



Subject:	Update Report on the Detailed Assessment for Air Quality
Date:	13 th June 2023
Reporting Officer:	Siobhan Toland, Director of City Services, City & Neighbourhood Services Department
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Restricted Reports	
Is this report restricted?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
If Yes, when will the report become unrestricted?	
After Committee Decision	<input type="checkbox"/>
After Council Decision	<input type="checkbox"/>
Sometime in the future	<input type="checkbox"/>
Never	<input type="checkbox"/>

Call-in	
Is the decision eligible for Call-in?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

1.0	Purpose of Report or Summary of main Issues
1.1	At the People and Communities Committee meeting of 8 th October 2019, and upon consideration of agenda item 3b, ' <i>Local Air Quality Management Update for Belfast</i> ', the Committee agreed a proposal that the council would agree to look at undertaking a detailed air quality assessment for the city and to measure particulate matter (PM _{2.5}). The Committee additionally agreed to bring back a further report on how the Council might undertake such a detailed assessment, to include the measurement of PM _{2.5} .
1.2	A number of subsequent reports were provided to the People and Communities Committee as to how a detailed review and assessment for nitrogen dioxide (NO ₂) and fine particulate matter (PM _{2.5}) might be delivered for the city and on the basis of these reports, a competitive

	<p>European 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.</p>
1.3	<p>Aecom consultants were appointed by the council in early 2021 to deliver the detailed assessment project over an approximate 2-year period, with a final project report scheduled to be presented to the People and Communities Committee by the end of March 2023. The Committee will be aware that Aecom consultants attended a special meeting of the People and Communities Committee on 13th February 2023 in order to provide an overview of the key findings of the Detailed Assessment and to receive comments from the Committee.</p>
1.4	<p>The Aecom detailed assessment has therefore considered nitrogen dioxide (NO₂), particulate matter (PM₁₀) and fine particulate matter (PM_{2.5}) for the city and it has been undertaken in accordance with the provisions of Part III of the Environment (Northern Ireland) Order 2002 and of the Department for Environment, Food and Rural Affairs (Defra) Local Air Quality Management Technical Guidance (LAQM.TG22).</p>
1.5	<p>The detailed assessment has considered nitrogen dioxide (NO₂), particulate matter (PM₁₀) and fine particulate matter (PM_{2.5}) concentrations in terms of national and European air quality standards and objectives and having regard to the September 2021 World Health Organisation (WHO) Air Quality Guideline values. WHO has advised that the Air Quality Guidelines provide evidence-informed, non-binding recommendations for protecting public health from the adverse effects of air pollutants by eliminating or reducing exposure to hazardous air pollutants and by guiding national and local authorities in their risk management decisions.</p>
1.6	<p>The Committee is advised that fine particulate matter (PM_{2.5}) is not in regulation for the purposes of district council local air quality management statutory functions but it has nevertheless been proactively considered for the Belfast City Council area via this detailed assessment. By way of comparator, The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 have established an annual mean concentration target value for PM_{2.5} of 10 mg/m³ to be achieved by 31st December 2040.</p>
1.7	<p>The Committee is further advised that the detailed assessment project was completed at the end of March 2023 in accordance with the project timeline and tender schedule. This report serves therefore to provide a brief overview of the key outworkings and conclusions of the</p>

	detailed assessment to the People and Communities Committee and to seek permission to add the Detailed Assessment reports to the Member's Library.
2.0	Recommendations
2.1	The Committee is invited to: <ul style="list-style-type: none"> Note this covering report concerning the key outworkings and conclusions of the Aecom detailed assessment for nitrogen dioxide (NO₂), particulate matter (PM₁₀) and fine particulate matter (PM_{2.5}) for the Belfast City Council area and to agree that the detailed assessment project reports covering ambient monitoring, atmospheric dispersion modelling and a summary of the detailed assessment be added to the Members' Library.
2.2	The Committee is additionally invited to note that Air Quality Officers from the Scientific Unit, upon request, will provide Party Briefings on the Detailed Assessment.
3.0	Main report
	<u>Key Issues</u>
3.1	The Committee has been advised previously that the detailed assessment project comprises four main components; (i) additional ambient monitoring; (ii) development of an emissions inventory for Belfast; (iii) atmospheric dispersion modelling for the Belfast City Council area and (iv) provision of a final written summary report of the Detailed Assessment project for NO ₂ , PM ₁₀ and PM _{2.5} .
3.2	The detailed assessment has therefore been undertaken for a 2019 base year, in order to overcome the impacts of the Covid-19 pandemic on ambient air quality concentrations, and for a forward projection year of 2028. This approach reflects Defra and Institute of Air Quality Management Covid-19 guidance that for an air quality study that includes validation against monitoring data, 2019 monitoring data should be used as the last 'typical' air quality year.
3.3	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 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

