been provided on the heating or hot water provisions for the development proposal'*. The following condition was applied to the response:<br>• **In the event that any centralised combustion sources (boilers, CHP,  biomass or generators) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017), this Service would request that an Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior to the installation of the plant. The assessment shall include details of the combustion plant to be installed, to include emission rates and flue termination heights of the proposed combustion systems and must demonstrate that there will be no exceedances of the Air Quality Strategy objectives at relevant human receptor locations, associated with operation of the proposed combustion plant and with the overall development.**<br>Proposal granted 26/04/2023 |
| 46-52 Upper Queen Street & 11a Wellington Street Belfast BT1 6FD. | Demolition of existing buildings and erection of 9 storey office building with associated ancillary facilities, terraced areas, screened external plant area to the roof, and all associated site works (previous permission and DCA Refs: LA04/2016/2359/F and LA04/2016/2341/DCA).<br><br>Ref: LA04/2022/0717/F | All information was submitted and reviewed, with a response provided on 14/06/2022, stating no concerns in relation to emissions from road transport, however combustion processes could not be fully assessed at this stage. The following condition was applied to the response:<br>• **In the event that any centralised combustion sources (boilers, CHP, biomass or generators) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017), this Service would request that an Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior to the installation of the plant. The assessment shall include details of the combustion plant to be installed, emission rates and flue termination heights of the proposed combustion systems and must demonstrate that there will be no exceedances of the Air Quality Strategy objectives at relevant human receptor locations, associated with operation of the proposed combustion plant and with the overall development.**<br>Proposal granted 28/03/2023 |
| Pearl Assurance House 1-3 Donegall Square East 1-5 Chichester Street Belfast BT1 5HB. | Change of use from storage at basement level, and retail/temporary cafe at ground floor level to a new restaurant; cafe/coffee shop and coffee dock at ground level; refurbishment and extension of existing offices at first to fifth floors; new glazed opening with access to balcony area to west elevation, and dormer window to south elevation and all associated works.<br><br>Ref: LA04/2022/0178/F | Air quality impact had previously been assessed and reviewed in relation to this application within linked application LA04/2019/0714/F. However, the most recent response confirmed, *'The previous application included a residential apartment situated on the fifth floor, which is considered to be a relevant human receptor location for the purposes of local air quality management. For clarity, the air quality objectives are not relevant to places of work or to other locations where members of the public do not have regular access. It is particularly noted that annual mean air quality objectives should not generally apply at building façades of offices or other places of work, where members of the public do not have regular access'*. A new AQIA was submitted and reviewed for the new application, with the AQO noting *'based on the information provided in relation to transport and combustion sources and the government technical guidance concerning relevant public exposure, this Service would have no concerns in relation to the ambient air quality impact of the operational phase of this development proposal… The consultant has considered the potential effects of dust emissions associated with the construction phase of the proposed development in accordance with the IAQM Guidance on the Assessment of Dust from Demolition and Construction 2014.'*. The following condition was applied to the response:<br>• **The dust management measures, as detailed within the RPS Air Quality Impact Assessment (December 2021) shall be implemented throughout the construction phase of the development.**<br>Proposal granted 26/10/2022 |
| The King's Hall and RUAS site south of Upper Lisburn | The development proposal is for a new residential-led mixed use scheme to be sited at Plot 4 of the | Air quality impact had previously been assessed and reviewed in relation to 103-bed care home within this application. All additional air quality information was reviewed, with a response provided on 17/06/2022, stating *'This Service is able to conclude that estimated* |

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| Road/Balmoral Avenue west of Harberton Park and north east of Balmoral Golf Club Belfast BT9 6GW. | wider Kings Hall Redevelopment Masterplan site and is to consist of 41no (2-and 3-bed mix) apartments, 361m² of commercial unit space, associated car parking, site works and landscaping. Previous planning approval was granted at the Proposed Development Site for a 103-bed care home under Planning Reference LA04/2019/2989/F.)<br><br>Ref: LA04/2019/2989/F | *transport emissions, as a result of the proposed development, are likely to have a negligible impact on nitrogen dioxide and particulate matter concentrations in the local area. However, this assessment has seemingly considered only the impact from road transport emissions on a series of human health receptors; This Service would advise that all air pollution sources should be considered when assessing the impact of the proposed development. It is acknowledged that in accordance with drawings/information provided as part of this application, the proposed development is to include plant area, boiler room, chimney stack, however no information concerning heating and hot water provisions (centralised combustion plant) has been provided within the report. This Service would advise that that in accordance to Environmental Protection UK and the Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017) any combustion plant where the single or combined NOx emission rate is more than 5mg/sec could give rise to impacts… Irwin Carr consultants have undertaken a construction impact assessment in accordance with Guidance on the assessment of dust from demolition and construction IAQM (2014)'*. The following conditions were applied to the response:<br>• **In the event that any centralised combustion sources (boilers, CHP or biomass) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017), this Service would request that an updated Air Quality Impact Assessment will be required.**<br>• **Dust management measures, as detailed within the Chapter 7 of the Irwin Carr Consulting, Air Quality Impact Assessment, Kings Hall – Plot 4 (3 February 2022) shall be implemented throughout the duration of the construction phase of the development.**<br>Proposal granted 28/07/2022 |
| 12 Stoney Road, Belfast. BT4 3SD. | Development of new, replacement Animal Health Sciences Building with General Stores Building, Post-Mortem Suite and Carcass Incineration Facility, and associated works.<br><br>Ref: LA04/2022/0915/F | A preliminary AQIA was submitted and reviewed, with a response provided on NIPP dated 29/09/2022 stating, *'this Service is able to conclude that estimated transport emissions, as a result of the proposed development, are likely to have a 'negligible' impact on local air quality. It has also been stated by Cundall Consultants that the heating strategy will involve the use of air source heat pumps… It is noted however that selection of the 'final' incinerator for the proposed development is to be made by the contractor at 'Stage 4'. The risk assessment has therefore been based on information from the existing permit and indicative design information for the proposed new incinerator… Moreover, the proposed development includes construction of a new incinerator building, and associated flue, to be located in close proximity to residential properties situated on Stoney Road. Whilst it is noted that there is an existing incinerator located at the site, it appears that the proposed development will result in a decrease in the distance between human health receptors and the discharge point for the incineration process… Consequently, this Service would reiterate that, in order to quantify the likely impact of this development and where necessary, to mitigate adverse human health effects associated with air pollution, a detailed Air Quality Impact Assessment is required'*. The following conditions were also applied to the response:<br>• **Prior to the installation of combustion plants, the applicant shall submit to and have approved in writing by the Planning Authority, an Air Quality Impact Assessment providing full specification details, including emission rates and flue termination heights, of the proposed combustion systems, including the incineration process. The assessment must demonstrate that there will be no significant adverse air quality impacts or exceedances of Air Quality Strategy objectives at relevant human receptor locations, associated with operation of proposed combustion processes and with the overall development.**<br>• **The assessment shall employ a suitably robust atmospheric dispersion model and it shall have regard to recent, up-to-date guidance and best practice for air quality such as: Local Air Quality Management Technical Guidance document LAQM.TG(16), Environmental Protection UK and the Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017) and the Institute of Air Quality Management 2014 publication, 'Guidance on the assessment of dust from demolition and construction Version 1.1'. The assessment should consider all of the regulated pollutants associated with the incinerator's proposed emission characteristics. Where odours are to be released as a consequence of incineration or any associated processes or activities, the Air Quality Impact Assessment shall also consider odour impact at relevant receptor locations in accordance with the Institute of Air Quality Management 2018 publication, 'Guidance on the assessment of odour for planning' and the March 2011 Environment Agency, 'Additional guidance for H4 Odour Management. How to comply with your environmental permit'. Air quality impacts associated with the demolition and construction phase shall be considered as part of the Air Quality Impact Assessment and where necessary, a Dust Management Plan shall be provided, describing the site-specific methods to be employed to control dust emissions.**<br>The proposal is ongoing. |
| Lands on and East of the River Lagan at Queens Quay (lands South of Lagan | Mixed-Use Development comprising: residential apartments and associated communal space (including gym, games room, | All submitted information was reviewed and a response was provided on 07/07/2022 requesting a detailed AQIA.<br>Proposal outcome: unknown. |

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| Bridge/M3 flyover and north of Queen's Bridge), Belfast and Lands between Middlepath Street and Bridge End east of railway line, Belfast. | library/lounges, media room, BBQ roof terrace areas, work spaces and meeting rooms); Grade A office space; general office space; own door office space; shops (local convenience and general); food and beverage space (restaurants, cafes, hot food bars, public houses); leisure and/or community and cultural and/or indoor/outdoor recreation activity accommodation space; an hotel; landscaped roof terrace areas for private and semi-public use; demolition of existing Station Street flyover; creation of public realm area incorporating infrastructure for outdoor recreation activities; landscaping; associated roads and access works; basement and ground floor car parking; indoor and outdoor cycle parking and all associated site works, infrastructure and associated services on land east of the River Lagan at Queen's Quay (lands south of Lagan Bridge/M3 flyover and north of Queen's Bridge), Belfast; and provision of a social/affordable housing scheme; landscaping; associated roads and access works; basement, ground, first and second floor car parking; indoor and outdoor cycle parking and all associated site works, infrastructure and associated services on lands between Middlepath Street and Bridge End and east of Railway Line, Belfast.<br><br>Ref: LA04/2022/0198/DETEIA | |
| Site at the corner of Hill Street and Talbot Street to the north and east of 51 Hill Street. | The development proposals consist of the construction of a 6-storey building with commercial ground floor and residential units over 5 floors above. The ground floor commercial units will be circa 271m$^2$ and the residential units will consist of 21no. 1 bed apartments and 14no. 2 bed apartments (35 apartments units in total).<br><br>Ref: LA04/2021/2229/O | An AQIA was submitted and reviewed, with a response provided on NIPP dated 29/07/2022, stating *'the Air Quality Impact Assessment in conjunction with the Technical Note sufficiently demonstrated that the proposed development will not have adverse impact on air quality in the vicinity of the site and that future occupants of the development will not be exposed to air quality concentrations exceeding UK Air Quality Objectives as a result of road transport emissions. However, it is also noted that boiler plant and hot water generators are proposed as part of this development. RPS consultants have advised that the heating systems and associated emissions for the proposed development are not likely to be significant. Moreover, it is noted that flues are proposed to terminate a minimum of 1m above roof level. It is further noted that the proposed development is to include private balconies, this Service would therefore advise that the termination points of flues or vents associated with any combustion plant should be so located as to safeguard recreation areas such as terraces/balconies/roof spaces and neighbouring receptors against exceedances of Air Quality Strategy objectives… with implementation of the mitigation measures proposed within Appendix D of the RPS Air Quality Impact Assessment, there will be no significant adverse dust effects arising from the construction phase of the proposed development'*. The following condition was applied to the response:<br>• **At full or reserved matters application stage, in the event that any centralised combustion sources (boilers, CHP, biomass or generators) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017), this Service would request that an Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior to the installation of the plant. The assessment shall include details of the combustion plant to be installed, to include emission rates and flue termination heights of the proposed combustion systems and must demonstrate that there will be no exceedances of the Air Quality Strategy objectives at relevant human receptor locations, associated with operation of the proposed combustion plant and with the overall development.**<br>Proposal granted 28/04/2023. |
| 35-41 Queen's Square, Belfast. BT1 3FG | Proposed erection of 15no. storey building comprising 60no. apartments with ancillary facilities | An updated AQIA was previously requested by the AQO on 23$^{rd}$ May 2022. The updated AQIA was submitted and reviewed with all relevant information, and a response was provided to the NIPP dated 13/09/2022 stating, *'This Service would advise, that although nitrogen dioxide* |

