

Air Quality Investigation Improvement Report

Case Reference IESS.21.013

September 2022

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1. Executive Summary and Key Findings

1.1 In March 2021, the European Court of Justice (ECJ) judged that, across the UK, breaches of air quality limit values¹ for nitrogen dioxide (NO₂) had been ‘systematic and persistent’ between 2010 and 2017. As a result of this judgment, and given that air quality policy and legislation in Scotland is devolved, Environmental Standards Scotland (ESS) decided to assess the issue. This involved examining the background to the ECJ’s decision, the attempts made to achieve compliance and the regulatory system for air quality.

1.2 The outcome of this work demonstrated:

- a long and protracted history of attempting to meet air quality limit values;
- a complex regulatory landscape; and
- uncertainty as to whether air quality limit values will be met in the future, especially given the longer term European Union programme of reducing limit values further and the Scottish Government’s commitment to ‘keeping pace’ with developments emanating from Europe².

1.3 Given this context, ESS decided to investigate the arrangements in place to achieve compliance with statutory limits for NO₂.

1.4 The investigation has found a number of areas where the system of management of local air quality can be improved. These areas concern the timeframes over which local air quality objectives³ should be met and the rules surrounding the plans to achieve this. ESS also considered that the governance and oversight arrangements are overly complex and opaque.

¹ Air quality limit values are legally binding limits for concentrations in outdoor air of major air pollutants that affect public health such as NO₂ and particulate matter (PM₁₀ and PM_{2.5}). These limits are based on scientific assessments of the risks to human health associated with exposure to the pollutants.

² [Scotland's future and our place in Europe - Protecting Scotland's Future: the Government's Programme for Scotland 2019-2020 - gov.scot \(www.gov.scot\)](https://www.gov.scot/publications/scotland's-future-and-our-place-in-europe-protecting-scotland's-future-the-government's-programme-for-scotland-2019-2020/pages/122.aspx)

³ Objectives are policy targets derived from the standards and are a compromise between what is desirable purely on health grounds and what is practical in terms of feasibility and costs. Generally expressed in terms of a target date on which exceedances of a standard must not exceed a specified number.

1.5 In view of the above, ESS has issued this improvement report to Scottish Ministers recommending a set of measures that should be taken to strengthen the effectiveness of the law underpinning the systems in place to improve air quality.

1.6 In summary, the recommended measures will require local authorities to:

- complete and publish air quality action plans within a specified target date after an air quality management area has been declared;
- achieve air quality action plan objectives within a specified target date; and
- review air quality action plans and update, where necessary.

1.7 Further recommendations require the Scottish Government to:

- identify or introduce an appropriate monitoring body;
- critically analyse the protocols surrounding the siting of monitoring stations and data provision; and
- revise its most recent air quality strategy to include specific and measurable timescales for reaching compliance.

1.8 This report has been laid in the Scottish Parliament and Scottish Ministers must respond to it by preparing and submitting an improvement plan to the Scottish Parliament.

2. The Role of ESS

2.1 ESS was established under the UK Withdrawal from the European Union (Continuity) (Scotland) Act 2021 (“the Continuity Act”) to fill the environmental governance gap caused by the UK’s departure from the European Union. ESS is an independent body, accountable to the Scottish Parliament. The role of ESS is to ensure there is effective scrutiny of public authorities’ compliance with environmental law, alongside the effectiveness of environmental law and the way it is being implemented and applied in Scotland. ESS may investigate matters in response to concerns brought to its attention (known as representations) or on its own initiative.

2.2 ESS’ remit covers a broad range of environmental law, including all aspects of environmental protection and harm, particularly in relation to human beings and their enjoyment of the environment. All public authorities, including the Scottish Government and its agencies, as well organisations carrying out functions of a public nature, fall within the remit of ESS. Public authorities are under a duty to cooperate with and assist ESS, and to try to swiftly resolve any matters that ESS raises with them. The Continuity Act provides ESS with powers to:

- issue an information notice requiring a public authority to provide ESS with any information ESS requires to carry out its functions;
- issue a compliance notice requiring a public authority to take the steps specified in the notice to address its failure to comply with environmental law (and to prevent that failure and the environmental harm associated with it from being repeated in the future);
- issue an improvement report where ESS considers that the actions of a public authority has failed to comply with environmental law, make effective environmental law, or implement or apply environmental law effectively;
- make an application for judicial review (or apply to the court for permission to intervene in civil proceedings) where ESS considers that the conduct of a public authority constitutes a “serious” failure to comply with environmental law and it is necessary to prevent, or mitigate, “serious” environmental harm; and
- make recommendations in relation to any matter relevant to ESS’ functions.

3. Public Health Effects of Poor Air Quality

3.1 Air quality concerns the level of pollution in the air. Poor air quality can cause harm to both the environment and human health and is widely recognised as being the largest environmental risk to public health in the UK⁴.

3.2 Air pollution results from the introduction or atmospheric production of a wide range of substances (pollutants) into the atmosphere from natural and man-made sources, from both local and transboundary origins. The pollutants of legislative focus include gases such as NO₂, sulphur dioxide (SO₂), ground-level ozone (O₃), and particulate matter (PM₁₀ and PM_{2.5}). These pollutants are introduced directly into the air through activities such as demolition, construction, industry, transport and combustion processes (including biomass), or indirectly by chemical reactions between individual pollutants in the atmosphere (as is the case for ground-level O₃). The contribution of each source on local pollution levels can vary significantly from year to year and in some cases seasonally depending on the interplay of local industrial processes, density and age of road transport and meteorological conditions⁵. In the UK, road transport remains the main source of poor air quality (specifically NO₂ and PM) within urban areas⁶.

3.3 Poor air quality has been associated with a range of harmful health effects, including an increased incidence of cardiovascular disease and exacerbation of the symptoms of those with pre-existing heart and lung conditions, such as asthma⁷. Following the tragic death of nine-year-old Ella Adoo-Kissi-Debrah, in 2021 the Coroner ruled that exposure to excessive air pollution from traffic sources (which included NO₂) was a contributory cause of her illness and death⁸. This was the first time that a Coroner had made such a UK finding. There is also growing evidence associating air pollution with other health conditions such as dementia, diabetes and adverse pregnancy outcomes⁹. Air pollution has been characterised by the World Health Organisation (WHO) as a “silent and invisible killer”¹⁰.

⁴ [Health matters: air pollution - GOV.UK \(www.gov.uk\)](https://www.gov.uk)

⁵ [Sources of air pollution — European Environment Agency \(europa.eu\)](https://europeanenvironmentagency.europa.eu)

⁶ [GB IIR 2022 FINAL MASTER \(defra.gov.uk\)](https://defra.gov.uk)

⁷ [PHE-CRCE-010 \(publishing.service.gov.uk\)](https://publishing.service.gov.uk)

⁸ [Ella Kissi-Debrah | Courts and Tribunals Judiciary, Inquest touching the death of Ella Roberta Adoo Kissi-Debrah | London Inner South Coroner's Court \(innersouthlondoncoroner.org.uk\)](https://innersouthlondoncoroner.org.uk)

⁹ [Cleaner air for Scotland: the road to a healthier future - gov.scot \(www.gov.scot\)](https://www.gov.scot)

¹⁰ [Air pollution the invisible killer \(thriveglobal.com\)](https://thriveglobal.com)

- 3.4 It is widely recognised that long-term exposure to air pollution has significant effects on public health. However, short-term 'high pollution' episodes can also have a profound impact especially on vulnerable individuals such as those with pre-existing medical conditions, pregnant women, babies and young children with developing organs and immune systems.
- 3.5 A report published in 2010 by the Committee of Medical Effects of Air Pollution (COMEAP) estimated that the impact of air pollution on public health in the UK is equivalent to 29,000 premature deaths, or the shortening of life by an average of 6 months¹¹. Poor air quality is estimated to contribute to approximately 2,000 premature deaths and a loss of 22,500 life years in Scotland.
- 3.6 In addition, significant evidence of health impacts of long-term exposure to lower levels of ambient air pollution (i.e. living near highly congested roads in urban areas) has been reported in a number of studies. For example, a modelling study¹² reported convincing evidence for a link between long-term exposure to air pollutants (NO₂) and particulate matter (PM) and respiratory hospital admissions in Lothian and Glasgow. Similar results have since been reported for Dundee and Perth¹³. Although these studies relate to hospital admissions, poor respiratory health can contribute to other serious diseases, therefore the true health and environmental impacts to which air pollution contributes is likely to be underestimated.
- 3.7 Increasing studies suggest that NO₂ and other air pollutants, are 'non-threshold pollutants'¹⁴ indicating that negative health effects are experienced at concentrations below the WHO standards and existing EU limit values and national ambient air quality objectives.

¹¹ [COMEAP mortality effects of long term exposure to particulate air pollution \(publishing.service.gov.uk\)](https://publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/431122/COMEAP_mortality_effects_of_long_term_exposure_to_particulate_air_pollution.pdf)

¹² [Air pollution and health in Scotland: a multicity study | Biostatistics | Oxford Academic \(oup.com\)](https://academic.oup.com/biostatistics/article/doi/10.1093/biostatistics/xz001/5511111)

¹³ [Study links air pollution to hospital visits | REHIS](https://www.rehis.org.uk/news/study-links-air-pollution-to-hospital-visits)

¹⁴ [REVIHAAP Final technical report final version \(who.int\)](https://www.who.int/publications/i/item/9789241501034)

4. Background to the ECJ Judgment

4.1 Although the ECJ's judgment was delivered in 2021, the judgement related to the UK's attempts to comply with the requirements of relevant European legislation over the period 2010 to 2017. During this period, the UK's plans in this connection were subject to domestic legal challenge, and were found by the Courts to be flawed or unlawful. This section sets out the background and history of these challenges, and the resulting developments.

4.2 In September 2011, the UK submitted air quality plans for some 40 zones (including zones in Scotland) where NO₂ limits had been exceeded during 2010. The lawfulness of these plans were challenged before the United Kingdom Supreme Court (UKSC) by the non-governmental organisation ClientEarth¹⁵. The Secretary of State had accepted that the UK was in breach of the Air Quality Directive's mandatory limits in a number of zones and agglomerations across the UK and projected that compliance would not be achieved until as late as 2025 in some cases. ClientEarth argued that, given this, the Secretary of State was obliged to apply for a time extension under Article 22 of the Air Quality Directive, which would need to include a clear plan on how compliance would be achieved by 2015. One of the questions raised in the case was the extent of the national and European authorities' involvement in the enforcement of the Air Quality Directive. The UKSC granted the declaration sought by ClientEarth to the effect that the UK was in breach of Article 13 of the Air Quality Directive¹⁶ to meet limit values¹⁷, that breach having been 'clearly established'. The Court also made clear that the way was open to immediate enforcement action at both national and European level. The Court did, however, stay the proceedings to make a reference to the ECJ concerning the obligations of Member States to seek postponement and what remedies were required by EU law to be provided by a national court in order to comply with the Air Quality Directive.

¹⁵ [R \(on the application of ClientEarth\) \(Appellant\) v Secretary of State for the Environment, Food and Rural Affairs \(Respondent\) \(supremecourt.uk\)](#) – NB This judgement begins at page 15 of the document.

¹⁶ Article 13 requires Member States to ensure that, throughout their zones and agglomerations, pollutant levels in ambient air do not exceed the limit values as set out in Annex XI of the Air Quality Directive.

¹⁷ The Air Quality Directive sets two limit values for NO₂ for the protection of human health: the NO₂ hourly mean value may not exceed **200** µg/m³ more than **18 times in a year** and the NO₂ **annual mean** value may not exceed **40** µg/m³.

4.3 The Court observed that the Air Quality Directive provided that limit values "may not be exceeded", which amounted to an obligation to achieve a certain result and the postponement of the original deadline of 2010 was possible only where, notwithstanding the implementation of appropriate pollution abatement measures, acute compliance problems existed. In those circumstances the Court said that, in order to be able to postpone (by a maximum of five years) the deadline specified by the Directive, a Member State was required to make an application for postponement when it was objectively apparent, having regard to existing data, and notwithstanding the implementation by that Member State of appropriate pollution abatement measures, that conformity with those values could not be achieved in a given zone or agglomeration by the specified deadline. The Court said that the Air Quality Directive did not contain any exception to that obligation.

4.4 The Court explained that, where the limit values for NO₂ were exceeded after the deadline set and no application for postponement had been submitted, Member States were required to establish an air quality plan that set out appropriate measures so that the period during which the limit values were exceeded could be **kept as short as possible**. The Court noted that the mere fact that such a plan had been established did not mean that the Member State concerned had entirely satisfied its obligations under the Directive. The Court also noted that, where a Member State had not complied with the limit values and had not applied for a postponement of the deadline in accordance with the prescribed conditions, it was for the competent national court to take any necessary measure, such as an order in the appropriate terms. This was so that the authority established the plan required by the Directive to ensure, in particular, that the period during which the limit values were exceeded was as short as possible.

4.5 The effect of the judgement was that national courts of Member States were able to order governments to produce plans which achieved compliance with NO₂ legal limit values in as short a time as possible.

¹⁸ [CURIA - Documents \(europa.eu\)](http://eur-lex.europa.eu/curia/doclist/curia.do?method=DoclistDocView&docid=62014CJ0203)

UKSC judgment issued 29 April 2015¹⁹

4.6 Following the ECJ judgment, the UKSC issued an order requiring the Secretary of State to prepare, in accordance with Article 23(1) of the Air Quality Directive, new air quality plans in respect of the relevant zones, according to a defined timetable, which was to be submitted to the European Commission no later than 31 December 2015. The UKSC stated:

“The critical breach is of Article 13, not of Article 22 or 23, which are supplementary in nature. The ECJ judgment, supported by the Commission’s observations, leaves no doubt as to the seriousness of the breach, which has been continuing for more than five years, nor as to the responsibility of the national court for securing compliance.

... The new Government, whatever its political complexion, should be left in no doubt as to the need for immediate action to address this issue. The only realistic way to achieve this is a mandatory order requiring new plans complying with Article 23(1) to be prepared within a defined timetable.”

High Court judgement ClientEarth v Department for Environment, Food and Rural Affairs (Defra) 2/11/2016²⁰

4.7 In 2016, ClientEarth brought a claim before the High Court of Justice on the ground that the 2015 plans²¹, which had been drawn up following the UKSC judgement, breached Article 23(1) of the Air Quality Directive. The Court held that:

- the proper construction of Article 23 meant that the Secretary of State must aim to achieve compliance by the **soonest date possible**, that the Secretary of State must choose a route to that objective which reduces exposure as quickly as possible, and that the Secretary of State must take steps which mean meeting the value limits **is not just possible, but likely**;

¹⁹ [R \(on the application of ClientEarth\) \(Appellant\) v Secretary of State for the Environment, Food and Rural Affairs \(Respondent\) \(supremecourt.uk\)](http://supremecourt.uk)

²⁰ [Microsoft Word - ClientEarth v SSEnvironFoodRuralAffairs Judgment FINAL.doc \(judiciary.uk\)](#)

²¹ [\[Withdrawn\] Air quality in the UK: plan to reduce nitrogen dioxide emissions \(2015\) - GOV.UK \(www.gov.uk\)](http://www.gov.uk)

- the Secretary of State fell into error in fixing on a projected compliance date of 2020 (and 2025 for London); and
- the Secretary of State fell into error by adopting too optimistic a model for future emissions.