	<p>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.</p>
3.3.1	<p>There were no monitored exceedances of the nitrogen dioxide 40 mg/m³ annual mean objective during 2019 at any Zephyr monitoring site, with the exception of the A12 Westlink site located adjacent to Henry Place (50.3 mg/m³). This site falls within the existing M1 Motorway / A12 Westlink corridor 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. There were no monitored exceedances of the nitrogen dioxide 200 mg/m³ 1-hour mean objective (18 exceedances permitted per annum).</p>
3.3.2	<p>There were no monitored exceedances of the PM₁₀ 40 mg/m³ annual mean objective at any Zephyr monitoring site during 2019 and no monitored exceedances of the PM₁₀ 50 mg/m³ 24-hour mean objective.</p>
3.3.3	<p>There were no monitored exceedances of the PM_{2.5} 20 mg/m³ annual mean objective / limit value at any Zephyr monitoring site during 2019.</p>
3.4	<p>Emissions inventory.</p> <p>An emissions inventory for Belfast was compiled by Aecom consultants and council Air Quality Officers covering nitrogen dioxide and particulate matter emission sources, including George Best Belfast City Airport, the 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.</p>
3.5	<p>Atmospheric dispersion modelling for the Belfast City Council area.</p> <p>Atmospheric dispersion modelling was undertaken by Aecom consultants for NO₂, PM₁₀ 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</p>

	<p>reflective of ambient conditions in the 2019 base year and the forward projection year of 2028.</p>
3.5.1	<p>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 areas of exceedance across the city.</p>
3.5.2	<p>2019 city-wide modelled nitrogen dioxide (NO₂) concentrations.</p> <p>Annual mean nitrogen dioxide concentrations for 2019 were predicted to be above the UK AQO level of 40 µg/m³ at 24 discrete sensitive receptor locations. All of these receptors are within or near to the boundaries of the existing Air Quality Management Areas (AQMA) 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 NO₂ 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 NO₂ concentrations below the AQO in these AQMA. Aecom's conclusions are consistent with those of the council concerning AQMA 3 and 4, as detailed within our 2022 Air Quality Progress Report. The 1-hour mean AQO of 200 µg/m³ was not predicted to be exceeded during 2019.</p>
3.5.3	<p>With the exception of the rural areas in the western part of the council's administrative area, predicted 2019 annual mean NO₂ concentrations throughout the city exceeded the much more stringent WHO AQG of 10 µg/m³. For the nitrogen dioxide 24-hour mean AQG of 25 µg/m³ (99th percentile, 3-4 exceedances per annum), Aecom have noted that monitoring results would suggest that the 24-hour mean NO₂ 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.</p>