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| | and all other associated site works (amendment to previous approval Z/2011/0472/F). (Amended Scheme proposed, further drawings and information received.)<br><br>Ref: LA04/2021/1985/F | *concentrations recorded at the Albert Clock monitoring site have been considered as elevated in the past, these monitored nitrogen dioxide concentrations have not exceeded the annual mean air quality objective since 2015. Moreover, monitored nitrogen dioxide annual mean concentrations at the Queen's Square site have been in compliance since 2014 and this Service would note that the residential apartments are to be located above the ground floor level of the proposed development, i.e. first floor and above. Therefore, although it would have been preferable that a quantitative AQIA was undertaken by RPS in support of this new application, this Service is able to accept RPS's stated conclusion that there is no requirement for mitigation relating to transport aspects of the operational phase of the proposed development, and that transport aspects of the development have been shown to be not significant in terms of air quality… based on the submitted technical information and confirmation that boilers' emissions are to be released above the roof level of the proposed development, which will provide adequate dispersion, this Service is able to conclude that the proposed boilers/generator are unlikely to give rise to unacceptable air quality impacts… Furthermore, RPS have also considered the potential effects of dust emissions associated with the construction phase of the proposed development in accordance with the IAQM Guidance on the Assessment of Dust from Demolition and Construction 2014'.* The following conditions were applied to the response:<br><ul><li>**Gas boilers and the standby generator for the hereby approved development shall be installed and maintained in accordance with the technical specifications detailed within Appendix B (Proposed Plant) of the RPS Proposed Studio Apartment Development, 35 – 41 Queens Square Belfast. Air Quality Technical Note NI2329. F03. July 2022. The flue of any combustion plant shall terminate above the roof level of the building, which that combustion plant serves.**</li><li>**Dust management measures, as detailed within Appendix B of the RPS: Air Quality Impact Assessment, Proposed Studio Apartment Development 35-41 Queen's Square, July 2022 shall be implemented throughout the duration of the construction phase of the hereby approved development.**</li></ul>The proposal is ongoing. |
| Woodland Grange, Finaghy Road North | Amendments to approved schemes ref. Z/2008/0993/F (erection of 53 No. dwellings) & ref. Z/2013/0120/F (erection of 46 No. dwellings); to reduce overall density from 99 No. dwellings to 94 No. dwellings and associated and ancillary works.<br><br>Ref: LA04/2022/0809/F | All relevant information was submitted and reviewed, with a response provided on 13/09/2022, requesting an AQIA.<br>The proposal is ongoing. |
| Lands bounded by Library Street (to south); Stephen Street (to west); Little Donegall Street (to north); and Union Street (to east) Belfast BT1 2JE. | Erection of Purpose-Built Managed Student Accommodation (PBMSA) development comprising 795 units with additional use of accommodation by further or higher education institutions outside term time, communal facilities, internal amenity courtyard, cycle stores, active ground floor uses including cafe and retail, and associated bin stores and plant and public realm improvements to surrounding footpaths.<br><br>Ref: LA04/2022/1284/F | An AQIA was submitted and reviewed, with a response provided on NIPP dated 07/12/2022 stating, 'the Air Quality Impact Assessment sufficiently demonstrated that the proposed development will not have adverse impact on air quality in the vicinity of the site and that future occupants of the development will not be exposed to air quality concentrations exceeding UK Air Quality Objectives. However, details of proposed heating systems are not confirmed at this stage. This Service would advise that any combustion plant where the single or combined NOx emission rate is more than 5mg/sec could give rise to impacts… Irwin Carr consultants have also considered the potential effects of dust emissions associated with construction phase of the development in accordance with Guidance on the Assessment of Dust from Demolition and Construction (IAQM) 2014'. The following conditions were applied to the response:<br><ul><li>**In the event that any centralised combustion sources (boilers, CHP, biomass or generators) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the *Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017)*, this Service would request that an updated Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior Page 5 of 9 to the installation of the plant. The assessment shall include details of the combustion plant to be installed, to include emission rates and flue termination heights of the proposed combustion systems and must demonstrate that there will be no exceedances of the Air Quality Strategy objectives at relevant human receptor locations, associated with operation of the proposed combustion plant and with the overall development.**</li><li>**Prior to commencement of construction, the applicant must submit to Planning Service, for review and approval in writing, a Construction Environmental Management Plan (CEMP). The CEMP shall be developed by the appointed contractor and outline the site-specific methods to be employed to minimise any noise, vibration and dust impacts associated with the phased construction operations demonstrating the use of 'best practicable means'. The plan must pay due regard to *BS 5228:2009+A1:2014 Code of practice for Noise and vibration on construction and open sites*, and incorporate the recommendations outlined within *Chapter 6 of Irwin Carr Consulting, Air Quality Impact Assessment, Purpose-Built Student Accommodation, Library Street, Belfast (21 June 2022)* throughout the duration of the construction phase of the development. The CEMP should also include arrangements for liaising with any nearby sensitive premises, both residential and commercial. All construction works thereafter must be carried out in accordance with the approved management plan.**</li></ul> |

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| | | Proposal refused 29/03/2023. |
| 177-183 Victoria Street, 66-72 May Street and 4-8 Gloucester Street, Belfast. | Demolition of existing building and erection of 11 storey building (May Street/Victoria Street) and 4 storey building (Gloucester Street) comprising 77 apartments with communal areas, ground floor retail services (A2) unit, cycle and car parking, and vehicular access via Gloucester Street.<br><br>Ref: LA04/2022/1219/F | An AQIA was submitted and reviewed, with a response provided on 26/09/2022. The response stated, *'Model verification exercise has been undertaken to minimise model uncertainty and gain a better representation of predicted pollutant concentrations for the assessment years. NO2 data from the non-automatic diffusion tube situated at one location at Cromac Street was selected for the verification process. An adjustment factor of 1.8 was calculated. However, it is unclear why only one location was utilised for the verification process, as more than one location is recommended, in line with the government's Local Air Quality Management Technical Guidance LAQM.TG (16)... Despite the underlined issue regarding the verification procedure at this occasion it is this Service's view that the assessment has sufficiently demonstrated that in relation to transport aspects, the proposed development will not have adverse impact on air quality in the vicinity of the site and that future occupants of the development will not be exposed to air quality concentrations exceeding UK Air Quality Objectives... details of proposed heating systems are not confirmed at this stage. Moreover, it is noted by this Service that drawings submitted as part of this proposal (TODD Architects 'Proposed Ground Floor Plan – May Street/Victoria Street Development' dated March 2022) demonstrate that ground floor will include Plant Room and Life Safety Generator. This Service would advise that any combustion plant where the single or combined NOx emission rate is more than 5mg/sec could give rise to impacts... Irwin Carr consultants have also considered the potential effects of dust emissions associated with construction phase of the development in accordance with Guidance on the Assessment of Dust from Demolition and Construction (IAQM) 2014.'*. The following conditions were applied to the response:<br><br>• **In the event that any centralised combustion sources (boilers, CHP, biomass or generators) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the *Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017)*, this Service would request that an updated Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior to the installation of the plant. The assessment shall include details of the combustion plant to be installed, to include emission rates and flue termination heights of the proposed combustion systems and must demonstrate that there will be no exceedances of the Air Quality Strategy objectives at relevant human receptor locations, associated with operation of the proposed combustion plant and with the overall development. As the proposed development is to include private terraces this Service would advise that the termination points of flues or vents associated with any combustion plant should be so located as to safeguard recreation areas such as terraces/balconies/roof spaces and neighbouring receptors against exceedances of Air Quality Strategy objectives.**<br>• **Dust management measures, as detailed within *Chapter 7 of Irwin Carr Consulting, Air Quality and Odour Impact Assessment, Mixed Use Development, May Street, Belfast (26 May 2022)* shall be implemented throughout the duration of the construction phase of the development.**<br>The proposal is ongoing. |
| Lands at London Road/Lismore Street, Belfast. BT6 8HH | Residential development comprising 121 units (apartments & duplexes) with associated private and communal amenity space, landscaping, parking provision, access and associated site works including relocation of existing substation.<br><br>Ref: LA04/2022/1083/F | An AQIA was submitted and reviewed, with a response provided on NIPP dated 20/10/2022. The response stated, *'The assessment has concluded that the changes in concentrations of the above pollutants would be of a negligible magnitude, and that any local air quality impact upon future sensitive receptors would not be significant. However, additional vehicle trips assessed as part of the new development was stated as 247, which is not in line with the TAF, which calculated additional daily vehicle movements as 258. Furthermore, existing sensitive receptors within the proposal locality were not taken account of during the assessment process. Only new sensitive receptors associated with the proposed development were assessed. Despite these minor issues, it is this Service's view that the assessment sufficiently demonstrated that vehicle movements from the proposed development will not have an adverse impact on air quality in the vicinity of the site and that future occupants of the development will not be exposed to air quality concentrations exceeding UK Air Quality objectives. However, details of proposed heating systems are not confirmed at this stage. This Service would advise that any combustion plant where the single or combined NOx emission rate is more than 5mg/sec could give rise to impacts... AONA Consultants have also considered the potential effects of dust emissions associated with construction phase of the development in accordance with Guidance on the Assessment of Dust from Demolition and Construction (IAQM) 2014. AONA Consultants have predicted that before the implementation of mitigation measures, the risk of dust impacts is 'high'. However, with implementation of the mitigation measures proposed within Appendix B of the AONA Consultants Air Quality Impact Assessment, there will be no significant adverse dust effects arising from the construction phase of the proposed development.'* The following conditions were applied to the response:<br><br>• **In the event that any centralised combustion sources (boilers, CHP, biomass or generators) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017), this Service would request that an updated Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior to the installation of the plant. The assessment shall include details of the combustion plant to be installed, to include emission** |

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| | | rates and flue termination heights of the proposed combustion systems and must demonstrate that there will be no exceedances of the Air Quality Strategy objectives at relevant human receptor locations, associated with operation of the proposed combustion plant and with the overall development.<br>• Dust management measures, as detailed within Appendix B of *AONA Consultants, Air Quality Impact Assessment, May 2022,* shall be implemented throughout the duration of the construction phase of the development.<br>The proposal is ongoing. |
| Former NI Water Ltd Sewage Treatment Works Blackstaff Road Belfast BT11 9DT | Partial redevelopment of former Kennedy Way Waste Water Treatment Works to include the development of new Mechanical & Electrical (M&E) workshops, storage, changing facilities and ancillary offices (development to include three new buildings 1) the main hub building; 2) a store to hold an alternative bottled water supply; and 3) a generator store), access improvements, parking, service yards, storage areas, contractors' compound, boundary fencing, cesspool, solar PV panels and landscaping.<br><br>Ref: LA04/2022/1479/F | An AQIA was submitted and reviewed, with a response provided on NIPP dated 15/12/2022. The response stated, *'It is noted that a new TAF (MRA Partnership, July 20222) submitted in support of this current application advises that the number of additional vehicle movements associated with the proposed development are anticipated to be less than 100AADT which is below the threshold that current guidance (Environmental Protection UK and the Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017) suggests could potentially lead to a significant adverse effect on local air quality. Consequently, based on the updated traffic information this Service is able to conclude that estimated transport emissions, as a result of the proposed development, are likely to have a 'negligible' impact on nitrogen dioxide and particulate matter concentrations in the local area. Despite some minor issues, and also considering the abovementioned updated traffic information this Service is able to accept RPS's stated conclusion that transport aspects of the development have been shown to be not significant in terms of air quality. However, it is noted that combustion plant details are still unknown at this stage. Therefore, the submitted AQIA has seemingly considered only the impact from road transport emissions on human health receptors. RPS have advised that the proposed energy system for the proposed development is not likely to be significant in terms of nitrogen dioxide emissions and will avail of modern efficient boiler technology. It has been furthermore advised that all boiler plant and hot water generators are proposed to be located in the ground floor boiler room. As such it is proposed to individually flue these directly through the plantroom, terminating a minimum of 1m above roof level. However, at this stage details of the exact heating system are not confirmed.'* The following conditions were applied to the response:<br>• **In the event that any substantial centralised combustion sources (boilers, CHP, biomass or generators) are proposed and there is a risk of impact at relevant receptor locations as per the criteria detailed within the *Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017)*, this Service would request that an updated Air Quality Impact Assessment be submitted to and approved in writing by the Planning Authority prior to the installation of the plant. The assessment shall include details of the combustion plant to be installed, to include emission rates and flue termination heights of the proposed combustion systems and must demonstrate that there will be no exceedances of the Air Quality Strategy objectives at relevant human receptor locations, associated with operation of the proposed combustion plant and with the overall development.**<br>• **The dust management measures, as detailed within Appendix D *(Dust Management Plan)* of the RPS Group Report entitled 'Air Quality Impact Assessment, Partial Redevelopment of Former NI Water Operational Land at Blackstaff Road/Kennedy Way, referenced NI 2588, dated July 2022* shall be implemented throughout the duration of the construction phase of the development.**<br>Proposal granted 28/04/2023. |
| Former Kennedy Enterprise Centre (north of Westwood Shopping Centre) Blackstaff Road Belfast BT11 9DT. | Proposed social housing led, mixed tenure residential development comprising of 52 no. dwelling houses and 87 no. apartments with public open space, children's play park, landscaping, car parking, associated site works and infrastructure and access arrangements from Blackstaff Road (139 no. units in total).<br><br>Ref: LA04/2022/1280/F | An AQIA was submitted and reviewed, with a response provided on NIPP dated 11/10/2022. The response concluded that there were several errors and queries in relation to the submitted AQIA, and so could not be evaluated. Therefore, a revised AQIA was requested.<br>The proposal is ongoing. |
| Land at and adjacent to 587 Upper Newtownards Road, Belfast, BT4 3LP. | Mixed-use development, comprising retirement living (use class c1), care home (use class c3) and medical facility (use class c3 or d1), associated access, amenity space, landscaping and car parking.<br><br>Ref: LA04/2022/1763/PAD | All submitted information was reviewed and a response was provided on 15/11/2022, stating, *'Considering a scale of the overall proposal, this development may increase traffic flows on the local roads and subsequently can have a negative impact on local air quality. Furthermore, the proposed development may have the potential to have a negative impact on the local area if any substantial combustion sources (boilers / CHP or biomass) are to be installed. Consequently this Service would advise that in accordance with Environmental Protection UK and the Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017) guidance, if the proposed development is to increase traffic flows on local roads by more than 100 AADT LDV or by more than 25 AADT HDV, an Air Quality Impact Assessment will be required for relevant human health receptors. Moreover, this Service would advise that any combustion plant where the single or combined NOx emission rate is more than 5mg/sec could give rise to impacts. As a result, in the event that the proposed development is to include any substantial centralised combustion plant (boilers/CHP, generator, biomass), and* |