4.8 The Court declared that the 2015 plan failed to comply with Article 23(1) of the Directive and Regulation 26(2) of the Air Quality Standards Regulations 2010 and quashed the plan. The Court ordered that new plans were to be published by 24 April 2017 and notified to the Commission by 31 July 2017 at the latest.

High Court judgment ClientEarth v Defra 21/02/2018²²

4.9 As a consequence of the High Court judgement, on 26 July 2017 Defra published the ‘UK plan for tackling roadside NO₂ concentrations’²³ and associated documents, which was the third attempt by the UK Government to provide an air quality plan that met its obligations in law. ClientEarth again challenged the plans in the High Court. The Court held:

‘... The obligation placed on Member States by Article 23 is to ensure that air quality plans are established; the competent authority in the UK for the purposes of the [Air Quality Directive] is the Secretary of State (see Regulation 3 of the English Regulations²⁴); and polite letters from the Government urging additional steps by individual local authorities are not enough. Whilst I see no obligation on the Secretary of State to impose legal directions on local authorities covering every stage in the process of achieving compliance, in my view the failure to make mandatory any step in the case of the 45 [local authority areas] means that the Government cannot show either that it is taking steps to “ensure” compliance or, as a result, that compliance is “likely”.

It follows that the 2017 Plan, in its application to the 45 local authority areas, does not contain measures sufficient to ensure substantive compliance with the [Air Quality Directive] and the English Regulations.

²² [Microsoft Word - clientearth-\(no3\)-final-judgmentdocx.docx \(judiciary.uk\)](#)

²³ [Air quality plan for nitrogen dioxide \(NO₂\) in UK \(2017\) - GOV.UK \(www.gov.uk\)](#)

²⁴ The equivalent regulations in Scotland are contained in the Air Quality Standards (Scotland) Regulations 2010, in which the Scottish Ministers are named as the competent authority.

Furthermore, each plan must comply with the requirements of the [Air Quality Directive] and the Regulations as to its form. As noted above, Annex XV of the Directive sets out information to be included in local (and other) [Air Quality Plans]. That includes information which identifies the measures being adopted, which sets out a timetable for implementation and provides an estimate of the improvement of air quality planned and the expected time required to attain that objective. Schedule 8 of the English Regulations²⁵ mirrors those requirements and requires the plans to include details of the measures or objectives adopted, with a description of all the measures set out in the project; the timetables for implementation; an estimate of the improvement of air quality planned and the expected time required to attain those objectives.

4.10 The Court found that the 2017 air quality plan was unlawful in that:

- in its application to the 45 local authority areas, it did not contain measures sufficient to ensure substantive compliance with the Air Quality Directive and the relevant English Regulations; and
- it did not include the information required by the Air Quality Directive and Schedule 8 to the English Regulations.

ECJ judgment – 19 March 2021²⁶

4.11 In what the European Commission described as a ‘final push’ to address the problem of air pollution, ministers from Member States were invited to a summit in January 2018. The plans proposed by the UK were deemed inadequate, insofar as they were insufficiently detailed or specific to be capable of delivering compliance **as soon as possible**. Accordingly, the European Commission referred the UK to the ECJ.

4.12 In its judgement of 19 March 2021, the ECJ held that the United Kingdom had manifestly failed to adopt, in good time, appropriate measures to ensure that the time period during which the limit values in question are exceeded was kept **as short as possible** in the zones concerned and that, consequently, the exceedance of those

²⁵ Schedule 7 of the Air Quality Standards (Scotland) Regulations 2010 contains identical provisions.

²⁶ <http://curia.europa.eu/juris/document/document.jsf?text=&docid=238474&pageIndex=0&doclang=en&mode=req&dir=&occ=first&part=1&cid=8579288>

limit values had remained systematic and persistent for at least seven years in those zones, despite the obligation for the Member State to take all appropriate and effective measures to comply with the requirement that the period of exceedance **was kept as short as possible**. The court held that the arguments put forward by the United Kingdom could not justify such long time periods for bringing to an end the proven exceedances of the limit values, having regard to the requirement to ensure that the period of exceedance should have been kept **as short as possible**. In respect of the UK plans of 2015, the Court also noted that:

- they did not contain the required information such as an estimate of the improvement of air quality planned;
- the description of the measures set out in the 2015 plans were often insufficiently detailed, summary or vague;
- the plans contained timetabling ‘that could be of considerable duration’;
- some measures contained in the plans were not legally binding and some did not relate to NO₂ emissions; and
- several measures in the plans were old or were only to be maintained for a short period.

4.13 In respect of the 2017 plans, the Court noted that they did not foresee a reduction in the time period for compliance with the obligations under the Air Quality Directive compared with what was foreseen in the 2015 plans and that, in the majority of cases, the period foreseen for complying with those obligations was even longer (for example, in respect of the Glasgow zone, the 2017 plans foresaw compliance by 2023 whereas the 2015 plans foresaw compliance by 2020). The Court stated that the fact that a plan sets out a particularly long time period for achieving compliance may be taken into account for establishing that a Member State has not adopted appropriate measures in good time to ensure that the period in which the limit values for NO₂ are exceeded is as short as possible in the zones concerned.

5. Legislation and Policy

5.1 The UK Government leads on the UK's contribution to international and European legislation relating to air quality, with input from the Scottish Government and the other devolved administrations. However, air quality is a devolved matter, with the Scottish Government having responsibility for the development of air quality policy and legislation for Scotland.

5.2 Responsibilities for monitoring air pollution and taking action to meet air quality standards lie with both central and local government. This section sets out the relevant regulatory frameworks and the strategies currently in place to achieve compliance.

EU Legislation and Policy

5.3 The European Union (EU) has been the main driver of the regulation of ambient air quality and many of the responsibilities in respect of achieving compliance originate from EU-derived legislation. Following the UK's exit from the EU, under retained EU law, the UK is required to continue meeting limit and target values for a range of air pollutants and other legal obligations covered by the relevant EU Directives.

5.4 The Air Quality Directive replaced most of the earlier EU air quality legislation, and sets target values and legally binding limit values²⁷ for concentrations in ambient (outdoor) air of major air pollutants that are known to have a significant impact on human health, including NO₂ and particulate matter (PM₁₀ and PM_{2.5}). Under the Air Quality Directive, it is the legal responsibility of EU Member States to achieve compliance with limit values within the “**shortest time possible**”. In Scotland, full compliance has been secured with all of the EU limit and target values, with the exception of the annual NO₂ objective where exceedances remain.

²⁷ Limit values are legally binding parameters that must not be exceeded. Limit values are set for individual pollutants and are made up of a concentration value, an averaging time over which it is to be measured, the number of exceedances allowed per year, if any, and a date by which it must be achieved. Some pollutants have more than one limit value covering different endpoints or averaging times. Target values are set out in the same way as limit values.

5.5 As part of the European Green Deal, the EU is revising the air quality standards²⁸ to align them more closely with the recommendations of the WHO²⁹ published on 22 September 2021³⁰. This revision also aims to improve overall EU legislation for clean air, building on the lessons learnt from a 2019 evaluation of the relevant Air Quality Directives.

UK Legislation and Policy

5.6 The Environment Act 1995 (“the 1995 Act”) requires the UK Government and the devolved administrations for Scotland and Wales to produce a national Air Quality Strategy (AQS) containing standards, objectives and measures for improving ambient air quality and to keep these policies under review. There is equivalent legislation for Northern Ireland. The most recent UK-wide strategy was published in 2007³¹ (“the 2007 Strategy”). Linking to the requirements of the EU Directives, the 2007 Strategy established the framework for air quality improvements across the UK. Measures agreed at the national and international level are the foundations on which the strategy is based.

5.7 The 2007 Strategy sets out the air quality standards and objectives in place to benchmark air quality in terms of protecting human health and the environment³². However, it was recognised that, despite such strategic measures, areas of poor air quality would likely remain and that these would best be dealt with using local measures implemented through what is known as the Local Air Quality Management (LAQM) regime. The procedures for undertaking this are set out in the 1995 Act.

5.8 Part IV of the 1995 Act also requires local authorities in the UK to regularly review and make assessments of air quality within their geographical area against the relevant regulations for each nation³³. For each air quality objective local authorities have to consider present and future air quality and assess whether the objectives are likely to

²⁸ [EU air quality standards \(europa.eu\)](https://european-council.europa.eu/media/eu-press/press-releases/2020/12/17_en.pdf)

²⁹ [WHO global air quality guidelines: particulate matter \(PM2.5 and PM10\), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide: executive summary](https://www.who.int/news-room/fact-sheets/detail/global-air-quality-guidelines)

³⁰ The new WHO limit values for NO₂ are annual mean of 10 µg/m³ and daily mean 25 µg/m³

³¹ [Air Quality Strategy Vol 1 \(publishing.service.gov.uk\)](https://publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/631038/Air-Quality-Strategy-Vol-1.pdf)

³² It should be noted that there is no legal requirement to meet the objectives set out in the 2007 Strategy.

³³ In Scotland, the relevant regulations are [The Air Quality \(Scotland\) Regulations 2000 \(legislation.gov.uk\)](https://www.legislation.gov.uk/ukdsi/2000/01/04/20000104_enacted.html), [The Air Quality \(Scotland\) Amendment Regulations 2002 \(legislation.gov.uk\)](https://www.legislation.gov.uk/ukdsi/2002/01/04/20020104_enacted.html) and [The Air Quality \(Scotland\) Amendment Regulations 2016 \(legislation.gov.uk\)](https://www.legislation.gov.uk/ukdsi/2016/01/04/20160104_enacted.html)

be achieved. Where a local authority concludes that any objective is unlikely to be achieved by the required date and in subsequent years it must, under the 1995 Act:

- declare an Air Quality Management Area (AQMA). Designation must be carried out officially by means of an 'order'. The extent of the AQMA may be limited to the area of exceedance or encompass a larger area;
- assess and identify the reasons for the problem, quantifying the sources of emissions; and
- develop an Air Quality Action Plan (AQAP) with relevant stakeholders setting out the measures that the authority will introduce in pursuit of the air quality objectives, within the AQMA.

5.9 Part IV of the Environment Act 1995, and corresponding Scottish LAQM Policy Guidance (PG(S)16)³⁴ and Technical Guidance (TG16)³⁵, outline that an AQAP must include:

- demonstration that the local air quality issues are clearly understood;
- an explanation of how the action plan will help to deliver the aims/objectives of Scotland's first clean air strategy³⁶;
- quantification of the source contributions to the predicted exceedances of the objectives; which allows the action plan measures to be effectively targeted;
- evidence that all available options have been considered on the grounds of cost effectiveness and feasibility;
- how the local authority will use its powers and also work in conjunction with other organisations in pursuit of the air quality objectives;
- clear timescales in which the authority and other organisations and agencies propose to implement the measures within its plan;
- quantification of the expected impacts of the proposed measures and, where possible, an indication as to whether the measures will be sufficient to meet the objectives; and
- how the local authority intends to monitor and evaluate the effectiveness of the plan.

³⁴ [Part IV of the Environment Act 1995 Local Air Quality Management: Policy Guidance: PG\(S\) \(16\) : Revised edition April 2018 \(www.gov.scot\)](http://www.gov.scot)

³⁵ [LAQM-TG16-April-21-v1.pdf \(defra.gov.uk\)](http://defra.gov.uk)

³⁶ [Cleaner air for Scotland: the road to a healthier future - gov.scot \(www.gov.scot\)](http://www.gov.scot)

5.10 Under Section 85 of the 1995 Act the Scottish Environment Protection Agency (SEPA) has reserve powers, with the approval of Scottish Ministers, to take action where local authorities have made insufficient progress. In this regard, SEPA may issue directions to local authorities requiring them to take any or all of the following steps:

- carry out an air quality review and assessment under Section 82 of the 1995 Act;
- repeat an air quality review and assessment in whole or in part;
- make an order designating an AQMA;
- revoke/modify any order;
- prepare an action plan;
- modify any action plan; and
- implement any actions in an action plan.

Scottish Legislation and Policy

5.11 Air quality is a devolved matter, and in Scotland the AQS objectives are set out in the Air Quality (Scotland) Regulations 2000³⁷, the Air Quality (Scotland) Amendment Regulations 2002³⁸ and the Air Quality (Scotland) Amendment Regulations 2016³⁹. These, combined, prescribe air quality objectives and the dates for achieving them in line with UK objectives and EU limit and target values (as well as some Scotland-specific objectives). As already noted, there is no legal requirement to meet the objectives set out in the AQS.

5.12 The European Air Quality Directive was transposed into Scottish legislation by the Air Quality Standards (Scotland) Regulations 2010⁴⁰. The Scottish Government, other UK administrations and EU Member States are responsible for securing compliance with legally binding limit values for pollutants. Work undertaken by local authorities through

³⁷ [The Air Quality \(Scotland\) Regulations 2000 \(legislation.gov.uk\)](#)

³⁸ [The Air Quality \(Scotland\) Amendment Regulations 2002 \(legislation.gov.uk\)](#)

³⁹ [The Air Quality \(Scotland\) Amendment Regulations 2016 \(legislation.gov.uk\)](#)

⁴⁰ [The Air Quality Standards \(Scotland\) Regulations 2010 \(legislation.gov.uk\)](#)

the LAQM system contributes towards the compliance actions implemented by central government.

5.13 Table 5-1 provides a summary of NO₂ limits and guidelines set by Scotland, the EU and WHO (including the newly published values). All values for NO₂ are the same, apart from the updated 2021 WHO guidelines.

Table 5-1 Limits and guidelines set by Scotland, the EU and WHO⁴¹ for NO₂

Pollutant	Scotland Regulations	EU limit values	WHO guidelines 2005	WHO guidelines 2021	Averaging period	Permitted number of exceedances
Nitrogen Dioxide (NO ₂)	200 µg m ⁻³	200 µg m ⁻³	200 µg m ⁻³	25 µg m ⁻³	1-hour	18
	40 µg m ⁻³	40 µg m ⁻³	40 µg m ⁻³	10 µg m ⁻³	Annual	-

5.14 The Scottish Government published its first clean air strategy (CAFS)⁴² in November 2015, which was replaced by a second clean air strategy (CAFS2)⁴³ in July 2021. Within these strategies the Scottish Government and its partner organisations (including Transport Scotland, SEPA, Public Health Scotland and Local Authorities) set out how they propose to further reduce air pollution to protect human health and the environment and fulfil Scotland's legal responsibilities over the period 2021-2026. CAFS2 is accompanied by a Delivery Plan⁴⁴ and aims to achieve the vision for Scotland "to have the best air quality in Europe"⁴⁵.