<p>3.5.4</p> <p>3.5.5</p> <p>3.5.6</p> <p>3.5.7</p> <p>3.5.8</p> <p>3.5.9</p>	<p>2028 city-wide modelled nitrogen dioxide (NO₂) concentrations.</p> <p>For the future assessment year of 2028, predicted annual mean NO₂ concentrations are below the UK AQO of 40 µg/m³ at all locations of relevant exposure throughout the city, the highest annual mean concentration being around 31 µg/m³ in the vicinity of Stockmans Lane. The 1-hour mean AQO of 200 µg/m³ is not predicted to be exceeded during 2028.</p> <p>In comparison to the much more stringent WHO AQG for annual mean NO₂ concentrations of 10 µg/m³, most of the city centre and surrounding areas, particularly close to the major road network, are predicted to exceed this AQG in 2028.</p> <p>2019 city-wide modelled PM₁₀ concentrations.</p> <p>Annual mean PM₁₀ concentrations in 2019 were predicted to be well below the UK AQO level of 40 µg/m³ at all locations of relevant exposure throughout the city, with the highest concentration around 21 µg/m³. Similarly, the number of exceedances of the PM₁₀ 24-hour mean (50 µg/m³) were predicted to be well below the 35 permitted per annum.</p> <p>Annual mean PM₁₀ concentrations in 2019 exceeded the much more stringent WHO AQG for PM₁₀ of 15 µg/m³ 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 PM₁₀ concentrations alone were found to approach or exceed the WHO AQG level.</p> <p>2028 city-wide modelled PM₁₀ concentrations.</p> <p>For the future assessment year of 2028, predicted annual mean PM₁₀ concentrations are well below the UK AQO of 40 µg/m³ at locations of relevant exposure throughout the city. As previously, there are no predicted exceedances of the PM₁₀ 24-hour mean (50 µg/m³).</p> <p>Annual mean PM₁₀ concentrations in 2028 are predicted to exceed the much more stringent WHO AQG for PM₁₀ of 15 µg/m³ 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 PM₁₀ concentrations alone are found to approach or exceed the AQG level.</p>
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<p>3.5.10</p> <p>3.5.11</p> <p>3.5.12</p> <p>3.5.13</p> <p>3.6</p> <p>3.6.1</p>	<p>2019 city-wide modelled PM_{2.5} concentrations.</p> <p>There are no sensitive receptor locations where predicted 2019 annual mean PM_{2.5} concentrations were greater than the 20 µg/m³ limit value / objective.</p> <p>Compared with the much more stringent WHO annual mean PM_{2.5} AQG level of 5 µg/m³, all modelled receptors have predicted PM_{2.5} concentrations of 5 µg/m³ 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/m³, which itself exceeds the AQG level of 5 µg/m³.</p> <p>2028 city-wide modelled PM_{2.5} concentrations.</p> <p>There are no predicted 2028 annual mean PM_{2.5} concentrations greater than 20 µg/m³ and therefore unlikely to be any locations of exceedance of the UK annual mean PM_{2.5} AQO.</p> <p>Compared with the much more stringent WHO annual mean PM_{2.5} Air Quality Guideline level of 5 µg/m³, all 1,797 sensitive receptor locations have predicted concentrations of 5 µg/m³ 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/m³, which itself exceeds the AQG level of 5 µg/m³.</p> <p>2019 Source apportionment.</p> <p>Source apportionment studies for nitrogen dioxide (NO₂) for 2019 have 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.</p> <p>For PM₁₀, the regional background sector was the predominant contributor to 2019 annual mean PM₁₀ concentrations, accounting for more than 53% of the total modelled PM₁₀ 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 PM₁₀ concentrations in 2019. The other background sector, which includes all other local background sources of air pollution, accounted for approximately 11% to 12%.</p>
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3.6.2	<p>In 2019, the source apportionment for PM_{2.5} followed a similar pattern to PM₁₀. 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 also a significant contributor to ambient PM_{2.5} concentrations. The other background sector accounted for an estimated 8% to 11%.</p>
3.7	<p>2028 Source apportionment.</p> <p>For nitrogen dioxide, the predominant source sector contribution to 2028 annual mean NO₂ 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 NO_x emissions in some localities.</p>
3.7.1	<p>For PM₁₀, the primary contribution to 2028 annual mean PM₁₀ concentration for the receptors considered comes from the regional background, accounting for more than 50% of the total modelled PM₁₀ concentrations. The domestic background, which includes domestic, commercial and institutional space heating, is estimated to typically account for 15% to 20% of the total modelled PM₁₀ concentrations. The 'other background' sector, which includes all other local background sources of air pollution, accounts for approximately 11% to 12%.</p>
3.7.2	<p>The 2028 source apportionment for PM_{2.5} follows a similar pattern to that for PM₁₀. 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 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 also a significant contributor to ambient PM_{2.5} concentrations in 2028. The other background sector accounts for an estimated 8% to 11%.</p>

3.8	<p>Conclusions.</p> <p>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.</p>
3.8.1	<p>This Air Quality Action Plan (AQAP) has been produced as part of our statutory duties required by the Local Air Quality Management framework. It outlines the actions that the Council, our statutory partners and other city bodies or organisations will take to improve ambient air quality in Belfast during the years 2021-2026. This AQAP succeeds the previous Action Plan, which covered the period 2015-2020. The Air Quality Action Plan contains mitigation measures to be implemented by the Council and its partner organisations which includes Department of Agriculture, Environment and Rural Affairs (DAERA); Department for Infrastructure (DfI), Belfast Planning Service, Translink, Sustrans and Belfast Harbour Commissioners. Such measures include sustainable transport measures, improved cycling infrastructure etc</p>
3.8.2	<p>For PM₁₀ and PM_{2.5}, Aecom have recommended that targeted actions to reduce public exposure to PM₁₀ 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. Source apportionment calculations indicate that targeting the domestic background sector with alternative sustainable heating systems, will also have benefits in terms of reducing NO₂ concentrations. DAERA have been informed of the outworking's of this report and they have advised that they continue to work on the Air Quality Strategy for Northern Ireland which will seek to address how air quality can be managed and improved through future policy and/or legislative changes.</p>
3.9	<p><u>Financial & Resource Implications</u></p> <p>The Committee is advised that funding to support delivery of this detailed assessment project has been provided by DAERA during the 2020-2021, 2021-2022 and 2022-2023 Local Air Quality Management grant years. Moreover, management of the detailed assessment project</p>

3.10	<p>and technical air quality contributions were provided by Air Quality Officers from the council's Scientific Unit.</p> <p><u>Equality or Good Relations Implications /Rural Needs Assessments</u></p> <p>None.</p>
4.0	Appendices – Documents Attached
	<p>Appendix 1 - Belfast Detailed Assessment Part A Air Quality Monitoring Report</p> <p>Appendix 2 - LAQM Detailed Assessment Report Part B – Modelling</p> <p>Appendix 3 - LAQM Detailed Assessment Report - Summary Report</p>