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| | | *there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning for Air Quality (January 2017), this Service would request that an Air Quality Impact Assessment will be required'.*<br><br>Proposal outcome: unknown. |
| Lands bound by Millfield North Street, Winetavern Street, Winetavern Street and Smithfield Square, North Belfast BT1 1JE. | Residential led mixed use regeneration scheme, including new market trading space, potential realignment of the public road network and new public realm.<br><br>Ref: LA04/2022/1290/PAD | All submitted information was reviewed by the AQO, and a response was provided on 01/12/2022 requesting an AQIA.<br><br>Proposal outcome: unknown. |
| Blackstaff Chambers, 2 Amelia Street, Belfast. BT2 7GS | Demolition of existing five-storey building and erection of replacement ten-storey mixed-use development, comprising ground floor retail (Use Class A1), 28no. serviced apartments over 7 floors (Sui Generis) and offices on the 8th and 9th floors (Use Class A2).<br><br>Ref: LA04/2022/1871/PAD | All information submitted was reviewed by the AQO and a response was provided on 08/12/2022, stating '*At the pre-application stage of a development there is limited information available, therefore this Service can only provide general advice on potential air quality impacts and the information required to assess these impacts. Considering a scale of the overall proposal, this development may increase traffic flows on the local roads and subsequently can have a negative impact on local air quality. Furthermore, the proposed development may have the potential to have a negative impact on the local area if substantial centralised combustion sources (boilers / CHP or biomass) are to be installed. Consequently this Service would advise that in accordance with Environmental Protection UK and the Institute of Air Quality Management, Land-use Planning & Development Control: Planning For Air Quality (January 2017) guidance, if the proposed development is to increase traffic flows on local roads by more than 500 AADT LDV or by more than 100 AADT HDV, an Air Quality Impact Assessment will be required for relevant human health receptors. Moreover, this Service would advise that any combustion plant where the single or combined NOx emission rate is more than 5mg/sec could give rise to impacts. As a result, in the event that the proposed development is to include any substantial centralised combustion plant (boilers/CHP, generator, biomass), and there is a risk of impact at relevant receptor locations as per the criteria detailed within the Environmental Protection UK and Institute of Air Quality Management, Land-use Planning & Development Control: Planning for Air Quality (January 2017), this Service would request that an Air Quality Impact Assessment will be required. The assessment shall include details of the combustion plant to be installed, to include emission rates and flue termination heights of the proposed combustion systems and must demonstrate that there will be no exceedances of the Air Quality Strategy objectives at relevant human receptor locations, associated with operation of the proposed combustion plant and with the overall development.'*<br><br>Proposal outcome: unknown. |
| Lands adjacent and south west of Monagh-Bypass, c. 300m north west of 1 Aitnamona Crescent, (part of wider Glenmona mixed-use development), Belfast. | Proposed residential development of c. 50 no. dwellings, including access, car parking, open space and all associated site works.<br><br>Ref: LA04/2022/1743/PAD | All submitted and reviewed, with a response provided on 09/12/2022, confirming that an '*Air Quality Impact Assessment will be submitted for the proposal at the full planning application stage. The Memo submitted with the PAD states that 'Air quality detailed dispersion modelling was undertaken as detailed within the submitted EIA Air Quality chapter, dated April 2019, and technical clarifications report, dated October 2019. The previously submitted air quality prediction models iterations will form the basis of assessment for the additional residential receptors associated with the proposed development. This Service is satisfied with this approach and will review the air quality impact assessment for this proposal once submitted at the full application stage'.*<br><br>Proposal outcome: unknown. |

# 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 Local Development Plan (LDP) – Plan Strategy

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 LDP Plan Strategy was adopted in May 2023 and includes a clear commitment to enhance environmental quality, where possible, and in assessing development proposals will ensure the consideration of a wide range of environmental factors including air quality. The Council has also published a suite of Supplementary Planning Guidance (SPG) which seeks to support, clarify and/or illustrate by example policies within the LDP. Where relevant to a particular development proposal, SPG can be taken into account as a material consideration when determining planning applications. New SPG on Environmental Quality may be prepared during the plan period (up to 2035) – this will be dependent on business need and whether any new regional policy or guidance is published in due course.

In terms of ambient air quality, one of the Plan Strategy's visions is for '*Building a smart connected and resilient place*'. The Plan therefore encourages the expansion of green infrastructure networks for walking and cycling to encourage active travel and improve air quality and promote increased use of public transport whilst retaining appropriate provision for cars.

In terms of strategic policies, **SP3 – Improving health and wellbeing** advises that the council will support development that maximises opportunities to improve health and wellbeing and that development will not be permitted where it will result in significant harm to life, human health or wellbeing. Justification and amplification include that the provision of good quality green open space linked to a green and blue infrastructure network, will help to improve air quality and provide respite beneficial for enhancing mental health. Improving connectivity between residential and employment areas which are well served by a range of sustainable travel modes would encourage active lifestyles, and reduce air pollution. This will deliver significant community health benefits.

**SP6 - Environmental resilience** states that the council will support development where it helps to reduce greenhouse gas emissions and is adaptable in a changing climate to build environmental resilience. Justification and amplification include that the policy aims to build environmental resilience and support the transition to a low carbon future. It embeds the RDS Policy to reduce our carbon footprint and  facilitate mitigation and adaptation to climate change, whilst improving air quality.

**SP7 – Connectivity** states that the council will support connectivity to and within the city by sustainable transport modes, such as public transport, walking and cycling. Land for sustainable transport infrastructure projects will be safeguarded and opportunities to protect and enhance existing provision will be maximised. Justification and amplification include that Belfast has a major transport challenge due to a large travel to work catchment area. A significant number of commuters using private vehicles cause congestion on the key city corridors, leading to increasing air pollution resulting in the designation of four Air Quality Management Areas, where pollution levels exceed EU standards. There is therefore a need to improve sustainable transport links with commuter towns and the strategic transport routes shall be protected, as important trade links that contribute to the economic health of the city.

**SP8 – Green and blue infrastructure** network states that the council will support the development of a green and blue infrastructure network, designating and safeguarding sites and accesses required for the green and blue infrastructure network across the plan area. Justification and Amplification include that this policy recognises the opportunity to plan for a green and blue infrastructure network across the plan area, to address the significant challenges of poor health due to an inactive lifestyle, poor connectivity, air pollution and climate change.

Moreover, Plan Policy **ENV1 – Environmental quality** states that planning permission will be granted for development that will maintain and, where possible, enhance environmental quality, and protects communities from materially harmful development. Development must not result in an unacceptable adverse impact on the environment, including the following considerations:

- Ground contamination;
- **Air quality;**
- Water quality;
- Noise; and
- Light pollution.

The Policy further advises that the council will also require development to address the following:

a) Existing land contamination and ensuring development does not cause contaminated land or pollute water;
b) **Local air quality, particularly nitrogen dioxide and particulates (including in Air Quality Management Areas);**
c) Protection of the city's designated quiet areas and quiet times of day for businesses (daytime) and residents (night-time); and
d) The need to limit the city's contribution to light spillage and 'sky glow'.

Justification and amplification in respect of ambient air quality includes that the presence of air pollution can lead to an adverse impact on human health. Air pollution is also known to adversely affect ecosystems such as water quality, soils, plants and animals. The RDS acknowledges that there is a need to reduce air pollution from transport by the use of more

energy efficient transport. The planning system also positively contributes to improving air quality and minimising its harmful impacts. Belfast City Council has declared four air quality management areas where there is an exceedance of nitrogen dioxide and particulate matter. These are: the M1 / Westlink corridor; Cromac Street/Albertbridge Road; the Upper Newtownards Road; and the Ormeau Road.

Any air quality issue that relates to land use and development is a material planning consideration and factors to be considered include:

- The severity of the impacts on air quality;
- The air quality in the area surrounding the proposed development;
- The likely use of the development, i.e. the length of time that people are likely to be exposed at that location; and
- The positive benefits provided through other material considerations.

The Belfast City Council Adopted Plan Strategy documents may be accessed via the following weblink:
https://www.belfastcity.gov.uk/Planning-and-building-control/Planning/Local-development-plan-(1)/Local-development-plan/Adoption-of-Plan-Strategy-documents

# 6 Local Transport Plans and Strategies

The Belfast Metropolitan Transport Plan (BMTP) 2015 is the current extant Transport Plan. A new Belfast Metropolitan Transport Plan is currently under development and will integrate with the Belfast City Council Local Development Plan. The BMTP will assess total transport demands arising from planned developments and how a proposed future transport network can contribute towards the achievement of a range of agreed objectives. The new BMTP will replace the extant Transport Plan and will include a range of schemes covering pedestrian, cycling, public transport, & road networks.

Whilst the contents of the new BMTP cannot be assumed in advance, the emphasis on the carbon transport hierarchy to firstly substitute trips by removing or reducing the need or distance to travel; secondly to shift modes by increasing the percentage of journeys made by walking, wheeling, cycling or public transport; and thirdly a switch to sustainable fuels, is expected to drive a focus on carbon reduction and sustainability within the Plan. To achieve the desired modal shift the plan will likely include substantial demand management measures to make sustainable modes comparably more attractive for some journey times than using a private car. The new Transport Plan is expected to include transport projects which will improve air quality in the city.

Whilst not explicitly listed within BMTP 2015, the Department for Infrastructure has continued to take forward a number of high-profile transport projects. These include the Belfast Transport Hub, Belfast Rapid Transit Phase 2, Park and Ride facility expansion, improved active travel interconnectivity and general public transport route improvements. Delivery of these projects will contribute to this Action Plan's goals of reducing $NO_2$ and $PM_{2.5}$ emissions from transport activities.

# 7  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, both within Council, and at Belfast City level. A Belfast Net Zero Carbon Roadmap, providing analysis of the city scope 1 and 2 emissions, which has indicated that buildings and transport are the two largest sources of emissions in Belfast. Accordingly, we have since established a Belfast Retrofit Delivery Hub, which will produce a programme of work in 2023/2024, and we are currently working on the Belfast EV Strategy which will shape the use of EV in for the city in the years to coming years. In December 2020, the Council launched the Belfast One Million Trees Programme, which sets a target of planting one million trees in the city by 2035. In 2022, Belfast received an 'A' in the global Carbon Disclosure Project framework, as recognition for the work undertaken to date in the city. In 2023, a Belfast Local Area Energy Plan will be developed which will set out an analysis of the energy capacity and needs of the city and make recommendations on future projects that will embed decarbonisation and renewable energy in the city.

Currently, Belfast City Council is working towards publishing a council climate risk assessment, climate plan and climate investment plan. 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. becoming a carbon-neutral organisation as urgently as possible

In parallel, a city climate action plan and climate investment plan will be developed in 2023/2024.  When published in 2024, these plans will aim to deliver the vision set out in the Belfast Resilience Strategy - to transition to a low-carbon economy in a generation. The Council will 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% by 2030 and 100% by 2050 (targets set out in the Belfast Net Zero Carbon Roadmap). The city plan is being developed in consultation with a number of cities as part of Belfast's membership of the Resilient Cities Network, and in close partnership with Queens University of Belfast through the Belfast Climate Commission and Place Based Climate Action Network.

# 8 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 percent of the action plan was completed by the 2010 deadline but, although the air quality limit values and objectives for particulate matter have now been achieved across the city, limit values and objectives for nitrogen dioxide continue to be exceeded and give cause for concern in a few remaining 'hot spot' locations.

In mid-2012, the Council commenced development of a new Air Quality Action Plan for the city to address the remaining $NO_2$ hotspots. Concentrations of $PM_{10}$ were complying with annual and daily mean objectives at this time within the M1 Motorway / A12 Westlink corridor AQMA.

The Council published a second AQAP for the city in 2015, which concluded at the end of 2020. A final review of the implementation of various mitigation measures included within the 2015-2020 AQAP was undertaken and reported by the Council to the Department of Agriculture Environment and Rural Affairs (DAERA) as part of the Council's 2020 Air Quality Progress Report, submitted to DAERA in June 2020.

Whilst the previous AQAP delivered improvements in ambient air quality within our AQMAs and across the city, a limited number of transport related nitrogen dioxide ($NO_2$) hotspots remain. Moreover, fine particulate matter ($PM_{2.5}$) has emerged as an additional air pollutant of concern. Consequently, in 2021, the Council with partner organisations developed a new 5-year Air Quality Action Plan 2021-2026 for the city.

The aim of this new AQAP is to continue reducing emissions from transport sources and to promote and enable a shift onto more sustainable modes of transport to achieve compliance with the air quality objectives for nitrogen dioxide. In addition, the aim of the Plan is also to identify, develop and implement mitigation measures, where necessary, to address concentrations of $PM_{2.5}$ across the city.

A summary of mitigation measures proposed as part of the new AQAP is provided within Table 8.1. Belfast City Council will monitor implementation of the Air Quality Action Plan 2021-2026 via at least annual meetings of the Action Planning Steering Group and will report on its progress as part of Progress Reports and/or Annual Status Reports.

### Table 8.1 - Action Plan Progress

| No. | Measure | Category / Classification | Lead Authority | Description | Implementation Date | Estimated Completion Date | Air Quality Benefits | Progress to Date |
|---|---|---|---|---|---|---|---|---|
| 1. | Zero Emission Public Transport | Promoting Low Emission Transport / Public Vehicle Procurement | Translink | Introduce circa 100 new zero-emission buses to the Greater Belfast area. | Nov 2020 to April 2022 | Dec 2022 | Replaces circa 100 diesel buses with zero emission vehicles. | Roll out of 103 Zero Emission vehicles for the Belfast Metro has been completed. |
| 2. | Zero Emission Public Transport | Promoting Low Emission Transport / Public Vehicle Procurement | Translink | Develop Programme to decarbonise the bus fleet in the Greater Belfast area. | Nov 2022 to Dec 2025 | Dec 2030 | To remove all diesel buses in Belfast Metro and replace with a zero-emission fleet by 2030. | Zero Emission bus fleet replacement programme is on course for completion by 2030. Circa one third of all Belfast Metro services are operated by zero emission buses |
| 3. | Bus Fleet Improvement | Vehicle Fleet Efficiency / Vehicle Retrofitting Programmes | Translink | Through vehicle modification, deliver minimum Euro 6 emission standards for all buses and coaches operating in Belfast. | Oct 2020 to Dec 2022 | Dec 2022 | Significant reduction in NOx and particulate matter emissions. | Euro 6 emission upgrade project has been completed for Goldline services and the Belfast Metro. |
| 4. | Decarbonisation of the rail network | Promoting Low Emission Transport / Public Vehicle Procurement | Translink | Work ongoing on a feasibility assessment to decarbonise the rail network including the potential roll out of electrification, battery traction and hydrogen technologies. | Oct 2020 | Dec 2023 | Ultimately, zero emission on the rail network by 2040. | Rail technological road map is being considered and is due to be finalised by December 2023. |
| 5. | Future Ticketing System | Transport Planning and Infrastructure / Public Transport Improvements | Translink | Contactless payment on Metro / Glider. Account-based ticketing on all bus and rail services. | 2018 | 2024 | Provide greater ease of use, improved integration and best value for customers, thereby encouraging modal shift to public transport and a reduction in emissions from cars. | Contactless payment rolled out on Metro. Installation of infrastructure during 2023 to facilitate roll out of full account-based ticketing by the end of 2024. |
| 6. | Belfast Transport Hub | Transport Planning and | Translink | Major new multi-modal transport hub for Belfast. | Main works construction | 2025 | Provide a new integrated transport hub, | Enabling works complete. Main |