⁴¹ [Air Quality in Scotland \(parliament.scot\)](https://www.parliament.scot/air-quality-in-scotland)

⁴² [Cleaner air for Scotland: the road to a healthier future - gov.scot \(www.gov.scot\)](https://www.gov.scot/cleaner-air-for-scotland-the-road-to-a-healthier-future)

⁴³ [Cleaner Air for Scotland 2 - Towards a Better Place for Everyone - gov.scot \(www.gov.scot\)](https://www.gov.scot/cleaner-air-for-scotland-2-towards-a-better-place-for-everyone)

⁴⁴ [Cleaner Air for Scotland 2: delivery plan - gov.scot \(www.gov.scot\)](https://www.gov.scot/cleaner-air-for-scotland-2-delivery-plan)

⁴⁵ [Cleaner air for Scotland \(CAFS\) strategy \(scottishairquality.scot\)](https://www.scottishairquality.scot/cleaner-air-for-scotland-cafs-strategy)

6. Investigation Approach

6.1 Following a comprehensive review of available data, ESS developed an investigation plan outlining the lines of enquiry identified as relevant to the investigation terms of reference. The lines of enquiry surrounded the following themes:

- Oversight – what systems are in place to monitor air quality?
- Safety netting/plan Bs – are there areas where the limit values are not forecasted to reduce/do not reduce below limit values, as required by the Air Quality Directive, and are public authorities' powers in this regard sufficient?
- Clarity – are the plans in place sufficiently evidenced and clear?
- Timeframes – are the plans in place sufficient to achieve compliance within '**the soonest time possible**', as required by the Air Quality Directive?
- Consequences – what are the consequences of not reaching compliance?
- Joined-up working – is there sufficient linkage across Government and with relevant authorities?

6.2 During the investigation, information notices⁴⁶ were prepared and issued to SEPA, the Scottish Government and all local authorities which had active AQMAs declared for NO₂ seeking information which ESS considered relevant to the terms of reference, and the lines of enquiry drawn from the above themes. The subsequent sections of this report sets out and examines some of the primary data received from the individual responses, along with secondary data taken from publically available information⁴⁷.

6.3 ESS would like to thank all public authorities for the assistance they provided during the investigation.

⁴⁶ Under ESS' governing legislation, an information notice can be issued requiring a public authority to provide information which ESS reasonably requires for the purpose of exercising any of its functions.

⁴⁷ Such as that contained on the Scottish Air Quality Database website [Home page | Scottish Air Quality](#)

7. Air Quality Management Areas in Scotland

7.1 The first AQMA to be declared in Scotland was in Edinburgh City Centre in the year 2000, followed by Aberdeen City Centre in 2001, Glasgow City Centre in 2002 and a further seven AQMAs were declared between 2005-2006. There are currently 13 of the 32 Scottish local authorities with at least one active AQMA in place. In regards to NO₂ specifically, 25 active AQMAs remain in place across the 13 local authorities⁴⁸ (see Annex 1). These are predominantly located in city centre or urban areas and this number has remained relatively persistent over the past three years, despite many having been in place since 2000-2006. As illustrated in Annex 1, to date, only five AQMAs relating to NO₂ have been revoked. As an aside, a few AQMAs boundaries have been extended for NO₂ in recent years and four AQMAs have been declared for NO₂ recently, in 2016.

7.2 In order to understand their scale and nature, ESS sought information from the 14 local authorities in respect of the remaining AQMAs⁴⁹. The responses received from the local authorities (see Annex 1) confirms that the Parkhead AQMA in Glasgow was revoked for NO₂ in October 2020, and the Haggs AQMA in Falkirk was revoked for NO₂ in October 2021 and both the Bonnygate and Appin Crescent AQMAs in Fife were revoked for NO₂ in September 2021 (however remain in place for PM₁₀). It is also evident that a number of AQMAs⁵⁰ have been consistently compliant with the NO₂ objective levels for the recommended three-year period and thus these AQMAs are under review by the Local Authorities for revocation later this year (or about to commence this process).

7.3 Two AQMAs (Bishopbriggs AQMA in East Dunbartonshire and Paisley Town Centre AQMA in Renfrewshire) despite recording no NO₂ exceedances for three consecutive years are not currently under review for revocation. Such precautionary decisions have been taken in light of ongoing major infrastructure works and to prevent the possibility of future declaration again should pollutant levels increase. In ESS' view, continuous

⁴⁸ [AQMA Details | Scottish Air Quality](#)

⁴⁹ It is important to note that local authorities have the overall responsibility when deciding AQMA boundaries, therefore AQMAs vary in size and scope in accordance with local air quality issues.

⁵⁰ The relevant AQMAs include: East Lothian AQMA, Inverleith Row AQMA in Edinburgh, Byres Road/Dumbarton Road AQMA in Glasgow, Johnstone AQMA in Renfrewshire, Lanark AQMA in South Lanarkshire.

monitoring in such areas is good practice, allowing any exceedances or issues of concern to be identified as soon as possible.

7.4 It is important to note that under the LAQM system there is no size requirement for AQMAs. However, AQMA boundaries should cover all areas where an exceedance has first been detected or is likely to occur. It is evident that local authorities have taken individual approaches and different methods for setting the boundaries of their AQMAs. While some local authorities have chosen an approach where a localised 'hot-spot' is declared as an AQMA, others have declared AQMAs that cover whole cities. On reviewing the evidence provided from each local authority it would appear that the smaller scale, localised AQMAs, such as Bonnygate and Crieff, have demonstrated more positive results in comparison to the more extensive city-wide AQMAs. For example, in Dundee, revocation is still not being considered due to persistent localised exceedances some 15 years since declaration. One exception to this is the Perth city-wide AQMA, where no exceedances have been recorded since 2018 and therefore this AQMA may be considered for revocation.

7.5 Notwithstanding the good practice seen, and the impending revocation of a number of AQMAs, in ESS' view the continued existence of AQMAs across 13 local authorities, several years since being declared (50% have been active for between 10- 22 years) is of concern. It is ESS' understanding that AQMAs were not designed or intended to be in place for such lengths of time, which suggests that the LAQM system is not delivering on air quality improvements to the extent that it should do. Nor is ESS clear on how such lengthy periods of non-compliance can be considered consistent with the State's obligation of achieving compliance with NO₂ limit values in as short a time as possible. Accordingly, the recommendations listed later in this report are made to address these concerns.

8. Air Quality Action Plans in Scotland

Development of AQAPs

8.1 Following the declaration of an AQMA, local authorities are required under Section 84 of the 1995 Act to develop an AQAP setting out the measures that the authority will introduce in pursuit of the air quality objectives within the AQMA (or in some cases AQMAs). An important point to note is that local authorities are not legally obliged to meet the air quality objectives within the AQMA. The requirement placed upon them under the LAQM system is that they must demonstrate that they are taking all reasonable steps in working towards them and report on progress annually. It follows that there is no legal responsibility to meet the air quality objectives within a specified period.

8.2 In addition, under the 1995 Act, there is no prescribed timescale for the submission of AQAPs. However, the Scottish Government expects plans to be submitted within 12 months from the date of AQMA declaration⁵¹.

8.3 The responses received from the 14 local authorities confirm that all active AQMAs have an AQAP in place; however, in some cases (for example the City of Edinburgh Council) an AQAP covers more than one AQMA within the geographical area. It is apparent that several AQAPs remain in draft form, namely Inverness AQAP, Linlithgow AQAP (despite the AQMAs having been declared since 2016) and the updated AQAP in the City of Edinburgh (following the declaration of Glasgow Road and Inverleith Row AQMAs in 2013). The timeframe between AQMA declaration and the publishing of a final AQAP varies between 14 months (Appin Crescent AQMA in Fife) and eight years (Bearsden AQMA in East Dunbartonshire), and some have yet to be finalised.

8.4 The long time periods between the declaration of an AQMA and the publishing of a final AQAP is inconsistent with the policy guidance provided by the Scottish Government, and therefore ESS considers this is an area that needs strengthened. ESS also considers that this raises questions over not only local attempts to achieve

⁵¹ [6: Air quality action plans - Local air quality management: policy guidance - gov.scot \(www.gov.scot\)](https://www.gov.scot/publications/air-quality-action-plans-local-air-quality-management-policy-guidance/pages/6.aspx)

compliance, but the effectiveness of the broader scrutiny systems currently in place to improve air quality. Accordingly, ESS makes the following recommendations:

The introduction of the requirement for local authorities to complete and publish AQAPs within a specified target date following the declaration of an AQMA.

The introduction of the requirement for local authorities to achieve AQMA and AQAP objectives within a specified target date.

Review of AQAPs

8.5 The 1995 Act requires that AQAPs be periodically reviewed by local authorities. While no time limit is explicitly set within the 1995 Act, local authorities have a duty to keep their action plans up to date. Section 84(4) of the 1995 Act states that an authority may from time to time revise an action plan. Whenever an action plan is revised, local authorities must consult the Scottish Ministers and other statutory consultees⁵². Responses received from the local authorities relating to this aspect of AQAPs confirms that a number of action plans published between 2010 and 2017 have undergone no formal review or update during their life span.

8.6 Despite some updates being made to existing action plans over the years, for example in Glasgow and Edinburgh (when additional AQMAs have been declared), no further updates have been carried out since 2009 and 2010 respectively. From the evidence provided it would appear that only two local authorities (Fife and North Lanarkshire) have committed to regular updates, Fife's latest update occurring in 2021. The more recently published plans (Crieff, Renfrewshire and South Lanarkshire) are not yet eligible for an update as they were only published in 2019.

8.7 In addition, information received from the four local authorities with recently approved Low Emission Zones (LEZs) (Aberdeen, Dundee, Edinburgh and Glasgow) confirm that they have refrained from any updates to existing plans on account of the anticipated contribution of the Scottish Government's most recent air quality strategy

⁵² [Part IV of the Environment Act 1995 Local Air Quality Management: Policy Guidance: PG\(S\) \(16\) : Revised edition April 2018 \(www.gov.scot\)](#) pg 25

(CAFS2) and the effects which the implementation of the LEZs will have in forthcoming revisions. However, all four local authorities confirm that additions to actions have been made over the years and that existing action plans are under review with an expected publication date in 2022-2023. Other local authorities offer reasons such as the Covid-19 pandemic and consistently low NO₂ levels as to why no updates have been undertaken.

8.8 Within the LAQM regime (as stated in PG(S)(16)⁵³ and TG(16)⁵⁴) local authorities may wish to establish an AQAP Steering Group that meets on an annual basis after the adoption and implementation of measures contained within the AQAPs, with the purpose to review the AQAP and progress achieved. Information was requested regarding such reporting structures from relevant public authorities. On reviewing the responses received it is evident that steering groups, and in some cases working groups, have been set up following the declaration of AQMAs to develop, prepare, update and deliver the AQAPs. However, this has not occurred across the board. Additionally, the responses highlight that continual involvement and regular meetings of such groups is varied and inconsistent between the local authorities.

8.9 One local authority which has implemented this aspect of the LAQM is Fife Council through the establishment of Fife Core Air Quality Steering Group (FCAQSG). This group aims to meet quarterly to review progress made in respect of the two AQAPs. The group comprises of various internal and external parties, these being: Fife Council Protective Services, Transportation, Fleet Operations, Planning, Climate and Zero Waste Team, Education and local Community Managers and Community Council members for both AQMA areas, to ensure any issues/concerns of the local community within the AQMAs are adequately addressed. NHS Fife also contribute in terms of promoting awareness of the importance of air quality as a public health issue and this has assisted in the presentation of air quality information on the Fife Council air quality website pages. Fife Council has also utilised contracted consultants to assist in the review and assessment process and also Scottish Government funded air quality projects. Lastly, SEPA is also represented on this steering group to ensure adequate

⁵³ [Part IV of the Environment Act 1995 Local Air Quality Management: Policy Guidance: PG\(S\) \(16\) : Revised edition April 2018 \(www.gov.scot\)](#) pg 24

⁵⁴ [LAQM-TG16-April-21-v1.pdf \(defra.gov.uk\)](#) pg 21

progress is being made in terms of the Council fulfilling its statutory air quality responsibilities and duties (including adequately progressing its AQAPs).

8.10 In contrast, Aberdeen City Council confirmed that a steering group has never been established with respect of AQAPs; however, a Delivery Group had been set up which is responsible for the development and implementation of the LEZ. In the case of Dundee City Council and West Lothian Council, the response information confirmed that a steering group has not met for some time. The response information from the remaining local authorities is limited, other than confirming a steering or working group has been established, there are no further details on whether these are active or not.

8.11 The information received also confirmed that no specific external monitoring is undertaken on AQAPs. However, a few local authorities routinely employ an independent air quality consultant to provide a third-party opinion on their AQAP. Internal reporting for reviewing and assessing local air quality levels is predominantly coordinated by local authority environmental health departments, which includes reviewing all planning applications relating to developments that have the potential to impact upon existing pollutant levels (these are detailed in Annual Progress Reports (APR) as set out in the following section on Oversight of AQAPs). Where there is a need to declare, amend or revoke an AQMA, a report is submitted to the relevant Committee/Chief Officer with delegated powers (and on occasion selected members). Any proposals to amend the existing plan, or create a new one, would similarly be reported to the Committee/Chief Officer with delegated powers to approve. In addition, within some local authorities the content of APRs are presented to Committee prior to submission via the Defra portal. However, the information received does not confirm that this is consistently carried out.

8.12 In ESS' view, the evidence demonstrates that the time periods associated with the preparation, review, and update of AQAPs needs to be tightened to ensure a consistent approach is adopted and that air quality limit values are continually at the forefront of local authorities' priority agendas. Accordingly, ESS makes the following recommendation:

The introduction of the requirement for local authorities to review and, where necessary, update AQAPs.

Oversight of AQAPs

8.13 The system of LAQM has been in place in the UK since 1997. However, following the implementation of the CAFS strategy the Scottish Government-produced updated policy guidance for the LAQM regime in Scotland⁵⁵. One of the main changes involved the streamlining of the LAQM reporting process, where an Annual Progress Report (APR) was introduced to replace the previous three-year cyclical process. An APR should be submitted by each local authority by 30 June each year, and should summarise local monitoring data collated by the local authority over the past five years, and focus particularly on the previous year's results, comparing these against the air quality objectives.

8.14 To achieve a deeper understanding of the external review process of APRs and AQAPs, information was sought from local authorities and the Scottish Government on the reporting structures currently in place through which local authorities: review and assess air quality; declare and revoke AQMAs; and develop and implement AQAPs. The responses received confirm that AQAPs are monitored, evaluated and reviewed by the Scottish Government, SEPA and an independent third party on an annual basis as part of the process of undertaking the APR. The APRs are submitted to these public authorities via Defra's online LAQM reporting portal⁵⁶.

8.15 Independent appraisals of the reports are undertaken by the Scottish Government and SEPA along with an air quality consultant appointed by the Scottish Government for this purpose. The appraisals assess whether all of the required information (detailed in a standard report template) submitted by each local authority has been provided, and whether the specified analytical and quality control methodologies have been applied to monitoring data. Local authorities are provided with individual feedback from the three parties based on the outcome of these appraisals. Where any corrections or changes to reports are requested, the authority is required to submit an amended report before the conclusions and proposed actions are accepted by the Scottish Government. Should an amended report still be considered unsatisfactory e.g.

⁵⁵ [Part IV of the Environment Act 1995 Local Air Quality Management - Policy Guidance PG\(S\) \(16\) \(www.gov.scot\)](http://www.gov.scot)

⁵⁶ [6: Air quality action plans - Local air quality management: policy guidance - gov.scot \(www.gov.scot\)](http://www.gov.scot)

insufficient progress with action plan measures, the Scottish Government will engage directly with the authority in question to resolve these issues.

8.16 Examples of feedback provided by the Scottish Government in response to APR appraisals were provided within the response information received. In the case of Dundee City Council, following the last APR review a comment was received requesting an update of their 2011 AQAP, while Highland Council was advised that their draft AQAP should be finalised. Positive recognition is also given to local authorities, for example, Perth and Kinross Council's 2020 APR was said to have a "proactive and dedicated approach to improving air quality across the area" and South Lanarkshire Council APR was "thorough, containing most of the evidence specified in the guidance". Fife Council's AQAP published for Bonnygate AQMA in Cupar has also been cited as an example of "best practice" by Defra and this is publically available on the Defra website for perusal by other local authorities and interested parties⁵⁷.

8.17 Whilst it is clear that a form of review has been taking place, the evidence received regarding the existing LAQM review and reporting structures highlights that a strengthening of the system is required. Currently, there is no set timeframe on how long the AQAP should take to develop and there are no penalties for overdue AQAPs other than warning letters. The updated policy guidance provides details and timescales of the reminder/warning letters that can be issued by SEPA (with the approval of the Scottish Ministers) associated with the late submission of APRs and AQAP namely:

- two months overdue – reminder letter;
- three months overdue – warning letter;
- four months overdue – final warning letter;
- six months overdue – Section 85 direction.

8.18 Given that action plans should be submitted within 12 months post-AQMA declaration, the above reminder and warning letters correspond to 14 months post-AQMA, 15 months, 16 months and 18 months respectively. As highlighted above, SEPA, with the approval of the Scottish Ministers, can also issue a Section 85 direction

⁵⁷ [Good Practice Examples: AQAPs | LAQM \(defra.gov.uk\)](https://www.defra.gov.uk/good-practice-examples-aqaps-laqm)

under the 1995 Act where a local authority has not advised the Scottish Government of the reasons for late adoption and agreed revised submission date timescales.

- 8.19 Given the apparent longstanding non-compliance of some areas of the LAQM, information was sought from SEPA as to whether it had approached the Scottish Ministers for approval to use its powers under Section 85 of the 1995 Act (this power appears to be a significant safety net in the system). SEPA confirmed that, to date, no powers under Section 85 have been exercised. This is in contrast to England where Section 85 directions have been issued on a number of occasions.
- 8.20 Further research into this area confirms that, in total, the UK government has issued Ministerial Directions to 64 local authorities in England to take action on NO₂ breaches⁵⁸. The directions require local authorities to carry out studies or to implement actions to deliver compliance with both the domestic objectives and EU limit values for NO₂ in the shortest time possible. Local authorities are expected to complete a feasibility study and/or business case for proposed plans and measures to bring forward compliance with the NO₂ legal limits.
- 8.21 ESS notes that the directions issued to English councils include reference to the requirements of the Air Quality Directive, where each local authority “must” improve the level of NO₂ in the “shortest possible time”. Timescale deadlines for compliance of the legal limits are also stipulated, for example in the case of the Manchester direction dated 7 February 2022, a deadline of 2026 was assigned⁵⁹. In addition, this direction also states that the relevant local authority must review measures in their local plan for NO₂ compliance and prepare and submit to the Secretary of State any proposed changes to those measures, in the case of Manchester by 1 July 2022 at latest (five-month time frame). In ESS’ view the clear, urgent, call for action by local authorities as defined within these directions contrasts with the approach thus far taken in Scotland. Accordingly, ESS makes the following recommendation:

⁵⁸ [Tackling local breaches of air quality \(nao.org.uk\)](https://nao.org.uk)

⁵⁹ [The Environment Act 1995 \(Greater Manchester\) Air Quality Direction 2022 \(publishing.service.gov.uk\)](https://publishing.service.gov.uk)

That the Scottish Government identifies or introduces a monitoring body with the remit to look at the system of air quality monitoring and compliance holistically. It is critical that this body should be able to move quickly where air quality does not meet legal requirements, consistent with the principle of achieving compliance within the shortest time possible, and thus it should have the requisite power to direct action when deemed necessary.

9. Monitoring and Reporting of NO₂

- 9.1 Currently, two separate systems are in place for air quality monitoring and reporting in Scotland for different purposes.
- 9.2 The first system is for compliance assessment purposes with the EU Directive⁶⁰. Here, Scotland is divided into zones and agglomerations⁶¹ (see Annex 2) based on population. The monitoring requirements are precisely defined and legally binding; there is a minimum number of monitoring locations points for each pollutant, sampling locations are prescribed to include anywhere the public has access (irrespective of whether this is regular access) and there is a requirement to use specified reference monitoring equipment (or alternatively equipment that can be shown to be equivalent to the reference methods).
- 9.3 This compliance assessment makes use of measurements from UK national monitoring networks as well as the results of modelling. Data includes the UK Automatic Urban and Rural Network (AURN), the largest automatic monitoring network and the main network used for compliance reporting against the Ambient Air Quality Directives⁶². This network consists of automatic air quality monitoring stations⁶³ measuring a number of pollutants including oxides of nitrogen (NO_x). In 2020, there were 172 AURN monitoring sites across the UK, of which 22 were in Scotland.
- 9.4 The second system is carried out at a local level for LAQM purposes and this network consists of both automatic (including AURN sites) and non-automatic monitoring⁶⁴. However, in contrast to the UK network, monitoring requirements under the LAQM are not legally defined, but discretionary depending on local circumstances, as outlined in TG(16) that local authorities are expected to adhere to. Monitoring locations are only required where members of the public are regularly present and there is relevant exposure⁶⁵ to the pollutant in question. There is no stipulation on the number of

⁶⁰ This system is a high-level system and relies to a large extent on monitoring.

⁶¹ An agglomeration is defined as any urban area with a population greater than 250,000.

⁶² [Monitoring Networks - Defra, UK](#)

⁶³ Automatic point monitoring are larger stations that provide high resolution, real-time data. These record daily and annual mean concentrations of relevant pollutants (including NO₂).

⁶⁴ Non-automatic monitoring comprises a network of diffusion tubes at point locations. These are manually changed every four to five weeks and are used by local authorities in assessing against annual mean levels of NO₂. This system is a high-level system and relies to a large extent on monitoring.

⁶⁵ Relevant public exposure, for example 'hot spot' locations where the highest concentrations are expected.

sampling locations needed and no requirement to use reference monitoring equipment⁶⁶ (although this is recommended by the Scottish Government).

9.5 In ESS' view, this aspect of the LAQM system raised an important issue about whether monitoring stations are sited in optimum locations and whether they provide adequate coverage of public exposure, for example at hospitals and schools. Following this line of enquiry, questions regarding monitoring locations and stations were included within ESS' enquiries to the local authorities. An overview of responses received is presented in Section 10.

9.6 In summary, key differences exist between the two networks operating in the UK including: legal responsibilities, scales of operation, monitoring and modelling requirements, exceedance reporting, and action planning.

NO₂ Monitoring

9.7 The data reported within this section and the following section on NO₂ Modelling and Mapping has been taken from the Scottish Air Quality Database (SAQD) annual reports and relevant APRs, accessed from the individual local authority website pages.

9.8 As noted above, NO₂ monitoring is undertaken at a number of automatic and non-automatic (passive monitoring)⁶⁷ sites across Scotland. All local authorities with active AQMAs in place have one or more automatic monitoring station monitoring NO₂ located within their area, the majority of these are operated by local authorities for LAQM purposes. However, a number of stations also operate as part of the AURN monitoring network. The automatic monitoring sites provide high-resolution, continuous data that feeds directly to the SAQD website, where the data is updated hourly (in near real time), whereas data provided from the latter sites vary between hourly or daily depending on the configuration of the individual station.

⁶⁶ The reference method for the measurement of nitrogen dioxide and oxides of nitrogen is that described in EN 14211:2012 'Ambient air — Standard method for the measurement of the concentration of nitrogen dioxide and nitrogen monoxide by chemiluminescence'.

⁶⁷ Non-automatic/passive monitoring is a low-cost, simple method useful for screening and highlighting exceedances of annual concentrations in local areas. Diffusion tubes can be easily moved/installed, therefore are also beneficial for use in short-term, baseline studies and can support automatic monitoring.

- 9.9 Automatic monitoring of NO₂ has been routinely carried out in Scotland since 1987. However, until the year 2000, relatively few automatic monitoring sites existed. Subsequent years have seen the number of monitoring sites in the SAQD increase from 20 sites (in 2000) to the current total of 100 sites (in 2022) (see Annex 3).
- 9.10 All automatic data maintained within the SAQD is subject to the same quality assurance/control procedures as the national network air quality monitoring stations, which ensures that all data in the database is quality assured and traceable to UK national calibration standards for the various pollutants.
- 9.11 Information provided from the responses received from the local authorities confirm that locations for the automatic stations monitoring NO₂ have been determined in line with TG(16), section 7.2. When determining site locations local authorities consider diffusion tube data, local sources of pollution (e.g. congestion, idling traffic, high traffic flows) and air quality dispersion modelling. Monitors are then placed as close to these hotspot areas as possible, dependent on footpath space and council-owned land. However, final locations are not solely based on relevant public exposure and proximity to sources of NO₂, but also take into consideration site practicalities such as a permanent power supply along with microscale requirements (security, accessibility, local surroundings etc.).
- 9.12 Local authorities undertake passive NO₂ monitoring through the use of diffusion tubes. At present the network consists of over 1050 sites across most of the 32 local authorities in Scotland (see Annex 4). The majority of these are located at roadside locations, although there are also several kerbside and background sites⁶⁸. Some locations comprise only a single tube while others may have triplicates, and some tubes are co-located at the automatic monitoring stations. Diffusion tubes are routinely changed by local authority environmental health departments every four to five weeks, in line with the Defra calendar of exposure periods, and submitted to the United Kingdom Accreditation Service (UKAS) accredited laboratories for analysis.

⁶⁸ Kerbside sites are located within one metre of the kerbside of a busy road. Roadside sites are located between one metre of the kerbside of a busy road and the back of the pavement. Typically this will be within five metres but can be up to 15 metres.

Urban background sites are distanced from sources and therefore broadly representative of city-wide background conditions e.g. urban residential areas. [Monitoring \(scottishairquality.scot\)](https://www.scottishairquality.scot/)

- 9.13 Similar to the automatic monitor locations, the majority of sites are located within declared AQMA boundaries or locations close to the AQMAs where modelling has predicted a potential exceedance of the air quality objectives, in accordance with the TG16. Background sites on the other hand are located away from significant NO₂ sources, where the aim is to record and understand local 'reference' NO₂ levels.
- 9.14 Diffusion tubes are inexpensive and can be installed over a broad geographical area, and are therefore used by local authorities as a screening tool to identify and monitor areas of high concentrations, such as alongside major roads. Unlike the automatic monitors no power supply is required, therefore the choice of site location is less restricted. However, suitable structures such as lampposts or road sign supports need to be available on which to secure the diffusion tube.
- 9.15 Locations are reviewed on an annual basis by local authorities, and new locations are often added in response to public complaints, new or proposed developments, or information which suggests that traffic flows on the roads have increased in locations where there are existing sensitive receptors. In general, diffusion tubes are located where ongoing monitoring suggests that the NO₂ levels are near to, or above, the air quality objective levels, and where it would be impractical to install an automatic monitor.
- 9.16 Passive diffusion tube data is also available on the SAQD website. As diffusion tubes are an indicative method of monitoring annual mean concentrations of NO₂, this data is only updated on an annual basis. However, local authorities do receive and hold monthly diffusion tube data following the completion of laboratory analysis.
- 9.17 In respect of the siting of these monitoring sites, ESS notes that TG16⁶⁹ states that it is expected that most roads of concern will already have been assessed in the previous rounds of review and assessment undertaken by local authorities and that, given this, it is unlikely that local authorities would have missed any roads where objectives are being breached. TG16 also provides guidance on the factors which local authorities should take into consideration during their screening assessments⁷⁰.

⁶⁹ [LAQM-TG16-April-21-v1.pdf \(defra.gov.uk\)](#)

⁷⁰ Paragraph 7.11

9.18 In summary, the evidence shows that local authorities utilise a blend of automatic and non-automatic systems to monitor NO₂ levels, with the vast amount of monitoring undertaken through the use of diffusion tubes⁷¹. Whilst TG16 sets out some factors which should be taken into account in the screening assessment, in ESS' view further consideration should be given to whether this guidance is robust enough to provide a sufficiently comprehensive picture of the state of air quality in our major cities, especially around areas where vulnerable groups are present, such as schools and hospitals⁷². Accordingly, ESS makes the following recommendation:

That the Scottish Government ensures that its ongoing review of data provision scrutinises the protocols for the siting of monitoring sites, with a view to establishing whether they provide a sufficiently comprehensive picture of the state of air quality.

NO₂ Modelling and Mapping

9.19 National air quality modelling for the UK focuses on two components: pollutant concentrations at background locations (on a 1 x 1 km grid square basis) and roadside pollutant concentrations (at four metres from the kerb of urban major road links). By contrast LAQM modelling is different in scope, purpose and methodology from the national modelling and will usually output contour plots showing dispersion away from the source, on a fine resolution grid. The level of detail and resolution of LAQM modelling is much greater in order to focus on local exposure and hotspots, and does not necessarily meet the requirements for air quality assessment under the Directives.

9.20 As part of the SAQD⁷³ project, Ricardo Energy & Environment have extended air quality analysis to cover the whole of Scotland using modelling and mapping techniques. Mapped concentrations of modelled background air pollutant concentrations are provided on a 1 x 1 km basis and modelled roadside air pollutant concentrations are provided for 52 road links in Scotland. The air pollution maps are

⁷¹ E.g. see the City of Edinburgh's interactive map of monitoring at: [Air Quality Monitoring Network \(arcgis.com\)](https://www.airqualitymonitoring.scot.nhs.uk/)

⁷² It should be noted that the Scottish Government has commenced a review of air quality data collection in Scotland. The intention of the review is to identify any notable gaps in data provision.

[https://www.scottishairquality.scot/sites/default/files/orig/assets/documents/Cleaner Air for Scotland 2 annual progress report 2021-22 June 2022.pdf](https://www.scottishairquality.scot/sites/default/files/orig/assets/documents/Cleaner_Air_for_Scotland_2_annual_progress_report_2021-22_June_2022.pdf)

⁷³ [Maps of annual concentrations \(scottishairquality.scot\)](https://www.scottishairquality.scot/sites/default/files/orig/assets/documents/Maps_of_annual_concentrations_(scottishairquality.scot))

derived from a combination of measurements from Scotland's network of air quality monitoring stations, and spatially disaggregated emissions information from the UK National Atmospheric Emissions Inventory (NAEI). These provide estimated pollutant concentrations for the whole of Scotland. The national methodology for producing the Scottish maps is based on the UK Pollution Climate Mapping (PCM) approach, used for producing air pollution maps for the whole UK.

10. Recent Trends in NO₂ Levels in Scotland

10.1 Data from the automatic and non-automatic monitoring sites provide an oversight of air pollutant concentrations and distributions across Scotland over time. In light of the COVID-19 pandemic lockdowns, and the cumulative effect this had on traffic flows and resultant NO₂ levels, trend analysis focuses on recent pre-pandemic levels, as ESS considers these more accurately reflect the current and immediate future NO₂ situation in Scotland.