| No. | Measure | Category / Classification | Lead Authority | Description | Implementation Date | Estimated Completion Date | Air Quality Benefits | Progress to Date |
|---|---|---|---|---|---|---|---|---|
| | (Belfast Grand Central Station) | Infrastructure / Public Transport Improvements | | | commenced in Q1 2022. | | including facilities for active travel to encourage and facilitate increased modal shift towards sustainable transport. | construction works progressing on schedule and planned for completion in 2025. Associated railway works ongoing. |
| 7. | Promote Public Transport | Promoting Travel Alternatives / Other – Promoting Public Transport | Translink<br><br>All BCC stakeholders | Undertake engagement across companies, organisations and agencies to incentivise reduced use of the private car and greater use of public transport.<br>Provide information at our stations, on Personalised Travel Planning, Corporate Commuter Initiatives (CCIs), providing best value fares information and promotional activity to attract modal switch onto public transport.<br>Promote the use of low and zero emission buses with the development of new branding and messaging to highlight their benefits. | Nov 2020 | Ongoing | Modal shift from car use to public transport/active travel will reduce emissions. | Engagement ongoing throughout 2022 and 2023 to date across a broad range of stakeholders promoting benefits of public transport, encouraging active, sustainable travel and modal shift from the private car. Programme of Personalised Travel Planning, Best Value Fares and Corporate Commuter Initiatives delivered. Ongoing promotion during 2022 and 2023 of low and zero emission buses, including branding and marketing / communications campaigns. |
| 8. | Belfast Rapid Transit (BRT) Phase 2 | Transport Planning and Infrastructure / Public Transport Improvements | A Belfast Region City Deal (BRCD) Infrastructure project being | If confirmed, as part of final Belfast Region City Deal, advance the development of Phase 2 BRT – bus priority measures, enhanced facilities & new vehicles. One of 3 infrastructure projects being | TBC – depends on BRCD prioritisation | TBC – depends on BRCD prioritisation | The proposed BRT 2 route options appraisal, which launched for public consultation on 26 July 2021, encompasses the City Centre and Ormeau Road AQMA. | The preferred route for BRT2 was announced in October 22; along the Antrim Road in the north and along the Ormeau Road and Saintfield Road in the south, extending |

| No. | Measure | Category / Classification | Lead Authority | Description | Implementation Date | Estimated Completion Date | Air Quality Benefits | Progress to Date |
|-----|---------|---------------------------|----------------|-------------|---------------------|---------------------------|----------------------|------------------|
| | | | developed by DfI | taken forward by DfI as part of BRCD | | | BRT will have a beneficial impact on modal shift, traffic movements and direct pollution levels along the route. For example, the Glider vehicles are demonstrating a 90% reduction in $NO_2$ and particulate matter emissions relative to the oldest vehicles in the Metro fleet. | towards Glengormley and Carryduff, respectively. The announcement also noted that the existing G2 City Centre to Titanic Quarter Glider service will be extended to connect with Queen's University and the City Hospital. |
| 9. | Bus & Rail based Park & Ride / Interchange | Alternatives to Private Vehicle Use / Bus and Rail based Park & Ride | DfI Translink | 1500 additional Bus & Rail Park and Ride spaces by 2023 across NI.<br><br>Promotion of active travel links. | April 2018 | 2025 | Modal shift from car use to Public Transport / Active Travel will reduce GHG emissions. | Trooperslane opened in May 2022 (230 spaces). The Ballymartin extension opened in October 2022 (170 spaces). Translink is progressing work on Mossley West (320 spaces), Ballymena (390 spaces) with planned opening 2024, Moira (490 spaces) and Newtownards (450 spaces), with planned opening 2025. |
| 10. | Bus Route Improvements | Transport Planning and Infrastructure / Bus Route Improvements | DfI Translink | Bus priority on all key Metro corridors in Belfast equivalent to that provided on the BRT Glider corridors.<br><br>Bus stop 'balancing' to reduce stop/start. | April 2020 | March 2025 | By converting general traffic lanes to bus lanes, journey times are reduced and consequently fuel consumption and emissions are reduced. | The aim is to have bus priority measures introduced on routes to complement the roll-out of the zero-emission vehicles. Castlereagh Road extended bus lanes were delivered in March 2023. |

| No. | Measure | Category / Classification | Lead Authority | Description | Implementation Date | Estimated Completion Date | Air Quality Benefits | Progress to Date |
|-----|---------|---------------------------|----------------|-------------|---------------------|---------------------------|----------------------|------------------|
| | | | | | | | By better balancing the location and number of bus stops, dwell times are reduced, reducing idling, stop/start and associated emissions. | |
| 11. | Park and Ride | Alternatives to Private Vehicle Use / Bus and Rail based Park & Ride | DfI Translink | The current Park & Ride Strategic Delivery Programme aims to deliver circa 2,000 additional spaces by 2025 (dependent on budget allocation) | 2013 | 2025 | This extension to the programme will have positive impacts on improving air quality for Belfast by providing alternative transportation for commuters travelling into the city rather than relying upon the private car. | DfI progressing business cases for Comber, Downpatrick, Dungiven and Tillysburn park and rides. Delivery is dependent on statutory approvals and funding. |
| 12. | Improved walking and cycling connectivity to public transport interchanges | Transport Planning and Infrastructure / Other - Active Travel Network Improvements | DfI Translink | Enhance walking and cycling infrastructure to bus and rail stations, halts and Park and Ride sites. | 2021 | Ongoing | Improve infrastructure to make it easier and more attractive to walk and cycle to and from public transport interchanges, thereby reducing car usage and associated emissions. | Translink is working with key stakeholders to improve integration between Active Travel and Public Transport.<br><br>Secure cycle shelters have been introduced at some train stations. |
| 13. | Bicycle Strategy for NI<br><br>Belfast Cycling Network | Transport Planning and Infrastructure / Cycle Network | DfI Sustrans | The Bicycle Strategy will be followed with a Belfast Cycling Network to guide the development and operation of cycling infrastructure across the city for the next 10 years.<br><br>A public consultation on the draft Belfast Cycling Network was held in early 2017. A consultation report was published in 2018. | 2017 | Published June 2021 | Increased levels of cycling could reduce congestion, improved air quality, reduce noise pollution and contribute to a cleaner environment. | Delivery plan published in March 2022. The estimated cost is £100m over 10 years.<br><br>Cycle lane commenced in north Belfast. |

| No. | Measure | Category / Classification | Lead Authority | Description | Implementation Date | Estimated Completion Date | Air Quality Benefits | Progress to Date |
|---|---|---|---|---|---|---|---|---|
| 14. | Blue / Green Infrastructure Funding | Transport Planning and Infrastructure / Other – Blue and Green Infrastructure | DfI | Capital grant funding for Councils to construct greenways.<br><br>The following greenway projects have been allocated a grant over the 2020/21 and 2021/22 period:<br>- Lagan Gateway greenway (BCC)<br>- Forth Meadow greenway (BCC)<br>- Strathfoyle greenway (DC&SDC)<br>- Strabane North greenway (DC&SDC)<br>- Banbridge Riverside lighting (ACB&CBC) | 2020-2022 depending on available Budget allocation | March 2022 | Greenways have the potential to bring significant benefits to us all in terms of more physically active lifestyles, active travel, improved mental and physical health and wellbeing, social inclusion, tackling climate change, the strengthening of the local economy and tourism. | Strathfoyle Greenway is due to open officially in 2023.<br><br>Lagan Gateway Bridge opened in November 2021 and work is underway to complete greenway paths on the Annadale side of the bridge. A 'letter of offer' from the Department was issued in 2022/23 for the second phase of the Lagan Gateway.<br><br>Lighting on the urban section of the Comber Greenway was completed in April 2023.<br><br>Further letters of offer have been issued for Greenways in 2022/23 |
| 15. | Green Recovery | Traffic Management / Strategic Highway Improvements | DfI | Temporary reallocation of road space to aid social distancing and active travel:<br>- Pedestrianisation of Hill Street/Gordon Street<br>- Reallocation of parking spaces for extended footway use<br>- Pop-up cycle lanes to connect main hospitals for key workers – Dublin Road, Donegall Road and Grosvenor Road | 2020/21 | Ongoing | Increased levels of walking and cycling could reduce congestion, improved air quality, reduce noise pollution and contribute to a cleaner environment. | **Pedestrianisation of Hill Street / Gordon Street** – the Department is currently finalising the design for pedestrianisation of Hill Street / Gordon Street in preparation of the formal consultation that will take place in late 2023.<br><br>**Reallocation of parking spaces for** |

| No. | Measure | Category / Classification | Lead Authority | Description | Implementation Date | Estimated Completion Date | Air Quality Benefits | Progress to Date |
|-----|---------|--------------------------|----------------|-------------|---------------------|---------------------------|----------------------|------------------|
| | | | | | | | | **extended footway use** – the Department is currently carrying out a review of the reallocation of parking spaces for extended footways introduced during the Covid-19 recovery period. The points identified within the review will help to inform development of future permanent schemes within Belfast City Centre.<br><br>**Pop-up cycle lanes to connect main hospitals for key workers (Dublin Road, Donegall Road and Grosvenor Road)** - the Department has reviewed the use of pop-up cycle lanes and published its findings, which has shown support for the concept. Work is now being undertaken to develop designs suitable for taking forward to consultation with the intention of formalising the current arrangements. |

| No. | Measure | Category / Classification | Lead Authority | Description | Implementation Date | Estimated Completion Date | Air Quality Benefits | Progress to Date |
|---|---|---|---|---|---|---|---|---|
| 16. | Belfast Multi-Modal Transport Model | Traffic Management / Other | DfI | It is expected that the Multi-Modal Transport Model will be enhanced and updated as part of the development of the Belfast Metropolitan Transport Plan in conjunction with the Belfast City Council Local Development Plan. However, this is currently 'in abeyance' in light of the COVID emergency and the programming of work for the Transport Plans. A key use of the model will be in transport and land-use option generation and testing. The transport model will provide forecasts of traffic flows and speeds to enable the estimation of air quality using separate detailed atmospheric dispersion modelling software held by Belfast City Council. | 2022 | Ongoing | This model will provide the capability to estimate the likely changes in air quality arising from changes in population and employment (BCC Planning inputs) and different transport investment options (DfI). Note that the decision to develop this model is currently 'in abeyance' in light of the COVID pandemic and the continuing impact on travel patterns. | Update of the Belfast Multi-Modal Transport Model has progressed in line with the initial development of the Belfast Metropolitan Transport Plan from mid-2022 to the present date. As part of this progress, the Transport Model has been augmented with input supply and demand data and updated to a 2019 base year. Forecast growth data is currently being collated and integrated to allow for future scenarios to be modelled and tested as part of the Belfast Metropolitan Transport Plan. |
| 17. | Belfast Metropolitan Transport Plan (BMTP) | Transport Planning and Infrastructure / Other | DfI | A new BMTP will be prepared to integrate with the Belfast City Council LDP. The BMTP will assess total transport demands arising from planned developments and the achievement of a range of agreed objectives. The new BMTP will become the extant Transport Plan and will include a range of schemes covering road, rail, bus, cycling and pedestrian networks. Whilst the contents of the new BMTP cannot be assumed in | 2023 estimated in line with LDP programme | 2030 in line with LDP assumed | It is expected that the balance of measures in the BMTP will impact positively on ambient air quality. | Work on the BMTP has progressed during 2022 and 2023 in line with Local Development Plan (LDP) timetables. Key deliverables such as the Vision, Objectives and Guiding Principles have been produced. Progress has included wide council and stakeholder engagement with the aim to launch the project publicly in |

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| | | | | advance, it is expected to include substantial demand management measures to restrict the use of private cars in the city centre and for commuting purposes in particular. These measures are expected to complement and reinforce any measures delivered as part of the Belfast City Council Parking Strategy and Action Plan. | | | | summer 2023. Work on testing schemes, proposed measures and associated evaluation will progress across 2023 for the City Centre, with the wider Belfast Metropolitan Urban Area to follow. A draft of the first iteration of the BMTP, which will cover this area, is anticipated to be available in advance of the LDP Local Policies Plan publication for Belfast City Council.