Automatic Monitoring Data

10.2 Between 2017-2019, the number of automatic monitoring sites recording exceedances of the annual mean NO₂ objective (40 µg/m³) were seven in 2017, six in 2018 and six in 2019 respectively⁷⁴. Four longstanding sites that have persistently exceeded the annual mean objectives over this three-year period are Dundee Lochee Road, Dundee Seagate, Edinburgh St Johns Road, and Glasgow Kerbside (Hope Street), as illustrated in Figure 10-1. In addition, the Dundee Lochee Road site also recorded exceedances in the NO₂ hourly objective level (200 µg/m³) on six occasions in 2017 and 2018, and on two occasions in 2019. The automatic monitoring site at Nicolson Street in Edinburgh was added to the AURN network more recently, in 2017, however recorded exceedances of the annual mean objective over the next three consecutive years. As illustrated in Figure 10-1 the annual mean concentration recorded at the site was 54.1 µg/m³ in 2017, 50.9 µg/m³ in 2018, and 50.4 µg/m³ in 2019. In 2019, the site also recorded four episodes of concentrations > 200 µg/m³ hourly level⁷⁵. The remaining non-compliant site in 2019 was Inverness Academy Street; this site had however been compliant until this point (since installation in 2017).

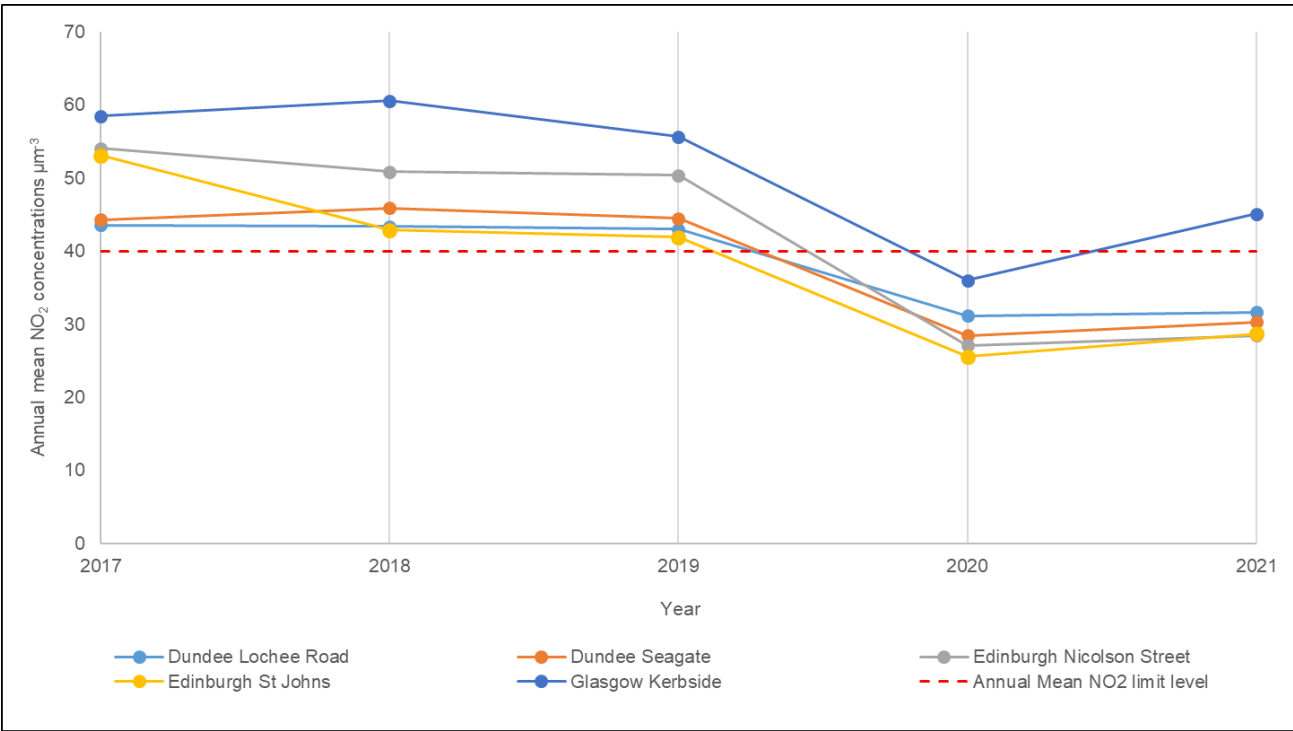
10.3 Analysis of the data on the SAQD showed that the highest NO₂ annual mean concentrations recorded between 2017 and 2019 were at Glasgow Kerbside (Hope Street), namely, 58.5 µg/m³ in 2017, 60.6 µg/m³ in 2018 and 55.7 µg/m³ in 2019 respectively. The next highest NO₂ concentrations recorded in 2017 were at Edinburgh Nicolson Street (54.1 µg/m³) followed closely by Edinburgh St Johns Road (53.1

⁷⁴ [Measurement and annual statistics | Scottish Air Quality](#)

⁷⁵ [laqm-annual-progress-report-2021 \(edinburgh.gov.uk\)](#)

$\mu\text{g}/\text{m}^3$). The annual mean concentrations at both sites decreased year-on-year (see Figure 10-1), however the Nicolson Street site only recorded a reduction of $3.7 \mu\text{g}/\text{m}^3$ between 2017-2019, whereas the St Johns Road site recorded a reduction of $11.2 \mu\text{g}/\text{m}^3$. In contrast both sites in Dundee (Lochee Road and Seagate) have remained relatively constant with levels of between 43.0 and 43.6 , and 44.3 and $45.9 \mu\text{g}/\text{m}^3$ respectively for this three-year period, as illustrated in Figure 10-1. Between 2017 and 2019 three sites became compliant with the NO_2 annual mean objective; these include Edinburgh Queensferry Road, Glasgow Dumbarton Road, and Perth Atholl Street.

Figure 10-1 Annual mean NO_2 concentrations ($\mu\text{g}/\text{m}^3$) at the five automatic monitoring locations recording exceedances in 2019.



10.4 In 2020, no automatic monitoring sites with 75% or more data capture recorded exceedances of the annual mean objective for NO_2 ($40 \mu\text{g}/\text{m}^3$) or the hourly mean (18 exceedances of $200 \mu\text{g}/\text{m}^3$)⁷⁶. The highest NO_2 annual mean concentrations in this year were measured at Glasgow Kerbside (Hope Street) with a level of $36.0 \mu\text{g}/\text{m}^3$, as shown in Figure 10-1. All of the sites shown in Figure 10-1 are located at either road or kerbside locations, therefore the significant decline in NO_2 annual mean concentrations

⁷⁶ [Microsoft Word - SAQD - annual report 2020 - Final \(scottishairquality.scot\)](#)

during 2020 is almost certainly a direct result of the lockdown restrictions and lesser traffic movements in these areas.

10.5 Data available on the SAQD⁷⁷ for 2021 (not yet published in an annual report) is also presented in Figure 10-1. It is evident that one automatic monitoring site (Glasgow Kerbside (Hope Street) exceeded the NO₂ annual mean objective with a value of 45.1 µg/m³, indicating a step change from the 2020 situation during Covid-19. In addition, small increases between 2020 and 2021 are also recorded at three of the four other monitoring sites while the data for Dundee Lochee Road has remained similar to 2020.

Non-automatic Monitoring Data

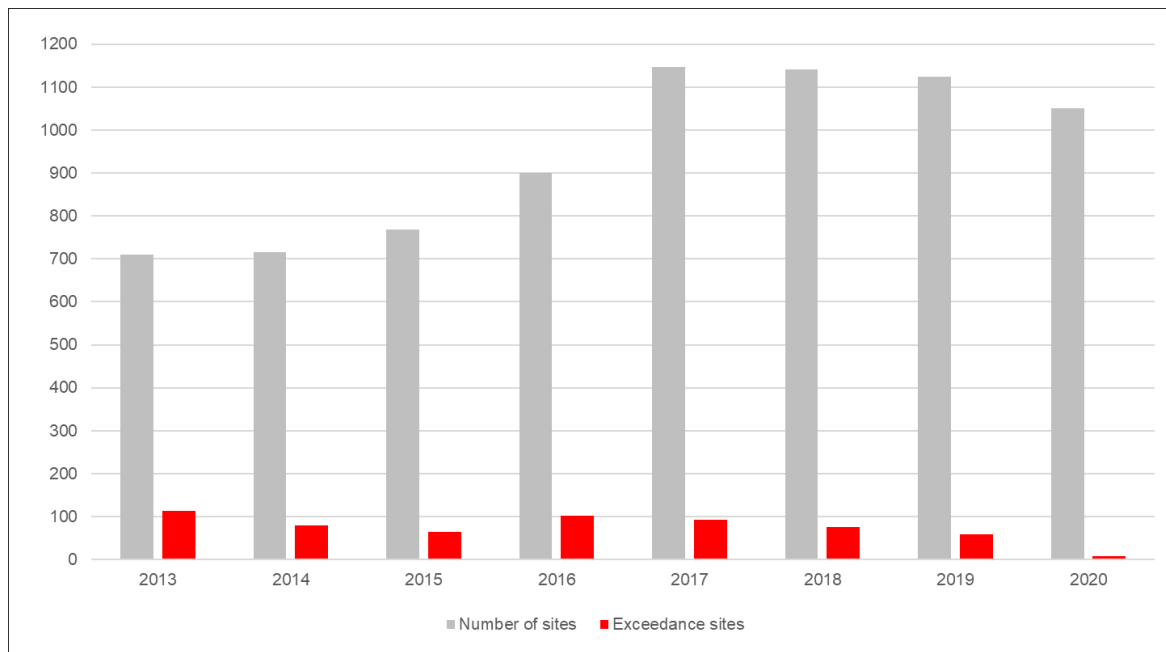
10.6 In the course of undertaking analysis of the non-automatic monitoring data some minor differences were noted between the figures reported from the SAQD website and the individual local authority APR's. Where this occurred, the value from the local authority APR (2021) was used as ESS considered this would contain the most accurate site information.

10.7 The number of diffusion tube sites that recorded exceedances of the NO₂ annual mean objective (40 µg/m³) during 2017, 2018 and 2019 are 93, 75 and 59⁷⁸ respectively, as illustrated in Figure 10-2.

⁷⁷ [Data \(scottishairquality.scot\)](https://www.scottishairquality.scot/)

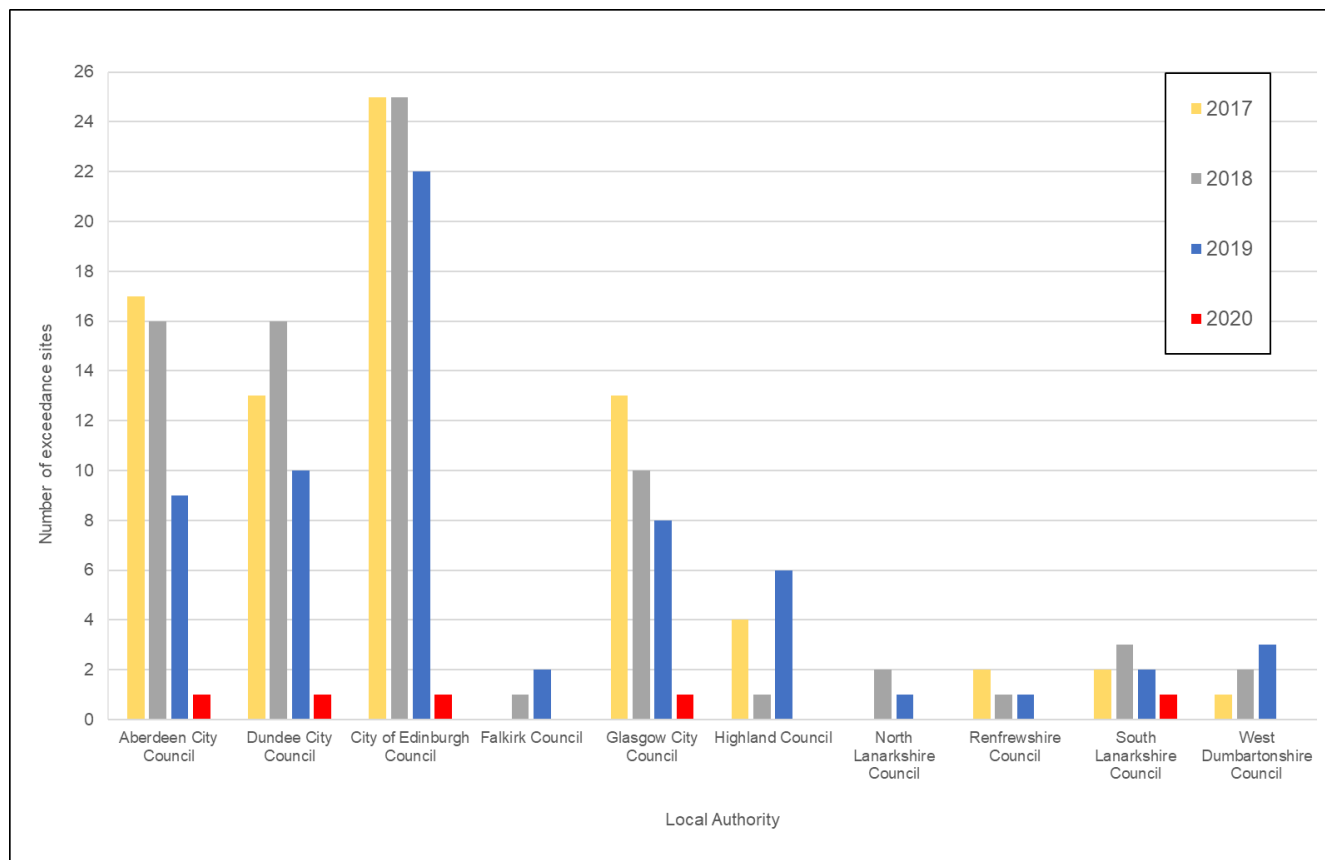
⁷⁸ [Microsoft Word - SAQD - annual report 2020 - Final \(scottishairquality.scot\)](#)

Figure 10-2 Number of diffusion tube sites and the number of these sites recording exceedances in Scotland between 2013 - 2020.



10.8 Despite reducing slightly year-on-year, further analysis of the site exceedance numbers reported in individual 2021 APR's continue to highlight areas of concern, as illustrated in Figure 10-3. Areas of concern primarily relate to city centre sites including Aberdeen, Dundee, Edinburgh and Glasgow, associated with high levels of transport emissions.

Figure 10-3 Number of sites in each of the Local Authority areas where exceedances of the annual mean NO₂ objective (between 2017 - 2020) were reported in 2019⁷⁹.



10.9 As shown in Figure 10-3, three local authorities recorded a greater number of sites exceeding the NO₂ annual mean objective in 2019 than in 2018. The Highland Council records an increase of five sites and Falkirk and West Dunbartonshire Councils both record one additional exceedance site across their geographical areas.

10.10 It is evident that the number of site exceedances (see Figure 10-2 and 10-3) are much lower in 2020, again, likely to relate to a reduction of vehicle movements following the Covid-19 lockdown restrictions imposed throughout Scotland. As yet there is no published diffusion tube data for 2021.