Sustrans are working as a subcontractor with Atkins to deliver the cycling and walking plan for the Belfast Council Area. The study started with Belfast City Centre as a first phase. |
| 18. | Electric Vehicles | Promoting Low Emission Transport / Procuring Alternative Refuelling Infrastructure to Promote LEV, EV recharging, gas fuel recharging | DfI | DfI is assisting the current public charge point network operator as it seeks to replace approx. 60 charge points i.e. 30 charge posts and a further 5 Rapid charge points to upgrade and improve the reliability of the existing public network.<br>• Department officials are engaging with OZEV and the Energy Saving Trust | 2015 | Ongoing | There are significant benefits to both the environment and to the driver in the use of electric vehicles. | The Department established EV Infrastructure Task-Force, made up of stakeholders with an interest in this area, published an EV Infrastructure Action Plan in November 2022 which sets out 6 priority actions to be delivered |

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| | | | | (EST), who administer the On-street Residential Charge Point Scheme (ORCS), in particular, with reference to councils in Northern Ireland.<br>• As part of the work being carried out on the transport elements of the Executive Energy Strategy the Department is considering how to chart a pathway to support vehicle electrification and seek to address financial and non-financial barriers to the uptake of EVs in Northern Ireland, taking into account the wider UK policy, legislative and funding environment as part of a wider clean transport strategy.<br>The Department is developing a charging infrastructure plan, in partnership with key stakeholders from government, public, private and third sectors to develop the charging network. | | | | to improve EV charging infrastructure.<br><br>The Department along with DfT and other devolved administrations launched a consultation into the introduction of a Zero-Emission Vehicle (ZEV) Mandate, which will require manufacturers to sell annual quotas of cars and vans. The consultation closed on 24 May. |
| 19. | Lagan Pedestrian and Cycle Bridge | Transport Planning and Infrastructure / Cycle Network | A Belfast Region City Deal (BRCD) Infrastructure project being | If confirmed in the final Belfast Region City Deal, the proposed bridge, is one of 3 infrastructure projects being taken forward by DfI as part of BRCD. It will span the River Lagan from the Gasworks to the Ormeau Embankment | TBC – depends on BRCD prioritisation | TBC – depends on BRCD prioritisation | Increased levels of walking and cycling could reduce congestion, improve air quality, reduce noise pollution, and contribute to a cleaner environment. | An Outline Business Case has been approved, with planning permission and other statutory approvals in place. Technical consultants were appointed in October |

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| | | | developed by DfI | aiming to improve accessibility to the city centre for residents and communities east of the River Lagan. The Bridge also aims to encourage both people from the city centre and local communities to use Ormeau Park for recreational use. | | | | 2022 to complete the preliminary design, prepare procurement documents, and manage the procurement competition. The current programme suggests that a contract to complete the detailed design and construct the bridge could be awarded next year - 2024. Completing the work is then expected to take up to 24 months from contract award. |
| 20. | Promoting travel alternatives: Behavioural change programmes | Promoting Travel Alternatives / Promotion of Cycling, Walking, Schools and Workplace Travel Plans | PHA, DfI and DAERA, Belfast City Council, EU Interreg (delivered by Sustrans)  Cycling UK/ Sustrans/ European | Sustrans works in a range of settings:<br>• Schools with the Active School Travel Programme;<br>• Workplaces with the Leading the Way Programme;<br>• Communities – to promote walking and cycling as a mode of transport.<br>In addition:<br>• Active Travel Hub in CS Lewis Square, east Belfast and more recently Whiterock Community Centre in west Belfast – provides a base for range of interventions with community groups, individuals and workplaces. | Ongoing  2015  2016  2017  2018 | Ongoing - Currently all these programmes are underway, with a review of extension. | Changing people's travel habits – swapping the car for walking, cycling and public transport.  Active Travel Hubs are visible in the community to provide info & encourage travel alternatives. | Sustrans continue to deliver the Active School Travel Programme.  Active Travel Challenge - annual month-long initiative in June promotes all forms of sustainable transport – walking, cycling and public transport. The Challenge is delivered by Sustrans and partners with Translink and PHA  The PHA is working on a tender for a holistic active travel behavioural change |

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| | | | Cycling Federation<br><br>Sustrans | • Project to encourage walking and cycling in new Forthmeadow Greenway<br>• Applied to run Active Travel Hub at Cathedral Gardens<br><br>**Cycle-friendly Employer Accreditation Scheme** – Cycling UK run this in N. Ireland with support from Sustrans.<br><br>**Pedal Perks** cycling discount scheme offered by range of businesses to encourage cycling to premises. | 2017 | | Provide facilities to encourage active travel e.g. cycle parking; changing facilities; mileage incentives.<br><br>Incentivises active travel to shops and facilities. | programme covering the areas delivered by Sustrans.<br><br>Meanwhile, the workplaces programme continues in Belfast and Londonderry. The Cycle-Friendly Employer Scheme continues and is promoted by the 'Leading the Way' team.<br><br>The Communities' project is also on-going, supporting those living in deprived communities to travel actively. Whiterock Hub opened in March 2023. It is a Hub for this project.<br><br>An Active Travel Hub opened in Cathedral Gardens in October 2022. Its main focus is on students and staff at Ulster University campus. It is supported by BCC, the PHA and UU. Funding is only confirmed until September 2023 and so the long-term future of Hubs in Belfast is not secured. |

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| | | | | | | | | Pedal Perks has expanded to the North West where Sustrans is recruiting retailers to sign up.<br><br>DAERA's Air and Environmental Quality Team (AEQ) delivered Clean Air Day presentations to primary schools across NI in May/June 2022.<br><br>BCC also carries out an air quality awareness campaign every June as part of Clean Air Day . |
| 21. | Transport planning and infrastructure:<br><br>Build safe protected cycling infrastructure | Transport Planning and Infrastructure / Cycle Network | DfI<br>Sustrans | **Belfast Bike Life report** – produced every 2 years in collaboration with DfI. Provides evidence of support for cycling and progress to date, includes a public survey of attitudes to cycling.<br><br>**Belfast Cycling Network** – published in June 2021, the Strategy sets out government plans to develop cycle routes in Belfast. The Bicycle Strategy will be followed with a Cycling Network for Belfast to guide the development and operation of cycling infrastructure in the city for the next 10 years. A public | 2015<br>Latest Bike Life report published in March 2020<br><br><br><br>2017<br><br><br><br><br><br><br><br><br><br>Ongoing | Ongoing<br>Next report due Spring 2022<br><br><br><br><br>Report published June 2021<br><br><br><br><br><br><br><br><br>Ongoing | Safety is biggest barrier to people cycling. Traffic-free greenways enable more people to walk or cycle. Urban greenways used by commuters as well as leisure trips. | New Belfast report published in May. It is now known as the Walking and Cycling Index. Indicates that little infrastructure has been built in the past 2 years in Belfast.<br><br>The delivery of Greenways is being considered and DfI has engaged with Councils on this.<br><br>The Walking and Cycling Index is currently collating data and case studies for |

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| | | | | consultation on the draft Belfast Cycling Network was held in January 2017 and in early 2018, a consultation report was published.<br><br>**Safe Routes to School campaign** – to enable children to walk and cycle rather than being driven.<br><br>**Strategic plan for Greenways** – Paths for Everyone. Funding pot for Councils to develop greenways. Sustrans can assist Councils with community consultation and feasibility plans. | Part of Active School Travel Programme/ lobbying work<br><br>2016 | Ongoing | | Belfast. The 2023 report will be published in March 2024. A dashboard showing all of the cities across the UK involved in the index will be online from mid-June 2023, which will allow the general public / decision-makers to see and compare cities' progress. Sustrans will promote this.<br><br>Sustrans has called for DfI to improve safe routes to school - no progress to report.<br><br>Sustrans has offered to support DfI in delivering the Department's national greenways plan: Input into the prioritisation model, review schemes, technical advice, support to councils (knowledge sharing, provide examples of best practice). Nothing yet confirmed. |
| 22. | Traffic management | Traffic Management / Strategic Highways Improvements, reduction of | DfI Sustrans | Introduction of 20 mph speed limits<br><br>**School Streets** – closing area around schools to traffic. This is a proposed pilot scheme, | 2019 | Ongoing | As above, as we saw in lockdown less traffic encourages people to walk or cycle. Traffic restraint measures necessary to reduce | Schemes to reduce 'rat running', such as Low Traffic Neighbourhoods will be considered more fully in the Belfast Metropolitan Transport |

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| | speed limits, 20 mph zones | | | which has proved successful and popular in GB.<br><br>**Low Traffic Neighbourhoods** – implement car-free areas. | TBC | | volume of traffic and polluting vehicles. | Plan, which is being developed in conjunction with the Council's Local Policies Plans. |
| 23. | Dust monitoring | Other / Air Quality Monitoring and Assessment | Belfast Harbour Commissioners | Monitor particulate matter from bulk cargoes in Port operational areas of Belfast Harbour Estate and implement mitigation measures. | Commenced | Ongoing | Identify areas of high concentration for action. | Monitoring ongoing. High concentration areas identified. Operational controls in place. |
| 24. | AQ Modelling | Other / Air Quality Monitoring and Assessment | Belfast Harbour Commissioners | Complete Baseline Air Quality Modelling of the Belfast Harbour Estate. | Commenced | 2022 | Establish theoretical baseline & identify areas for attention. | Completed.<br><br>Baseline modelling completed. Further modelling via CACHE Net Zero Demonstration Project. |
| 25. | NO$_2$ Monitoring | Other / Air Quality Monitoring and Assessment | Belfast Harbour Commissioners | Conduct monthly diffusion tube monitoring of NO$_2$ at 18 sites within the Belfast Harbour Estate. | Commenced | Ongoing | Establish baseline of NO$_2$ levels & identify areas for attention. | Completed.<br><br>Monitoring ongoing & baseline established. Further modelling via CACHE Net Zero Demonstration Project. |
| 26. | Real Time AQ Monitoring stations | Other / Air Quality Monitoring and Assessment | Belfast Harbour Commissioners | Implement real time Air Quality Monitoring for air pollution at 5 locations within the Belfast Harbour Estate. | 2021 | Ongoing | Accessible Air Quality information/ potential link to SMART traffic controls. | Completed.<br><br>5 real time AQ sensors installed. Ongoing data validation for NO2 and PMs.<br><br>In addition, ongoing IoT AQ Sensors Project. Further modelling via CACHE Net Zero Demonstration Project. |

| No. | Measure | Category / Classification | Lead Authority | Description | Implementation Date | Estimated Completion Date | Air Quality Benefits | Progress to Date |
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| 27. | Strategy | Policy Guidance and Development Control/Other | Belfast Harbour Commissioners | Publish a Harbour Air Quality Strategy. | 2021 | 2021 | Public commitment to improve Air Quality. | Completion of AQ Strategy will be informed by CACHE Project outcomes. |
| 28. | Low/zero carbon fuels | Promoting Low Emission Transport / Company Vehicle Procurement | Belfast Harbour Commissioners | Replace the light vehicle fleet with electric/alternative fuels. | 2021 | 2025 | Reduced air emissions from vehicles. | Requirements re-assessed and procurement process underway. |
| 29. | EV Charging | Promoting Low Emission Transport / Procuring Alternative Refuelling Infrastructure to Promote LEV, EV recharging, gas fuel recharging | Belfast Harbour Commissioners | Work with tenants to encourage installation of EV charging points. | 2021 | 2025 | Reduced air emissions from vehicles. | Electricity supply network being reviewed in advance of further developments. |
| 30. | Car sharing | Alternatives to Private Vehicle Use / Car & Lift Sharing Schemes | Belfast Harbour Commissioners | Introduce a Car Sharing Scheme for tenants. | 2021 | Ongoing | Reduced air emissions from vehicles (subject to relaxation of Covid-19 restrictions). | Being considered as a part of Strategic Transport Master Plan. |
| 31. | Active Travel | Promoting Travel Alternatives / Promotion of cycling and walking | Belfast Harbour Commissioners | Encourage active travel, including walking and cycling to; from and within the estate for local journeys. | 2021 | Ongoing | Reduced air emissions from vehicles. | Being considered as a part of Strategic Transport Master Plan. |
| 32. | SMART traffic control | Traffic Management / Other | Belfast Harbour Commissioners | Queens Road Mobility project / SMART traffic system. | 2021 | 2023 | Reduced air emissions from vehicles. | Completed |
| 33. | Integrated commuter plans | Promoting Travel Alternatives / Workplace Travel Planning | Belfast Harbour Commissioners | Integrated commuter plans to reduce private car use including first and last mile connectivity. | 2022 | 2025 | Reduced air emissions from vehicles. | Being considered as a part of Strategic Transport Master Plan. |

| No. | Measure | Category / Classification | Lead Authority | Description | Implementation Date | Estimated Completion Date | Air Quality Benefits | Progress to Date |
|-----|---------|--------------------------|----------------|-------------|---------------------|---------------------------|----------------------|------------------|
| 34. | Cycle lanes | Transport Planning and Infrastructure / Cycle Network | Belfast Harbour Commissioners | Additional cycle lanes and crossing points. | 2020 | 2025 | Reduced air emissions from vehicles. | Improved cycle lanes on Airport Road and Sydenham Road. <br><br> No further expansion. |
| 35. | Green corridors | Transport Planning and Infrastructure / Other – Blue and Green Infrastructure | Belfast Harbour Commissioners | Introduce Green spaces and screening/corridors. | 2021 | 2025 | Absorb vehicle emissions. | Biodiversity Action Plan being updated to include expansion of screening and corridors. |
| 36. | Shore-side power | Promoting Low Emission Plant / Shift to installations using low emission fuels for stationary and mobile sources | Belfast Harbour Commissioners | Assess feasibility of shore power – cruise/ferry vessels. | 2021 | 2025 | Reduced air emissions from vessels. | Feasibility assessment continuing based on vessel operator requirements. |
| 37. | Decarbonise port cranes & HGV's | Promoting Low Emission Plant / Shift to installations using low emission fuels for stationary and mobile sources | Belfast Harbour Commissioners | Substitute hydrocarbon fuels with low carbon alternatives – cranes/plant & HGV's. | 2021 | 2025 | Reduced air emissions from port plant & equipment. | HVO implementation scheduled for land-based assets at Q4 2023. |
| 38. | Decarbonise work & pilot boats | Promoting Low Emission Plant / Shift to installations using low emission fuels for stationary and mobile sources | Belfast Harbour Commissioners | Trial alternative marine fuels - Work and Pilot Boats. | 2022 | 2025 | Reduced air emissions from vessels. | Being implemented (Q2). |
| 39. | Commercial incentive | Promoting Low Emission Plant / | Belfast Harbour | Assess feasibility of Clean Vessel Incentive Scheme. | 2022 | 2023 | Reduced air emissions from vessels. | Initial assessment carried out. No |

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| | | Other - Feasibility Study | Commissioners | | | | | immediate plans to implement it. |
| 40. | Ship planning | Other – Vessel Management | Belfast Harbour Commissioners | Optimise Vessel Passage Plans & Berth Utilisation. | 2020 | Ongoing | Reduced air emissions from vessels. | Completed. Port Management Information Systems (PMIS) in use. |
| 41. | Zero carbon vessel | Promoting Low Emission Plant / Shift to installations using low emission fuels for stationary and mobile sources. | Belfast Harbour Commissioners | Introduce electric/hybrid workboat. | 2021 | Ongoing | Reduced air emissions from vessels. | Collaboration with Artemis Technologies on development of electric foiling workboat. |
| 42. | Driver ECO Skills | Vehicle Fleet Efficiency / Driver Training and ECO Driving Aids | Belfast City Council | Driver ECO Training & Refresher Driver ECO Training & Monitoring by GPS. | From 2020/21 onward | Ongoing | Fuel consumption reduction. | All new Drivers are trained in ECO Driving as part of the induction process and refresher training is also carried out where deemed appropriate. |
| 43. | Promoting Cleaner commercial vehicles | Promoting Low Emission Transport / Company Vehicle Procurement-Prioritising uptake of low emission vehicles | Belfast City Council | Replacing older commercial EU3-4 vehicles above 3.5 ton with EU6 cleaner standard. | From 2020/21 onward | Ongoing | Emission level reduction. | We continue to replace EU3-EU4 above 3.5 tonne with EU6 cleaner standard vehicles. We replaced 22 vehicles in 2022/23 to EU6 standard and have planned to replace a further 23 vehicles in 2023/24 to EU6 standard.

From Jan 2023 200 vehicles have transitioned to HVO bio |

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| | | | | | | | | bulk fuel (50% of the fleet size) based at Duncrue Complex. In terms of HVO consumed this would equal approx. 80% of all fuel purchased.<br><br>FuelSense software fitted to EU6 RCVs to prevent harsh acceleration and enhance fuel efficiency |
| 44. | Vehicle Emission Testing | Vehicle Fleet Efficiency / Testing Vehicle Emissions | Belfast City Council | All fleet vehicles tested annually to manufacturers approved EU standard. | From 2020/21 onward | Ongoing | Ensuring vehicles meet their EU approved Standard. | All 281 vehicles in 2022/23 presented for their Annual GVC Test have passed their emission test criteria. |
| 45. | Promoting Electric Commercial panel vans | Promoting Low Emission Transport / Company Vehicle Procurement | Belfast City Council | Replacing older commercial panel vans up to 3.5 ton with Electric. | From 2020/21 onward | Ongoing | Reduction in the commercial panel van fleet carbon footprint. | Some 28 light vehicles under 3.5 tonne have been replaced with electric models up to 31-03-23. |
| 46. | Promoting Vehicle Electric Bin-lifts | Promoting Low Emission Transport / Company Vehicle Procurement | Belfast City Council | Replacing Refuse Collection Vehicles with rear electric bin-lifts. | From 2020/21 onward | Ongoing | Refuse Collection Vehicle fuel consumption reduction. | There are currently some 23 RCVs with rear OmniDEL rear electric twin bin-lifts. A further 5 are due to be received by 31-03-24. A further 30 RCVs with standard rear twin-bin lifts will be replaced with OmniDEL rear electric twin-bin lift models as and when capital funding becomes available |

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| 47. | Just Eat Belfast Bikes | Transport Planning and Infrastructure / Public Cycle Hire Scheme | Belfast City Council | Public Bike Scheme in City Centre – 300 bikes and 30 docking sites originally in 2015 in public places, including Titanic Quarter, the Gasworks, Queen's University and York Street. This has now increased to 47 docking stations. | | From 2015 onward | Ongoing | Cutting congestion and improving air quality. | Expansion plan approved; a further eight stations are being delivered currently. New contract will be going out for tender later this year. |
| 48. | Local Development Plan | Policy Guidance and Development Control / Other Policy | Belfast City Council | Number of planning permissions granted on zoned Open Space. Policy: OS1 | Belfast City Council Planning decisions and liaising with CNS. | From 2023 onwards | 2035 | To limit the net loss of zoned open space for uses other than those ancillary or compatible with open space use. | The LDP Plan Strategy was adopted on 2nd May 2023 and its policies will take effect from this date. Monitoring of the Plan Strategy is underway, and the outcomes will be published in an Annual Monitoring Report submitted to the Department for Infrastructure |
| | | | Belfast City Council | Number of planning permissions that secure Green and Blue Infrastructure improvements, including through Developer Agreements. Policy: SP8 GB1 | Belfast City Council through Major Planning decisions (BCC) and S76 Agreements. | | 2035 | 75% of major permissions contributing to G & B Infrastructure improvements. | |
| | | | Belfast City Council | The number of applications granted for renewable | BCC monitoring major planning | | 2035 | Increase in number of renewable energy schemes. | |

| No. | Measure | Category / Classification | Lead Authority | Description | | Implementation Date | Estimated Completion Date | Air Quality Benefits | Progress to Date |
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| | | | | energy development. Policy: ITU4 | decisions with Development Management | | | | |
| | | | Belfast City Council | Proportion of journeys by sustainable modes– active travel, bus rail & BRT. Policy: TRAN1 TRAN3 TRAN4 TRAN5 TRAN9 | Travel survey for Northern Ireland (TSNI) (DfI). | | 2035 | An increase in the proportion of journeys made by sustainable modes | |
| | | | Belfast City Council | Number of new dwellings permitted annually outside settlement limits. Policy: DC policies | Housing Monitor and Planning decisions (BCC). | | 2035 | To sustainably manage the number of new dwellings in the countryside. | |
| | | | Belfast City Council | Number of non-residential proposals permitted annually outside settlement limits. Policy: DC policies | Planning decisions (BCC). | | 2035 | To sustainably manage the amount of new non-residential development in the countryside. | |

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| 49. | Additional Air Quality Monitoring | Other / Air Quality Monitoring and Assessment | Belfast City Council | Additional $NO_2$ and PM Monitoring using Small Sensors and Diffusion Tube Technologies to assess air quality within Belfast City Council area. | Ongoing | Ongoing | To provide more detailed and real time information on pollution levels across the city. | Six small scale air quality sensors (Earthsense Zephyr) to monitor $NO_2$, $PM_{10}$ and $PM_{2.5}$ were installed in 2021 as part of the Detailed Air Quality Assessment Project. – as per measure 50 below. In addition, council officers continue to review air quality monitoring data, to determine where new diffusion tube or other sensors may need to be established to fill any monitoring information gaps. To date, an additional 12 $NO_2$ diffusion tubes have been located throughout the city since the end of 2021. The results are reported as part of the council's annual Progress or Updating and Screening Assessment Reports. |
| 50. | Detailed Air Quality Assessment for Fine Particulate Matter ($PM_{2.5}$) and Nitrogen Dioxide ($NO_2$) for the Belfast City Council area | Other / Air Quality Monitoring and Assessment | Belfast City Council/ DAERA | The purpose of this project is to generate, through the application of ambient monitoring and atmospheric dispersion modelling, detailed information on fine particulate matter ($PM_{2.5}$) and nitrogen dioxide ($NO_2$) concentrations within the city boundary in | February 2021 | March 2023 | The outcome of the modelling study may serve to assist in the development of mitigation policies and measures to better address $PM_{2.5}$ and $NO_2$ concentrations across the city. | The Detailed Assessment project was finalised in March 2023. Outcomes of the project are summarised and reported within this 2023 Progress Report. The various Detailed Assessment project |

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| | | | | order to ascertain whether UK air quality objectives, European Commission limit values or WHO guideline values are being achieved in relevant human health receptor locations. | | | | reports were considered by the People and Communities Committee at its meeting of 13th June 2023. |
| 51. | Enforcement within Smoke Control areas and education concerning the use of polluting fuels. | Other / Enforcement Charges and Public Awareness | Belfast City Council | Belfast City Council will undertake greater enforcement within the city's smoke control areas, and it will develop and deliver an awareness campaign to educate Belfast residents of the adverse air quality impacts of using polluting fuels within their homes. | Ongoing | Ongoing | Reduced smoke emissions and greater levels of compliance within Smoke Control Areas | Enforcement within Smoke Control Areas is continuously monitored. Belfast City Council also provides information on its website in relation to Smoke Control Areas within Belfast City.<br><br>An awareness campaign was carried out on 16th June 2022 (Clean Air Day), publicising Smoke Control Areas within Belfast, as well as other measures that individuals can take to improve ambient air quality in the city. The campaign also provided links to air quality information on the council's website.<br><br>A public information initiative concerning smoke control areas was delivered in |
| | | | | | Awareness Campaign August 2022 | Ongoing | Greater awareness about polluting fuels and their adverse ambient impacts on air quality. | |

| No. | Measure | Category / Classification | Lead Authority | Description | Implementation Date | Estimated Completion Date | Air Quality Benefits | Progress to Date |
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| | | | | | | | | autumn 2022 through the council's social and other media channels. |

# 9 Conclusions and Proposed Actions

## 9.1 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 2022.

Nevertheless, 2022 monitoring data for nitrogen dioxide confirms continuing exceedances of the annual mean objective for nitrogen dioxide within the M1 Motorway / A12 Westlink Air Quality Management Area at Henry Place, and a new annual mean exceedance at the M3 / M2 Motorway / A12 Westlink junction. Defra $NO_2$ distance calculations have been provided for the above locations to calculate expected concentrations at a relevant human health receptor locations.

The Diffusion Tube Processing Tool has predicted a nitrogen dioxide annual mean concentration of 30.3 µg/m$^3$ at Henry Place and 31.3 µg/m$^3$ at the M3 Motorway respectively, which indicates that no exceedances are likely at relevant human health receptor locations (Appendix A).

There were no other monitored exceedances of Air Quality Strategy objectives for nitrogen dioxide within the council area during 2022. In addition, 2022 was the third year when the annual mean objective was achieved at the Stockman's Lane AQMS. It is however acknowledged that the Covid-19 pandemic has had an extraordinary impact on the monitored 2020 and 2021 nitrogen dioxide annual mean concentrations. It is unclear at this stage what impact the Covid pandemic has had on 2022 data, but it is assumed that changing working habits and working locations may have contributed to the reduction of annual mean nitrogen dioxide concentrations. Also although the DfI traffic report for 2022 is not yet finalised, the indicative results suggest that traffic volumes for the whole of Northern Ireland still remain lower than in 2019, the pre-pandemic year.

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 the Stockman's Lane and Westlink/Roden Street sites, as summarised in Table 2.4, it can be seen that the number of exceedances of the hourly mean objective has substantially decreased over recent years, demonstrating compliance with the 200 µg/m$^3$ objective, not to be exceeded more than 18 times per year annum - since 2013. In fact, there have been no exceedances of the 1-hour mean standard of 200 µg/m$^3$ at either site since 2018. This is in keeping with the relationship between the nitrogen dioxide annual mean and 1-hour mean objectives, detailed within Section 7.97 of the August 2022 Defra LAQM.TG(22) guidance, which states that previous research carried out on behalf of Defra and the Devolved Administrations has identified that exceedances of the $NO_2$ 1-hour mean objective are unlikely to occur where the annual mean is below 60 µg/m$^3$. This assumption is considered valid and local authorities should therefore refer to it if where $NO_2$ 1-hour mean monitoring data is not available (typically if monitoring $NO_2$ using passive diffusion tubes).

Accordingly, it was recommended by Defra/DAERA within the 2022 Progress Report Appraisal Response (28th October 2022) that *the M1-Westlink AQMA could be amended to revoke the designation for the 1-hour mean $NO_2$ objective as compliance has been achieved for the past 5 years.* The council will consider this recommendation.

It was also recommended, within the above Appraisal Response, *to consider the revocation of the Cromac Street and Albertbridge Road AQMA due to continual compliance with $NO_2$ annual mean objective.*

The council will consider the above recommendation; however, we are aware that we should only consider the revocation of any AQMA following a minimum of three (ideally five) consecutive years of compliance. Also Technical Guidance (TG22) advices that compliance reached in 2020 may not be representative of long-term trend in pollutant concentrations due to the change in activity observed across the UK as a result of Covid-19 pandemic. Moreover, where $NO_2$ monitoring is completed using diffusion tubes, it is recommended that revocation of an AQMA should be considered following three

consecutive years of annual mean $NO_2$ concentrations being lower than 36 µg/m$^3$ (10% of the annual mean $NO_2$ objective). Consequently, as the diffusion tube located at Cromac Street recorded a $NO_2$ annual concentration of 36 µg/m$^3$ in 2019, we will consider the potential revocation of this AQMA when 2023 monitoring year is completed.

The nitrogen dioxide annual mean concentrations within the Ormeau Road AQMA, as presented within this report, remain significantly below the annual mean air quality objective. The council will consequently consider the potential revocation of the Ormeau Road Air Quality Management Area (AQMA) for exceedance of the nitrogen dioxide annual mean objective.

The council had previously liaised with the Department of Agriculture, Environment and Rural Affairs (DAERA) regarding the potential for revocation of the Ormeau Road AQMA. It has however since been agreed that as nitrogen dioxide annual mean monitoring data from the Ormeau Road monitoring site contributes to the derivation of the Draft Programme for Government Framework 2016 – 2021 Indicator 37: Improve air quality, this AQMA should remain in place over the short to medium term.

However, after a detailed review and assessment of 2022 data (post Covid-19) the council is planning to revisit the Ormeau Road AQMA potential revocation option with DAERA later this year.

Moreover, 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; even before Covid-19. 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 20 – 29 µg/m$^3$ since 2018, meaning that the nitrogen dioxide annual mean objective is being consistently achieved along the Upper Newtownards Road.

In addition, the Knock Road non-automatic roadside diffusion tube, located at the junction of the Upper Newtownards Road, Hawthornden Way and the Knock Road (worst case scenario location within this AQMA) has not recorded exceedances of the nitrogen dioxide annual mean objective since 2016. The 2017 calendar year was the first year when the annual mean concentration at the Knock Road junction fell below the air quality objective

(36 µg/m$^3$), which was still the case in 2022 (25.3 µg/m$^3$). Consequently, there have not been any exceedances of air quality objective (NO$_2$) identified within the Upper Newtownards Road AQMA for the last six years.