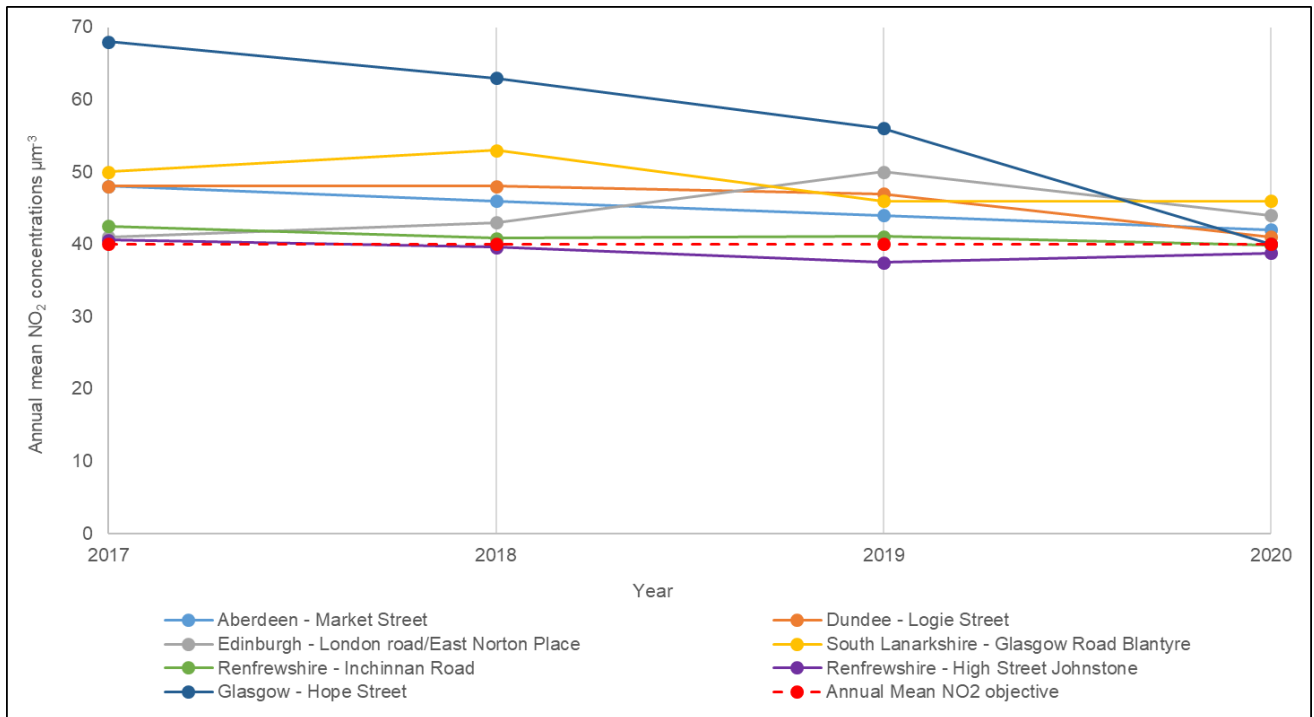
10.11 Seven of the 1050 diffusion tube sites (from 2020) across six local authorities reported exceedances or borderline exceedances⁸⁰ of the annual mean objective for

⁷⁹ This includes bias-adjusted and distance-corrected data for Renfrewshire diffusion tube sites.

⁸⁰ Following bias adjustment and corrections the annual mean NO₂ concentrations at the Renfrewshire Inchinnan Road and Renfrewshire High St Johnstone sites reduced from 40.2 to 39.9 µg/m³ and 39.2 to 38.8 µg/m³ respectively as per LAQM TG16.

NO₂ in 2020⁸¹. Most of these have also persistently exceeded the annual mean objective since 2017 onwards. These sites include Aberdeen (39 Market St), Dundee (Logie St), Edinburgh (London Road/East Norton Place), South Lanarkshire (233 Glasgow Road Blantyre), Renfrewshire (Inchinnan Road, High St Johnstone) and Glasgow (Hope St). Figure 10-4 illustrates the annual mean NO₂ concentrations for each of the seven sites during the period 2017-2020.

Figure 10-4 Annual mean NO₂ concentrations at each of the seven diffusion tube site locations recording exceedances in 2020.



10.12 Analysis of the 2017 to 2019 data for these sites confirms that only one site, Glasgow Hope Street, recorded an average reduction of over 10 µg/m³ in NO₂ concentrations within this three-year period. In contrast, the Edinburgh London Road/East Norton Place site recorded an increase from 41 µg/m³ in 2017 to 50 µg/m³ in 2019, with concentrations at the other five sites remaining relatively constant or small reductions of between 1 and 4 µg/m³ (see Figure 10-4).

10.13 As illustrated in Figure 10-4, the highest NO₂ concentrations recorded in 2020 occurred at the South Lanarkshire 233 Glasgow Road Blantyre site with a value of 46

⁸¹ [Air quality scot 2015-V10 \(scottishairquality.scot\)](https://www.scottishairquality.scot/air-quality-scot-2015-v10)

$\mu\text{g}/\text{m}^3$. It is also worth highlighting that out of the seven sites this is the only site that does not fall within an existing AQMA boundary. However, South Lanarkshire Council have installed an automatic monitor in this area in January 2019 to gather supplementary evidence as to whether a new AQMA should be declared. The remaining six sites recorded values of between 40 and 44 $\mu\text{g}/\text{m}^3$ in 2020, as illustrated in Figure 10-4.

10.14 In ESS' view, this evidence emphasises the importance of ensuring a comprehensive monitoring system exists which regularly reviews and accurately captures the dynamic and complex nature of variances in air pollutant concentrations at a local level.

Modelling data

10.15 Ricardo Energy and Environment's modelled analysis maps⁸² for NO₂ levels in 2019 shows that there were no predicted exceedances of the Scottish annual mean NO₂ objective of 40 $\mu\text{g}/\text{m}^3$ at background locations⁸³. However, overall exceedances of the Scottish annual mean NO₂ air quality objective were modelled at roadside locations in four of the six zones and agglomerations in Scotland. Exceedances of the annual mean NO₂ objective at roadside locations were modelled at 52 road links (102.5 km of road) in the Glasgow Urban Area and at 20 road links (45.0 km of road) in Central Scotland. In the Edinburgh Urban Area there were nine road links (11.0 km of road) where exceedances of the Scottish annual mean NO₂ air quality objective were modelled, and in the North East Scotland zone, four roads had an exceedance (8.5 km of road). In total, the Scotland-specific model predicted that the Scottish annual mean NO₂ air quality objective was exceeded along 85 road links (167 km of road) in 2019. No roadside exceedances of the Scottish annual mean NO₂ air quality objective were modelled in the more rural zones of Scotland, i.e. the Highlands and Scottish Borders.

⁸² [Scottish Air Quality Maps](#)

⁸³ Background locations are sited away from identified pollutant source(s) to achieve background levels of a pollutant within a local area.

11. Current Strategies to Achieve Compliance

CAFS

11.1 In 2015, the Scottish Government published its air quality strategy 'Cleaner Air for Scotland – The Road to a Healthier Future' (CAFS). CAFS brought together into a single framework a number of Government policies impacting on air quality, and sets out a series of 40 actions intended to deliver further air improvements.

11.2 One of the main intentions of CAFS was to provide the support required by local authorities (and others) to implement effective actions and to provide strong national and local political leadership to help deliver air quality improvements. One of the central components of CAFS was the development of two new technical frameworks, the National Modelling Framework (NMF) and the National Low Emissions Framework (NLEF). SEPA has been leading the development of the NMF and working closely with local authorities, providing technical assistance by developing robust air quality modelling, and the subsequent evidence, for the four initial cities (Glasgow, Edinburgh, Aberdeen and Dundee). The intention is that these outputs will provide some of the evidence required for the NLEF⁸⁴.

11.3 The Scottish Government through CAFS, sought for the first time to bring together the major policy instruments concerning Air Quality and related policy areas (e.g. climate change, transport, planning, health) under one overarching strategy. However, during the five-year lifespan of CAFS a number of the actions were not achieved⁸⁵ and NO₂ limit values continued to be exceeded in a number of locations.

CAFS2

11.4 On 15 July 2021, the Scottish Government published its new strategy for tackling poor air quality (Cleaner Air for Scotland 2 - Towards a Better Place for Everyone

⁸⁴ This has been completed, with NLEF guidance published in January 2019 (<https://www.gov.scot/publications/national-low-emission-framework/>). The four cities proceeded with LEZ development with the NLEF being co-developed at the same time.

⁸⁵ 36 of the 40 CAFS actions were completed with the remaining four actions carried over into CAFS2.

“CAFS2”). The new strategy set out a wide range of actions that will be taken by the Scottish Government to improve air quality.

11.5 Although the Scottish Government has committed to ensuring that all trunk and local roads which are required to be assessed by the methodology comply with European Union limit values, there is no specific timescale set for this, nor are there any timescales set for when the other actions will be taken. In ESS’ view a number of the other actions are aspirational in nature and do not contain sufficient detail to assess effectiveness. For example, ESS notes that CAFS2 does not outline specific time periods for proposals to be implemented and timescales to attain objectives, with the delivery plan merely referring to the specific actions as short- (2022), medium- (2024), and long-term (2026). There is also, in ESS’ view, insufficient detail and modelling of how it is likely that the proposed system will bring about compliance within the shortest time possible.

11.6 In view of this, further information was sought from the Scottish Government. The Scottish Government response confirmed that, under Section 88(2) of the 1995 Act, local authorities are required to have regard to any guidance (issued under Section 88(1)) by the Scottish Ministers when undertaking their LAQM duties. In this respect CAFS2 is considered by the Scottish Government to be statutory guidance for those elements of the strategy which local authorities have responsibility for delivering. Other than this, there is no legal status for CAFS2, although certain individual actions within the strategy may have their own legal requirements.

11.7 The Air Quality (Scotland) Regulations 2000, the Air Quality (Scotland) Amendment Regulations 2002 and the Air Quality (Scotland) Amendment Regulations 2016 set out the deadlines by which air quality objectives should be achieved by local authorities for the purposes of LAQM. Unlike the EU limit values, which Member States (and the UK under EU exit legislation) are legally obliged to meet, under the 1995 Act local authorities are required to demonstrate that they are doing all that is reasonably possible to work towards achieving the objectives. This is because local pollution sources are often outside the direct control of authorities e.g. trunk roads managed by Transport Scotland or industrial processes regulated by SEPA. There is for this reason an element of subjectivity in assessing progress towards compliance with the objectives.

11.8 CAFS and CAFS2, in conjunction with the existing legal instruments available, provide the mechanisms for necessary improvements in air quality in Scotland. CAFS and subsequently CAFS2 has placed a greater focus on delivering air quality improvements through evidence-based actions/measures and this is complemented by the existing LAQM regime. As part of this process ministerial and delivery groups were set up, with the ministerial group scheduled to meet twice yearly. ESS sought information regarding these groups from the Scottish Government. The response received advises that the first ministerial meeting took place on 8 December 2021, and the second took place six months later, on 8 June 2022. The delivery group is scheduled to meet quarterly and has so far met on three occasions, including 1 December 2021, 9 March 2022 and 1 June 2022. As the groups are still in the early stages of their discussions, there are no specific outputs to date, other than to agree the terms of reference and the memberships. Discussions have focused on initial progress with implementing the CAFS2 actions and more general developments around air quality within the respective membership organisations.

11.9 An annual progress report will be published for CAFS2 summarising work on the various actions over the previous year. Members of the delivery group will contribute to the report, which will then be submitted to the ministerial group for approval. Once approved by the ministerial group, the report will be presented to the Scottish Parliament. Response information from the Scottish Government confirms that the first annual progress report⁸⁶ was submitted and approved by the ministerial group during the June 2022 meeting. Confirmation has also been received, that this report has been submitted to Parliament on 13 June 2022, prior to the summer recess. In light of the above, ESS makes the following recommendation:

That CAFS2 is revised to include specific and measurable timescales for when compliance with NO₂ limit values should be achieved.

Low Emission Zones

11.10 Transport-related sources of air pollution are the main cause of long-term and persistent exceedances in NO₂ levels within urban areas of Scotland. Outwith CAFS,

⁸⁶ [*Cleaner Air for Scotland 2 annual progress report 2021-22 June 2022.pdf \(scottishairquality.scot\)](#)

and to help tackle this issue, the Scottish Government committed to the introduction of LEZs into the four largest cities in Scotland. Scotland's first LEZ was established in December 2018 in Glasgow⁸⁷, with further LEZs planned for Aberdeen, Dundee and Edinburgh by 2024⁸⁸. Implementation of the LEZs was delayed due to the pandemic. In addition, other local authorities in Scotland with active AQMAs have undertaken assessments as part of their APR process (in accordance with the NLEF) to determine whether an LEZ would be an appropriate intervention in their areas. The 2020 APRs of these local authorities confirm that at present no further LEZs are anticipated. The two main objectives of the LEZ (along with other national and local measures) are to help achieve compliance with the air quality objectives, and to contribute to meeting climate change reduction targets.

- 11.11 Following the commitment of LEZ's made by the Scottish Government in 2017, a three-tiered governance arrangement was established for the introduction of LEZs in Scotland. Whilst the Scottish Government sets the national framework for LEZs the responsibility for the overarching decision-making and development of LEZs falls to the individual local authority. To achieve greater insight into such arrangements ESS sought information from the four local authorities with forthcoming LEZs.
- 11.12 Response information received confirms that the four individual local authorities have followed the recommended Scottish Government requirements including: the 2019 NLEF guidance document⁸⁹; Transport (Scotland) Act 2019⁹⁰; LEZ (Scotland) Regulations 2021⁹¹; and the 2021 Transport Scotland LEZ Guidance document when developing their LEZ. During this process LEZ delivery groups were set up, and included external representatives from organisations such as SEPA, National Health Service (NHS), Tayside and Central Scotland Transport Partnership (TACTRAN), and Transport Scotland. The delivery groups were responsible for: guiding option development, testing and appraisal work; determining and implementing a communications and engagement strategy; and determining the options to be put forward to decision-makers (local authority committees) for approval at various stages of the LEZ development process. Subsequently, the convenor for each committee

⁸⁷ This LEZ was only for buses, and will be expanded to include all vehicles by 2024.

⁸⁸ [Low Emission Zones Scotland | Transport Scotland](#)

⁸⁹ [low-emission-zone-guidance-october-2021.pdf \(transport.gov.scot\)](#)

⁹⁰ [Transport \(Scotland\) Act 2019 \(legislation.gov.uk\)](#)

⁹¹ [The Low Emission Zones \(Scotland\) Regulations 2021 \(legislation.gov.uk\)](#)

would represent the individual local authority at the LEZ Leadership Group along with representatives of the Scottish Government, Transport Scotland, NHS, SEPA and senior councillors from the other LEZ cities. The role of the LEZ Leadership Group was to monitor and oversee the successful implementation of LEZs in the four Scottish cities.

11.13 Enforcement timelines (and associated grace periods) are again decided at the local level with the potential for a phased approach towards enforcement, as is being used by Glasgow City Council. The Transport (Scotland) Act 2019 offers 'grace periods' of no less than one and no more than four years. As such, local authorities have the autonomy to choose a grace period for their LEZ schemes and can use the powers provided by the Act to inform their own LEZ plans. A two-year grace period has been approved for the Dundee, Aberdeen and Edinburgh LEZ schemes, with enforcement commencing in May/June 2024. Glasgow proposes a one-year grace period for Phase 2 of its existing LEZ, a year ahead of the other cities (June 2023). However, residents of the zone are subject to an additional one-year grace period with enforcement for these vehicles beginning on 1 June 2024. Full enforcement for all vehicles will therefore commence at a similar time as the other three LEZ schemes. Once the LEZs are fully operational and enforceable from Summer 2024, response information received suggests that compliance with the NO₂ air quality objectives are predicted to be achieved within the LEZ areas by that date. Therefore, the first full year where all four LEZs will apply to all vehicles is expected to be 2025, some three years from now.

11.14 During the investigation, ESS looked at the ways in which other cities across the UK have implemented the equivalent of LEZs, specifically with regards to discretionary 'grace periods' or soft enforcement approaches. Both the Bath and Birmingham Clean Air Zones (CAZ)⁹², launched in 2021, offer exemptions and mitigations to reduce the negative impacts on groups identified as most likely to be affected (residents, low income workers and businesses) from CAZ implementation. In the case of the Birmingham CAZ (which includes cars) a longer exemption period of two years is offered to non-compliant private vehicles registered within the CAZ, in comparison to a one-year exemption for equivalent commercial vehicles and non-compliant private vehicles registered to low income workers (earning less than £30,000 p.a.) whose

⁹² A CAZ is similar to a LEZ however deterrence methods, charges and penalties vary between Scotland and England.

registered place of work is in the CAZ.⁹³ Through this approach Birmingham City Council believe their CAZ balances the need to reduce the impact on individuals and businesses and deliver compliance in the shortest possible time⁹⁴. This contrasts with the blanket two-year grace period (regardless of type of vehicle, use, income and purpose of journey) approved for the Aberdeen, Dundee and Edinburgh LEZs.

11.15 LEZ penalties are set nationally in legislation, within the Low Emission Zones (Emission Standards, Exemptions and Enforcement) (Scotland) Regulations 2021⁹⁵. Enforcement of the four LEZs will be undertaken by Automatic Number Plate Recognition (ANPR) cameras stationed at all boundary entry points. Local authorities are not currently penalised for not achieving compliance with the LEZ objectives. However, their plans to achieve compliance are subject to oversight by the Scottish Government and local authorities may be ordered to review and adjust their plans if they are deemed inadequate⁹⁶.

11.16 The investigation has looked into the specific coverage of the proposed LEZs and mapped these against known hotspots of NO₂ exceedances and declared AQMAs boundaries. As shown in Annexes 5 and 6, two of the four LEZs (Dundee and Edinburgh) fail to include all monitoring sites recording persistent exceedances of the annual mean objective and therefore raise questions over how local authorities plan to tackle these non-compliant areas falling outside the LEZ boundaries. Furthermore, ESS is also aware that following the prescribed modelling and consultation processes at least two local authorities (Aberdeen and Edinburgh) have reduced the scope of their LEZs, therefore information was sought from the relevant public authorities in this regard.

11.17 Modelling of LEZ scheme scenarios in all four cities has been undertaken by SEPA based on methodology established by the NMF. Local city model simulations have been developed utilising ADMS-Urban (a recognised air quality modelling software system that is used for modelling all aspects of air pollution across urban areas) supported by transport modelling to assess potential changes in pollutant concentrations resulting from different traffic scenarios. Detailed traffic data, as

⁹³ [Applications open for Clean Air Zone exemption permits | Birmingham City Council](#)

⁹⁴ [*Document.ashx \(cmis.uk.com\)](#)

⁹⁵ [The Low Emission Zones \(Emission Standards, Exemptions and Enforcement\) \(Scotland\) Regulations 2021 \(legislation.gov.uk\)](#)

⁹⁶ [low-emission-zone-guidance-october-2021.pdf \(transport.gov.scot\)](#)

described in the NMF Pilot Study, was first collected in 2017 to generate the air quality model for each of the cities under the NMF. Further traffic counts were undertaken in 2019 in all four cities and more recently in 2022, counts were recorded in Dundee, Edinburgh and Glasgow. Additional data was collected in 2020 to model the impacts of the pandemic.

- 11.18 The data was collected using a selection of junction turn counts, automatic turn counts and ANPR detections to determine the 11 vehicle categories, fleet age and modal type. In addition, detailed information on the bus fleet was obtained including fleet age and service frequencies to reflect more accurately bus vehicle emission standards and to capture the emissions associated with all the categories of the vehicle fleet. All counts were undertaken by SEPA and Transport Scotland in conjunction with the local authorities, as part of the NMF. It is expected that this will continue following LEZ implementation to refine and validate the modelling and future monitoring. SEPA confirm they are committed to developing a central approach to gathering existing traffic data and commissioning additional data collection to refine the above. In addition, Dundee City Council have also installed permanent Automatic Traffic Count (ATC) sites around the city to monitor traffic levels in air quality locations.
- 11.19 All LEZ boundary proposals were subject to an initial public and stakeholder consultation phase, in accordance with the criteria set out in the LEZ Regulations. The final LEZ scheme design proposal, including the boundary, was subject to another round of public and stakeholder engagement before submission to the Council Committees and Scottish Government Ministers for approval. Legislation requires that the boundaries and performance of the LEZ once introduced, shall be monitored and reported on annually. Should the LEZ be identified as not meeting the objectives set, the local authority is able to modify the scheme subject to approval by the Scottish Ministers.
- 11.20 Emissions modelling carried out by SEPA suggests that the introduction of the LEZs will significantly reduce NO₂ and PM₁₀ emissions from vehicles which will result in lower pollutant concentrations within the LEZs. In addition, a reduction in NO₂ levels at locations outwith the LEZ areas is predicted to result mostly due to improvements in bus fleets operating on routes that extend outwith the LEZ area. For example, in

Edinburgh it is predicted that there will be a reduction of NO_x⁹⁷ (noting NO₂ is a form of NO_x but doesn't represent all NO_x) emissions from traffic sources by 55% (equivalent to 25-30 tonnes/year) within the LEZ boundary, when compared to 2019 levels. For areas not covered by the LEZ, it is predicted that NO_x emissions from traffic sources will decline by 15% when compared to 2019 levels. Overall, NO_x emissions across the city model will decline by 20% (or 72 tonnes/year), when compared to 2019 levels. On several roads within the LEZ, NO_x emissions are predicted to decline by over 50%, and on Princes Street NO_x emissions are predicted to decline by over 75%. Although average concentrations are predicted to be reduced, information provided clearly states that "this does not necessarily mean that compliance will be met at all locations, especially on busy roads and junctions"⁹⁸. In view of this, ESS agrees with the response provided by City of Edinburgh Council that "AQAP measures will need to take a holistic overview of providing further improvement".

11.21 In the case of Glasgow, recent monitoring data available on the SAQD website (illustrated in Figure 10-1) highlights that in 2021, an exceedance of the annual mean NO₂ objective was recorded at the Glasgow Kerbside automatic monitoring station⁹⁹. This kerbside monitor is located on Hope Street, and the full length of Hope Street is included within the existing LEZ boundary of which phase one (buses only) has been in operation since 2018.

11.22 This LEZ will be extended to all other 'polluting' vehicles in 2024, where modelling results predict large reductions of NO₂ inside the LEZ after full implementation. The response information from Glasgow City Council states that almost all predicted exceedances of the objectives will be removed. However, again some isolated exceedances are predicted to remain on key bus routes and near junctions, for example Hope Street. This is also true for Aberdeen, where exceedances are anticipated to remain on Bridge Street and Holburn Street, both of which are located within the approved LEZ boundary. In contrast, the information received from Dundee City Council anticipates that compliance will be achieved at all locations within the approved LEZ boundary.

⁹⁷ Nitrogen oxides (NO_x) is a collective term used to refer to nitrogen monoxide (nitric oxide or NO) and nitrogen dioxide (NO₂).

⁹⁸ Response from City of Edinburgh Council

⁹⁹ [Scottish Air Quality Database Annual Report](#)

11.23 Analysis of the information received from the responses highlights that localised and isolated exceedances are also expected to remain in areas outside the LEZ boundary both in Aberdeen and Edinburgh (see Annex 6), despite small overall decreases in NO₂ concentrations due to the implementation of the LEZ. Likewise, in Dundee despite a slight overall improvement in levels within the city centre area, NO₂ levels are not predicted to reduce to below the objective level at three existing monitoring locations outwith the LEZ area (Lochee and Loons Road and Dock Street). This forecast, in ESS' view, is not surprising given the relatively limited coverage of the AQMA boundary by the LEZ (as illustrated in Annex 5) and concerns also arise regarding the potential for pollutant displacement to other areas. In contrast, the response information received from Glasgow City Council predicts that after its Phase 2 LEZ is fully operational, all areas outwith the LEZ boundary will be compliant with NO₂ limit values.

11.24 In view of the above information, ESS agrees that LEZs are certainly a step in the right direction to achieving compliance with NO₂ limit values in Scotland's cities. However, the relative 'effectiveness' of LEZs as a standalone mitigation may be difficult to ascertain and should almost certainly be accompanied by other ambitious strategies to encourage behaviour change and the uptake of alternative sustainable transport options. There is strong evidence that air pollutants (including NO₂) still cause harm to public health at concentrations well below legal limit values, highlighting the need for urgent action, and increased commitment and collaboration from all key players within this area. Accordingly, ESS makes the following recommendation:

That the recommended monitoring body has the remit to monitor the implementation and effectiveness of LEZs.

12. Conclusions

- 12.1 There are examples of where air quality limit values in respect of NO₂ concentrations have not been met. The courts have been clear on the seriousness of the issue and the State's responsibility to comply with air quality limit values within as short a time as possible.
- 12.2 There has been slow, incremental, improvement in air quality. The introduction of LEZs may improve matters further. However, despite the efforts made to improve air quality, areas of non-compliance with respect to NO₂ have remained and are anticipated to remain going into the future. Such outcomes are, in ESS' view, no longer tenable given the significant length of time which has passed since compliance should have been achieved, and the serious impacts poor air quality has on public health.
- 12.3 **ESS concludes that significant weaknesses remain in the systems to improve air quality with respect to NO₂.** There are instances of AQMAs being in place for years after declaration and examples of AQAPs not being reviewed for significant periods of time or published years after the declaration of the AQMA to which they relate. Despite examples of long-term exceedances, no directions have been issued to public authorities in respect of this.
- 12.4 ESS is also concerned whether the LAQM monitoring system is robust enough to provide a comprehensive picture of air quality, particularly in and around our cities. CAFS2 does not include sufficiently specific and timely measures and specific timescales to be consistent with the overarching duty to achieve compliance within the shortest time possible.
- 12.5 ESS concludes that the system of governance and oversight of air quality is overly complex and opaque. ESS is unconvinced whether the current structures are agile enough to eliminate air quality exceedances within the shortest time possible.
- 12.6 If the Scottish Government decides to keep pace with EU plans to reduce limits for NO₂ further, ESS does not consider that the current system will be capable of meeting these revised limits effectively and efficiently and within the shortest time possible.

12.7 ESS has issued this improvement report under Section 26 of the Continuity Act to remedy these concerns as they represent a systemic failure. In ESS' view, the following weaknesses constitute a failure to make effective environmental law, the consequences of which carries the risk of prolonging the health impacts of poor air quality:

- the lack of any legal requirement for local authorities to complete and publish AQAPs within a specified target date following the declaration of an AQMA;
- the lack of any legal requirement on local authorities to complete AQMA objectives within a specified timeframe;
- the lack of any legal requirement for local authorities to review and, where necessary, update AQAPs; and
- the lack of a dedicated monitoring body with the remit and powers to act quickly and robustly.

12.8 Improving air quality more widely is a complex issue, but ESS considers that strengthening the operational and governance arrangements for air quality management will contribute positively towards this. Accordingly, under Section 28 of the Continuity Act, ESS recommends that the Scottish Government should:

1) Introduce the requirement for local authorities to complete and publish AQAPs within a specified target date following the declaration of an AQMA, which must be within as short a time as possible.

2) Introduce the requirement for local authorities to achieve AQMA and AQAP objectives within a specified target date, which must be within as short a time as possible.

3) Introduce the requirement for local authorities to review and, where necessary, update AQAPs. The targets for any such review and update must be consistent with the principle of as short a time as possible.

4) Identify or introduce a monitoring body¹⁰⁰ with the remit to look at the system of air quality monitoring and compliance holistically (including the monitoring of the implementation and effectiveness of LEZs). It is critical that this body should be able to move quickly where air quality does not meet legal requirements, consistent with the principle of achieving compliance within the shortest time possible, and thus it should have the requisite power to direct action when deemed necessary¹⁰¹.

12.9 Under Section 30 of the Continuity Act, Scottish Ministers must respond to this report by preparing an improvement plan and laying this before the Scottish Parliament, setting out what they propose to do in respect of these recommendations¹⁰².

12.10 ESS also makes the following recommendations to the Scottish Government under its power to make recommendations in relation to any matter relevant to its functions¹⁰³:

5) that the Scottish Government ensures that its ongoing review of data provision scrutinises the protocols for the siting of monitoring sites, with a view to establishing whether they provide a sufficiently comprehensive picture of the state of air quality, particularly in and around our major cities. Specific focus should be placed on areas where vulnerable groups are present, such as schools and hospitals.

6) that the Scottish Government revises CAFS2 to include specific and measurable timescales (consistent with the overarching duty to achieve compliance within the shortest time possible) for when compliance with NO₂ limit values should be achieved.

12.11 ESS will monitor and publicly report upon the implementation of these recommendations.

¹⁰⁰ The rationale and precedent for a monitoring body has already been set. Under Section 47 of the Climate Change (Scotland) Act 2009, Scottish Ministers can designate a body to monitor and investigate whether public bodies are complying with their climate change duties.

¹⁰¹ Although it is not ESS' role to regulate the system of air quality monitoring, we will continue to scrutinise the relevant data and any wider developments in the interim.

¹⁰² The improvement plan must be laid before the Scottish Parliament within a maximum of nine months from ESS laying this report.