It is considered that the monitoring data in addition to the outcomes of the recently concluded 2023 Detailed Assessment for PM$_{10}$, PM$_{2.5}$ and NO$_2$ (Section 1.5), provide appropriate evidence to help inform decisions to potentially revoke the Air Quality Management Areas along the Ormeau Road and Upper Newtownards Road. We will liaise with DAERA concerning potential revocation of these AQMAs later this year.

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. We are however aware that pollution levels in recent years were atypical and very much impacted by Covid-19 restrictions and home working. The above-mentioned decreases in nitrogen dioxide annual mean concentrations are much greater than would have been predicted and so we will keep these results under review and follow Defra's advice when undertaking any future year projections for air pollution levels in Belfast that incorporate this data.

Finally, Belfast City Council confirms that no new Air Quality Management Areas need to be declared for the city at this time. There have been no monitored exceedances of Air Quality Strategy Objectives for any pollutant other than nitrogen dioxide over recent years across the city, and no significant new sources of air pollution have been identified, which would have the potential to alter this position.

## 9.2 Conclusions relating to New Local Developments

Of the planning applications received and reviewed during 2022, it is concluded that they would have no significant adverse impact on existing local air quality. In addition, no significant changes in local circumstances have been identified within Belfast, which would require detailed consideration. It is not considered necessary therefore to proceed to a 'Detailed Assessment' based on new local developments or potential sources.

## 9.3 Proposed Actions

In conclusion, this 2023 Progress Report has not identified the need to proceed to a Detailed Assessment for any pollutant under consideration.

Although the council was not required to proceed to a Detailed Assessment as a result of the outworkings of the 2022 review and assessment process, the council nevertheless elected to undertake a detailed assessment of ambient air quality for the city, for particulate matter ($PM_{10}$, $PM_{2.5}$) and nitrogen dioxide ($NO_2$) pollutants. This decision was based on recent evidence from national studies confirming that domestic solid fuel burning contributes more than previously thought to particulate emissions. The project also allowed the council to investigate fine particulate matter ($PM_{2.5}$) concentrations across the city as this pollutants is not currently in regulation for the purposes of local air quality management. The project detailed assessment commenced in February 2021 and was finalised earlier this year; its key outcomes are presented within this Progress Report in section 1.5.

Furthermore, Belfast City Council has already highlighted that it operates an expansive air quality monitoring network across the city, predominantly for nitrogen dioxide. In 2022, we added five more diffusion tubes to our monitoring network to provide additional nitrogen dioxide monitoring data across the city and in spring 2023, we added a further seven diffusion tubes to the network to address the outcomes of 2023 Detailed Assessment, and to confirm modelled $NO_2$ concentrations in the vicinity of our existing AQMAs.

On this basis, the council is content that current monitoring locations provide an appropriately detailed representation of pollution levels for the city and, as a consequence, we consider that the network does not to be expanded further at this time.

However, although the recently updated and strengthened WHO air quality guideline values are not legally binding in UK, based on their recommended guideline concentrations, there may be a need for additional monitoring, especially in relation to fine particulate matter ($PM_{2.5}$) and nitrogen dioxide ($NO_2$).

Moreover, as part of the council's ongoing Detailed Assessment project for fine particulate matter and nitrogen dioxide, five new monitoring locations, employing small sensor air

quality monitoring equipment, were installed in July 2021; providing a more detailed analyses of particulate matter and nitrogen dioxide concentrations across the city. The council took over ownership and operation of the monitors in May 2022. Later this year, we will determine whether to retain the monitors in their current locations for another year, or to relocate all or some of them to better assess $PM_{10}$, $PM_{2.5}$ and $NO_2$ concentrations at relevant human health receptor locations across the city.

To ensure that we continue to collect high quality data, in 2019/2020 Belfast City Council 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, was also upgraded to a new heated inlet instrument. The only analyser, which has not been yet replaced is the API Model 200E NOx analyser, located at Westlink/Roden Street site, which still continues to perform satisfactorily and remains supported by the manufacturer.

During 2022, we updated the communication system (including modems) to 4G at all four monitoring sites. Moreover, the T200 analysers at the Upper Newtownards Road, Stockman's Lane and Ormeau Road were converted over to operate NumaView software.

With regard to our four Air Quality Management Areas, a review of the monitoring data within the AQMAs and for the city indicates that there have been improvements in annual mean nitrogen dioxide levels across the city over recent years.

Moreover, a detailed assessment for the city, for particulate matter ($PM_{10}$, $PM_{2.5}$) and nitrogen dioxide ($NO_2$) pollutants was concluded earlier this year (March 2023). It is considered that the detailed atmospheric dispersion modelling, in addition to monitoring data, provides further evidence to help inform a decision on the potential revocation of our Air Quality Management Areas along the Ormeau Road and also the Upper Newtownards Road.

Accordingly, later this year the council will liaise with the Department of Agriculture, Environment and Rural Affairs, Department for Infrastructure and other relevant authority partners regarding these potential revocations.

In terms of forward actions, in 2021 the council, along with competent authority and other partner organisations across the city, developed a new 5-year Air Quality Action Plan for the Belfast that will cover the period 2021-2026. The Action Plan was approved by Defra's technical assessors and DAERA in February 2022 and is currently available on the council's website via the following weblink: https://www.belfastcity.gov.uk/Documents/Belfast-City-Air-Quality-Action-Plan-2021-2026

The primary aim of this new Air Quality Action Plan is to continue to reduce $NO_2$ emissions from transport sources and to promote and enable a shift towards more sustainable modes of transport in order to achieve compliance with UK Air Quality Objectives for $NO_2$. Where necessary, an additional aim of this Action Plan is to identify, develop and implement mitigation measures to address concentrations of fine particulate matter ($PM_{2.5}$) across the city.

Belfast City Council will continue to monitor implementation of the Air Quality Action Plan 2021-2026 via at least annual meetings of the Air Quality Action Planning Steering Group and will report progress to the Department of Agriculture, Environment and Rural Affairs (DAERA) via our various Action Plan Progress Reports or alternatively via Annual Status Reports, when they are introduced.

# 10 References

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Defra 'Workplace Analysis Scheme for Proficiency (WASP) $NO_2$ diffusion tubes proficiency tests'.

https://laqm.defra.gov.uk/air-quality/air-quality-assessment/qa-qc-framework/

Directive 2008/50/EC in respect of ambient air quality and cleaner air for Europe

https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32008L0050

Environment (Northern Ireland) Order 2002.

https://www.legislation.gov.uk/nisi/2002/3153/contents/made

DAERA Northern Ireland Air – Air Quality in Northern Ireland website

https://www.airqualityni.co.uk/

Earthsense - MyAir Portal.

EarthSense

# 11 Appendices

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

# Appendix A: QA/QC Data

## 11.1 QA/QC Diffusion Tube Monitoring

In 2022, Belfast City Council appointed Gradko International Ltd. 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.

Government provides an additional layer of surety for local authorities operating nitrogen dioxide diffusion tubes through the independent analytical proficiency-testing scheme, the AIR PT scheme.

AIR is an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). AIR PT is a new scheme, started in April 2014, which combined two long running PT schemes: LGC Standards STACKS PT scheme and HSL WASP PT scheme. As part of this scheme laboratories are provided with a number of test samples that are designed to test their proficiency in undertaking chemical analysis of diffusion tubes.

For the 2022 sampling period, Gradko's performance was assessed as follows:
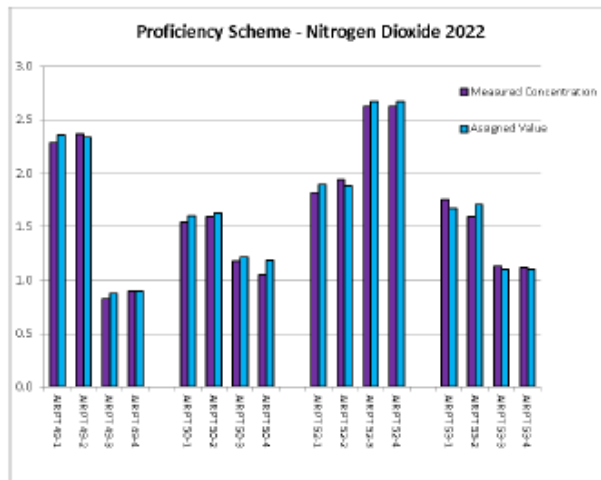
**gradko**
environmental

(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 2022

Methods: GLM 7 – CARY 60 Spectrophotometer

| AIR PT Proficiency Scheme - Nitrogen Dioxide 2022 | | | Procedure GLM 7 | | |
|---|---|---|---|---|---|
| Date | Round | Assigned value | Measured concentration | z-Score | % Bias |
| Feb-22 | AIR PT 49-1 | 2.36 | 2.29 | -0.4 | -3.0% |
| Feb-22 | AIR PT 49-2 | 2.34 | 2.37 | 0.2 | 1.3% |
| Feb-22 | AIR PT 49-3 | 0.88 | 0.83 | -0.65 | -5.7% |
| Feb-22 | AIR PT 49-4 | 0.9 | 0.9 | 0.0 | 0.0% |
| | | | | | |
| May-22 | AIR PT 50-1 | 1.6 | 1.54 | -0.5 | -3.8% |
| May-22 | AIR PT 50-2 | 1.63 | 1.59 | -0.29 | -2.5% |
| May-22 | AIR PT 50-3 | 1.22 | 1.18 | -0.44 | -3.3% |
| May-22 | AIR PT 50-4 | 1.19 | 1.05 | -1.48 | -11.8% |
| | | | | | |
| Aug-22 | AIR PT 52-1 | 1.90 | 1.82 | -0.56 | -4.2% |
| Aug-22 | AIR PT 52-2 | 1.88 | 1.94 | 0.43 | 3.2% |
| Aug-22 | AIR PT 52-3 | 2.67 | 2.63 | -0.2 | -1.5% |
| Aug-22 | AIR PT 52-4 | 2.67 | 2.63 | -0.2 | -1.5% |
| | | | | | |
| Oct-22 | AIR PT 53-1 | 1.67 | 1.75 | 0.64 | 4.8% |
| Oct-22 | AIR PT 53-2 | 1.71 | 1.59 | -0.94 | -7.0% |
| Oct-22 | AIR PT 53-3 | 1.1 | 1.13 | 0.36 | 2.7% |
| Oct-22 | AIR PT 53-4 | 1.1 | 1.12 | 0.24 | 1.8% |



Proficiency Scheme - Nitrogen Dioxide 2022

January 2023                                    Page 1of 1

The 2022 council's monitoring network comprises 76 diffusion tubes situated throughout the city at 68 locations. The monitoring has been completed in adherence with Defra's *Local Air Quality Management Technical Guidance document LAQM.TG(22)* and 2022 Defra's *Diffusion Tube Monitoring Calendar*.

### Diffusion Tube Annualisation

Guidance for the treatment of diffusion tube monitoring data, as provided in Table 2.6 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.TG22.

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.

Based on 2022 monitoring data, annualisation was required for four non-automatic diffusion tube monitoring sites: Ulster University, M3 Motorway, Springfield Road, and Lisburn Rd/Tates Ave Junction. All tubes were annualised using automatic monitoring results from Derry Rosemount and Ballymena Ballykeel automatic monitoring stations, both of which had >85% data capture.

### Table A.1 - Annualisation Summary for Diffusion Tubes

| Diffusion Tube ID | Annualisation Factor Ballymena Ballykeel | Annualisation Factor Derry Rosemount | Annualisation Factor Site 3 Name | Annualisation Factor Site 4 Name | Average Annualisation Factor | Raw Data Simple Annual Mean (µg/m3) | Annualised Data Simple Annual Mean (µg/m3) |
|---|---|---|---|---|---|---|---|
| 105 | 1.0923 | 1.0625 | | | 1.0774 | 34.2 | 36.8 |
| 106 | 1.0923 | 1.0625 | | | 1.0774 | 52.5 | 56.5 |
| 107 | 1.0923 | 1.0625 | | | 1.0774 | 23.9 | 25.7 |
| 108 | 1.0923 | 1.0625 | | | 1.0774 | 36.3 | 39.2 |

### Diffusion Tube Bias Adjustment Factors

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 2023 report, the monitoring data has been corrected using a local bias adjustment factor derived from the above four co-location studies.

The local bias adjustment factor was calculated using the Defra Diffusion Tube Processing Tool (with a 95% confidence interval as an estimate of the uncertainty on the bias adjustment factor). Calculations are presented within Table 2.6.

For those local authorities that do not wish or are unable to undertake a triplicate diffusion tube colocation study, government publishes a database of bias adjustment factors derived from other local authority co-location studies throughout the United Kingdom. These factors are used subsequently to calculate a combined bias adjustment factor for a range of nitrogen dioxide diffusion tube laboratories.

The latest factors were published in March 2023 and the derived bias adjustment factor for Gradko Laboratories for a 20% solution of triethanolamine was 0.83. This factor is only slightly higher than the council's 2022 locally derived bias adjustment factor of 0.81. The council therefore considered our locally derived factor as acceptable and of the good precision. Moreover, we have always used our own bias adjustment factors and we will therefore continue with the same methodology for consistency in results reporting.

Consequently, Belfast City Council has applied a local bias adjustment factor of 0.81 to the 2022 monitoring data. A summary of bias adjustment factors used by the Council over the past five years is presented in 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 2023 report, the monitoring data has been corrected using a local bias adjustment factor derived from the above four co-location studies.

The local bias adjustment factor was calculated using the Defra Diffusion Tube Processing Tool (with a 95% confidence interval as an estimate of the uncertainty on the bias adjustment factor). Calculations are presented within Table 2.6.

For those local authorities that do not wish or are unable to undertake a triplicate

diffusion tube colocation study, government publishes a database of bias adjustment factors derived from other local authority co-location studies throughout the United Kingdom. These factors are used subsequently to calculate a combined bias adjustment factor for a range of nitrogen dioxide diffusion tube laboratories.

The latest factors were published in March 2023 and the derived bias adjustment factor for Gradko Laboratories for a 20% solution of triethanolamine was 0.83. This factor is only slightly higher than the council's 2022 locally derived bias adjustment factor of 0.81. The council therefore considered our locally derived factor as acceptable and of the good precision.

### Table A.2 - Bias Adjustment Factor

| Year | Local or National | If National, Version of National Spreadsheet | Adjustment Factor |
|------|-------------------|---------------------------------------------|-------------------|
| 2022 | Local | - | 0.81 |
| 2021 | Local | - | 0.79 |
| 2020 | Local | - | 0.79 |
| 2019 | Local | - | 0.91 |
| 2018 | Local | - | 0.86 |

### NO$_2$ Fall-off with Distance from the Road

Only two annual mean exceedances occurred during 2022; Henry Place (42.0 µg/m$^3$) and at the location next to the M3 Motorway (45.8 µg/m$^3$). Both tubes are located at kerbside locations adjacent to arterial roadways. The Henry Place tube is located within the existing M1 Motorway / A12 Westlink Air Quality Management Area and has been the subject of mitigation measures for some time.

The M3 Motorway tube was added to the councils' monitoring network due to the introduction of new relevant human health exposure at a residential development; this new monitoring site is next to the dominant road transport pollution source and situated at a worst-case scenario location. It is anticipated though that when all of the development construction works are finalised later this year, this monitoring site can be moved from its current kerbside site to a roadside / façade location more reflective of actual human health exposure.

Nevertheless, Defra NO$_2$ distance calculations have been provided for the above locations to predict annual mean concentrations at relevant human health receptor locations.

The Diffusion Tube Processing Tool has predicted an annual mean concentration of 30.3 µg/m$^3$ at Henry Place) and 31.3 µg/m$^3$ at the M3 Motorway, which indicates that no exceedances are likely at these relevant human health receptor locations (Table A.3) during 2022.

Also, as distance correction should be considered at any monitoring site where the annual mean concentration is greater than 36 µg/m$^3$, and the monitoring site is not located at a point of relevant exposure, an additional diffusion tubes located at Stockman's Lane AQMS and Stockman's Lane Roundabout required distance correction during 2022.

A summary of the LAQM NO$_2$ fall-off with distance calculator is presented in Table A.3.

**Table A.3 - NO$_2$ Fall-off with Distance Inputs**

| Diffusion Tube ID | Distance (m) | | NO$_2$ Annual Mean Concentration (µg/m$^3$) | | |
|---|---|---|---|---|---|
| | Monitoring Site to Kerb | Receptor to Kerb | Bias Adjusted and Annualised | Background | Predicted at Receptor |
| 21, 22, 56 | 1.5 | 16.5 | 37.8 | 11.5 | 24.0 |
| 70 | 1.0 | 18.0 | 42.0 | 22.0 | 30.3 |
| 101 | 3.5 | 13.5 | 39.2 | 22.0 | 32.9 |
| 106 | 0.5 | 15.5 | 45.8 | 22.0 | 31.3 |

# 11.2 QA/QC of Automatic Monitoring

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.

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 operated 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 throughout 2022. In addition, data management support including data collection, scaling, reporting and ratification was provided by *AQDM.*

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.

Finally, in 2022 *NPL* provided quality assurance and quality control support for the council's monitoring equipment to ensure compliance with the requirements of the National Air Quality Strategy as detailed within the Defra Technical Guidance Document LAQM.TG(22). *NPL* staff visited our sites on a six-monthly basis and compared the performance of our analysers against a range of laboratory grade standards. *NPL* subsequently provided a series of calibration and scaling factors that were used to correct our 2022 automatic monitoring data.

Automatic data presented in this report relates to the calendar year (i.e. January – December). 2022 ratified data capture levels exceeded the Department's 75% data capture threshold for the calculation of annual statistics at all council sites.

## PM$_{10}$ and PM$_{2.5}$ Monitoring Adjustment

In relation to the 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.

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 a heated 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 1.035. It should be noted that the data presented on the Defra/Northern Ireland Air website and in this report has already been corrected to the reference equivalent.

## Automatic Monitoring Annualisation

All automatic monitoring locations within Belfast City Council recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data.

## NO$_2$ Fall-off with Distance from the Road

No automatic NO$_2$ monitoring locations within Belfast City Council required distance correction during 2022.

## Table A.4 - Local Bias Adjustment Calculations

| | Upper Newtownards Road AQMS | Westlink/Roden Street AQMS | Stockman's Lane AQMS | Lombard AQMS |
|---|---|---|---|---|
| | **STEP 3a Local Bias Adjustment Input 1** | **STEP 3b Local Bias Adjustment Input 2** | **STEP 3c Local Bias Adjustment Input 3** | **STEP 3d Local Bias Adjustment Input 4** |
| **Periods used to calculate bias** | 11 | 12 | 12 | 10 |
| **Bias Adjustment Factor A** | 0.88 (0.83 - 0.95) | 0.78 (0.74 - 0.82) | 0.78 (0.74 - 0.82) | 0.8 (0.75 - 0.85) |
| **Diffusion Tube Bias B** | 13%  (6% - 20%) | 28%  (22% - 34%) | 28%  (21% - 34%) | 25%  (17% - 33%) |
| | | | | |
| **Diffusion Tube Mean ($\mu g/m^3$)** | 24.0 | 35.6 | 46.7 | 26.7 |
| **Mean CV (Precision)** | 3.7% | 3.4% | 3.7% | 4.1% |
| | | | | |
| **Automatic Mean ($\mu g/m^3$)** | 21.2 | 27.8 | 36.5 | 21.3 |
| **Data Capture** | 97% | 99% | 99% | 93% |
| | | | | |
| **Adjusted Tube Mean ($\mu g/m^3$)** | 21  (20 - 23) | 28  (26 - 29) | 36  (35 - 38) | 21  (20 - 23) |

| | | | | |
|---|---|---|---|---|
| **Overall Diffusion Tube Precision** | Good Overall Precision | Good Overall Precision | Good Overall Precision | Good Overall Precision |
| **Overall Continuous Monitor Data Capture** | Good Overall Data Capture | Good Overall Data Capture | Good Overall Data Capture | Poor Overall Data Capture |

| | | |
|---|---|---|
| **Combined Local Bias Adjustment Factor** | 0.81 | *Warning - One or more Co-location studies has Poor Overall Continuous Monitor Dat* |

Notes:

A single local bias adjustment factor has been used to bias adjust the 2022 diffusion tube results.

e

# 11.3 QA/QC of non-LAQM Monitoring (Zephyr)

The council is aware that *Defra is funding the development of a Publicly Available Specification to standardise the use of low-cost sensors as standalone units or as part of a network and thus improve the reliability of their application, account for uncertainties and enable better integration with other measurements* (LAQM Technical Guidance (TG22)). Therefore, in the absence of this standardised QA/QC methodology the council officers followed the US Environment Protection Agency guidance *The Enhanced Air Sensor Guidebook* available on Defra's website https://uk-air.defra.gov.uk/research/aqeg/pollution-sensors.php, in consultation with Earthsense (Zephyr manufacturers) to develop a QA/QC methodology, ensuring that results were as robust as possible.

Prior to installation, the monitoring unit is tested by the manufacturer against EU reference analyser standards. Moreover, the Zephyr monitors recently obtained MCERTS Performance Standards as an Indicative Ambient Particulate Monitor, which gives additional confidence in the performance of the monitors.

A two-stage data scaling process has then been undertaken in the calculation of an annual mean. First, to account for any bias in the monitoring method, data were compared between the co-located Zephyr unit and the AURN Belfast Centre monitoring station, and an adjustment factor was obtained through linear regression analysis (example below).

**Figure A.1 - Stage 1 Scaling Calculation Example of Co-Located Zephyr and Belfast AURN Automatic Results**
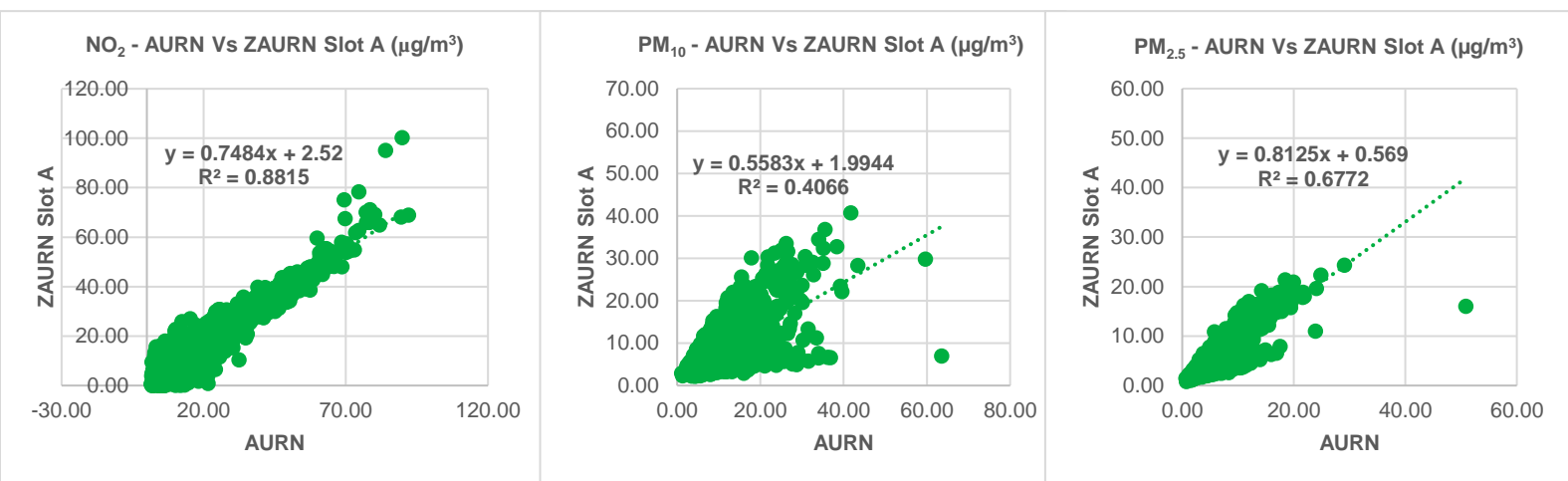
Then, to account for any variation in sensor cartridge response between locations, a second sensor cartridge, initially installed within the co-located zephyr unit at AURN Belfast Centre, was periodically moved between each of the sites to provide a second adjustment for sensor performance, again utilising the same linear regression methodology.

**Figure A.2 - Stage 2 Scaling Calculation Example Between Stage 1 Adjusted Zephyr Cartridge (A) and Static Cartridge (B) with Westlink Zephyr Data**
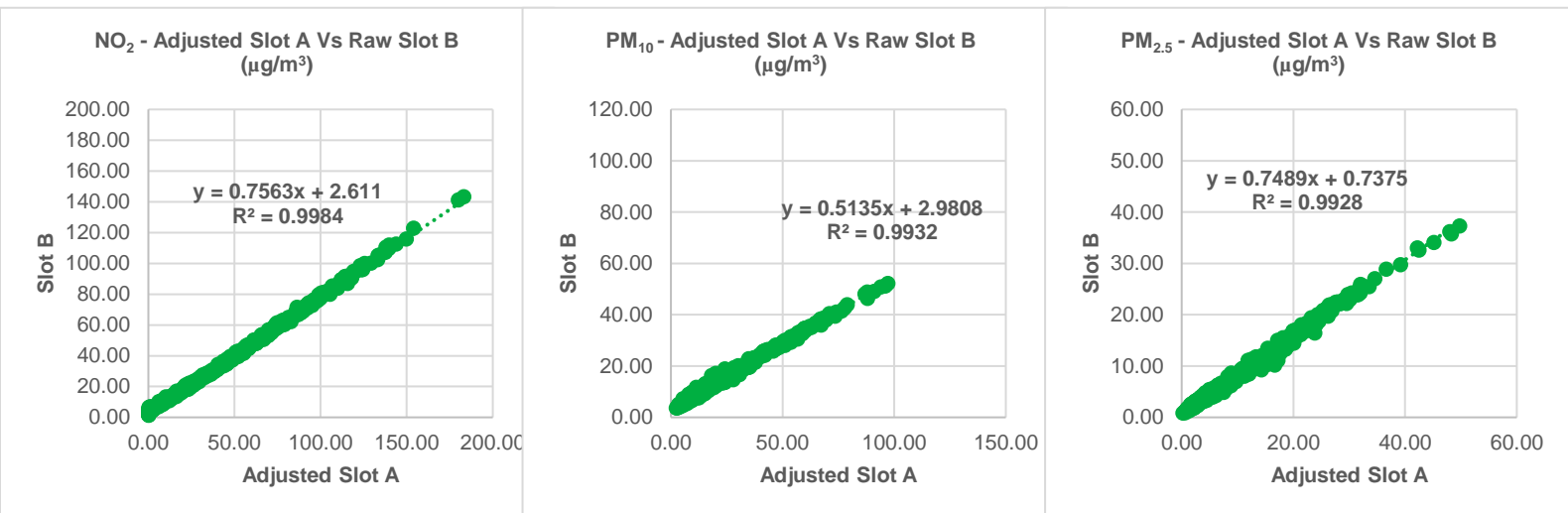


It should be noted that only Stage 1 scaling needed to be carried out with the co-located AURN zephyr, as results from Slot B could be directly compared and adjusted to the automatic station results for the entire year.