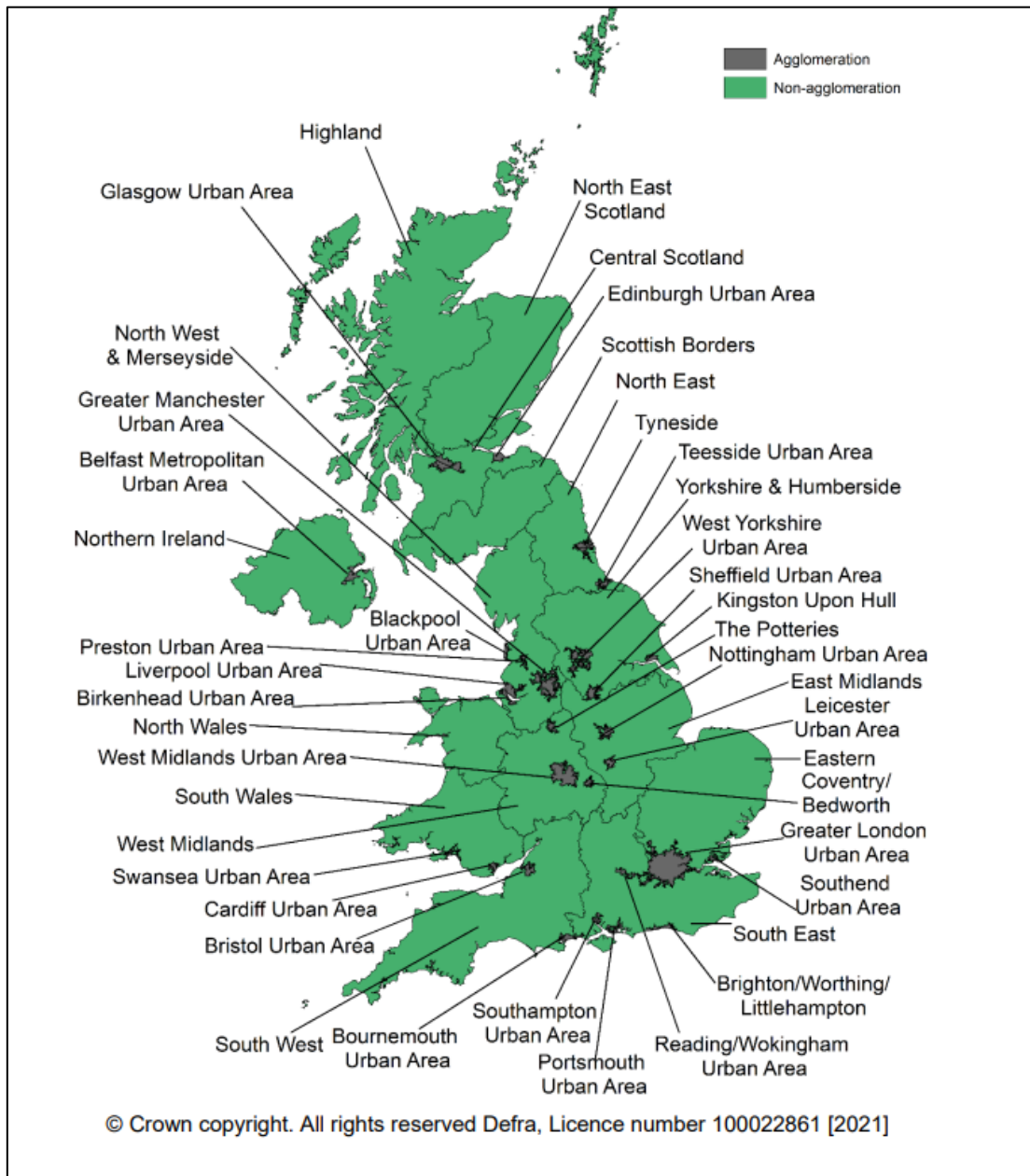
¹⁰³ See Section 20(2)(c) of the Continuity Act

Annex 1 Local Authorities in Scotland with Air Quality Management Areas declared for NO₂

Local authority	AQMA Name	Year Declared (date revoked)
Aberdeen City	Aberdeen City Centre AQMA	2001 (extended in 2011)
	Wellington Road AQMA	2008
	Anderson Drive AQMA	2008 (extended in 2011)
City of Edinburgh	Edinburgh City Centre AQMA	2000 (extended in 2013 and 2015)
	Edinburgh St Johns Road AQMA	2006
	Great Junction Street AQMA	2009 (extended in 2013)
	Inverleith Row AQMA	2013
	Glasgow Road AQMA	2013
Dundee City	Dundee AQMA	2006
East Dunbartonshire	Kirkintilloch Road / Bishopbriggs AQMA	2005
	East Dunbartonshire Council / **Bearsden AQMA	2011
East Lothian	High Street / Musselburgh AQMA	2014
Falkirk	**Banknock & Hags AQMA	2010 (October 2021)
	Falkirk Town Centre AQMA	2013
Fife	**Bonnygate Cupar AQMA	2008 (September 2021)
	**Appin Crescent / Dunfermline AQMA	2011 (September 2021)
Glasgow City	Glasgow City Centre AQMA	2002
	Byres Road/ Dumbarton Road AQMA	2007 (extended in 2012)
	**Parkhead AQMA	2007 (October 2020)
Highland	Inverness City Centre AQMA	2014
North Lanarkshire	Motherwell AQMA	2005
	Coatbridge AQMA	2005 (amended to include NO ₂ in 2015)
	Chapelhall AQMA	2005 (amended to include NO ₂ in 2015)
Perth and Kinross	Perth AQMA	2006
	Crieff AQMA	2014
Renfrewshire	Paisley AQMA / Paisley Town Centre AQMA	2006 (extended in 2009 and amended to Paisley Town Centre AQMA)
	Johnstone High Street AQMA	2016
	Renfrew Town Centre AQMA	2016
South Lanarkshire	Lanark AQMA	2016
West Lothian	Broxburn AQMA	2011
	Linlithgow AQMA	2016

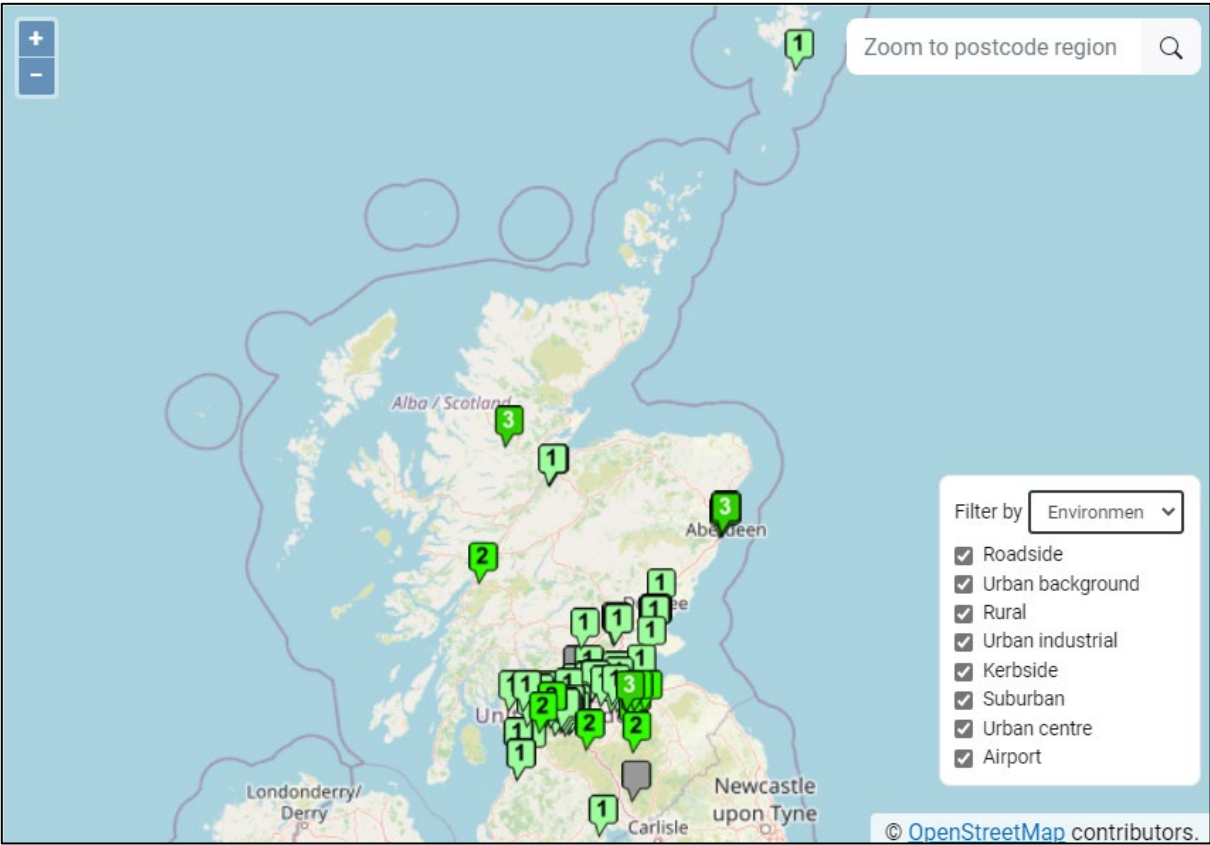
**recently revoked for NO₂

Annex 2 Map illustrating UK Zones for NO₂ monitoring



Source [air pollution uk 2019 \(defra.gov.uk\)](https://www.defra.gov.uk/air-pollution-uk-2019)

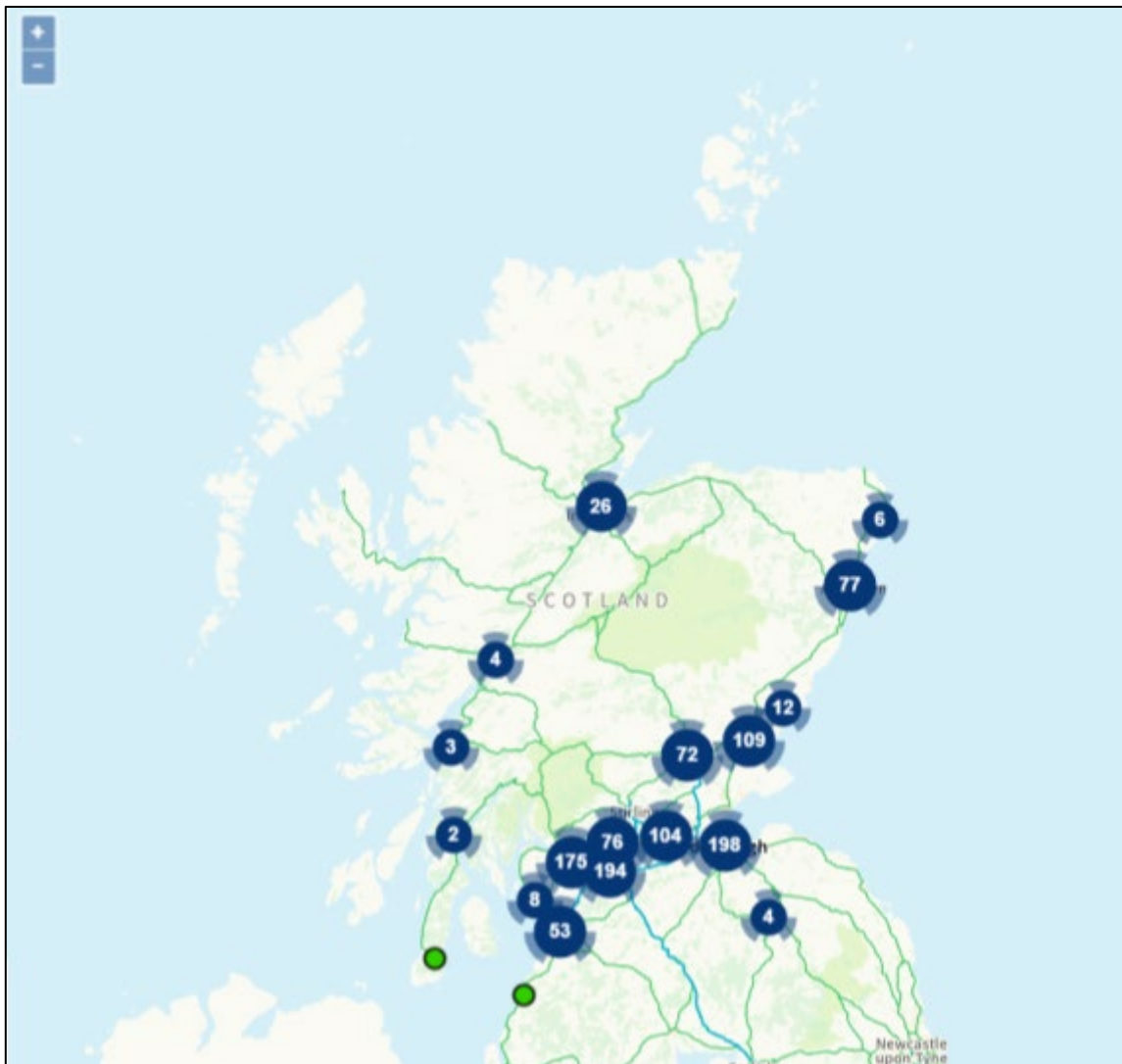
Annex 3 Map illustrating the locations of the automatic air quality monitors in Scotland



Source [Latest pollution map \(scottishairquality.scot\)](https://www.scottishairquality.scot)

Accessed 10/09/2022

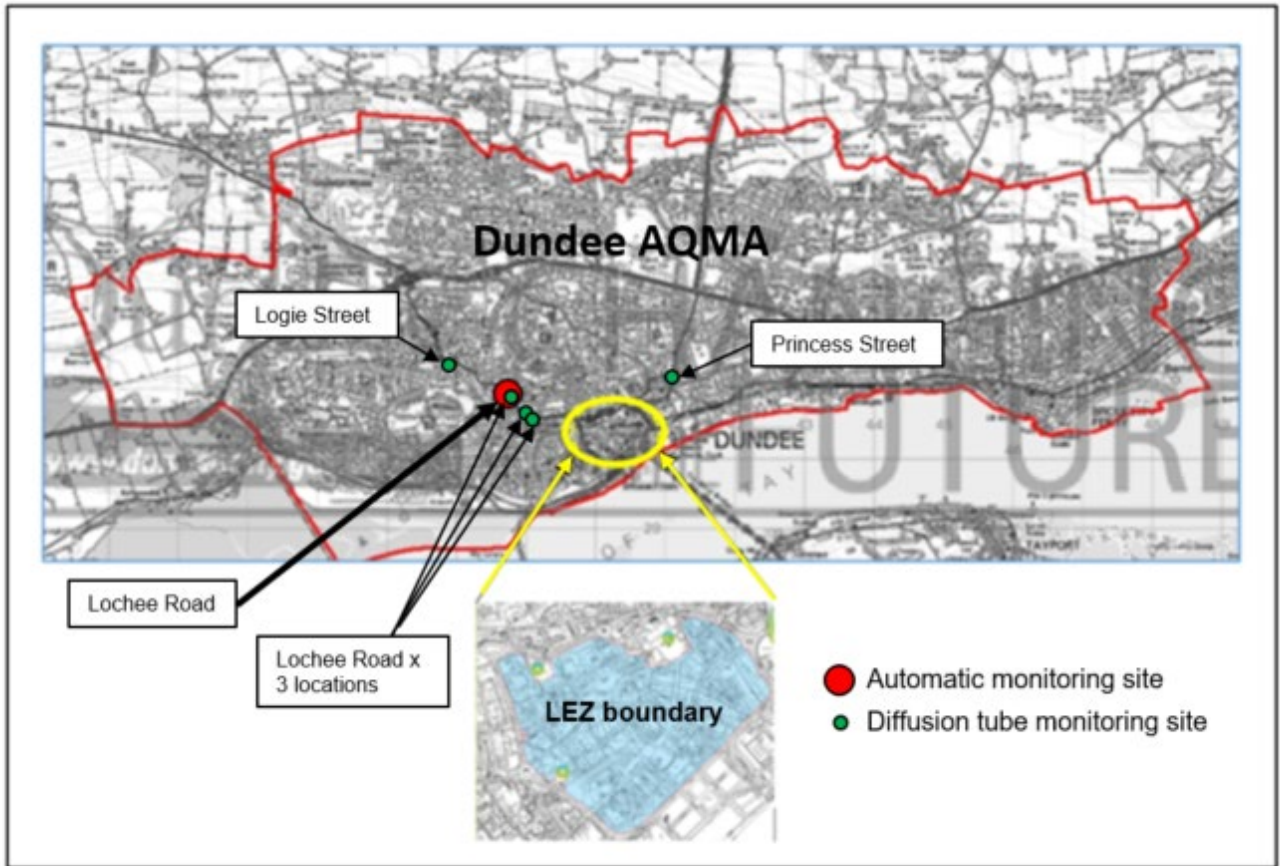
Annex 4 Map illustrating the latest available diffusion tube locations (2019) for all relevant Local Authorities in Scotland¹⁰⁴.



Source [Latest pollution map \(scottishairquality.scot\)](https://www.scottishairquality.scot)
Accessed 10/09/2022

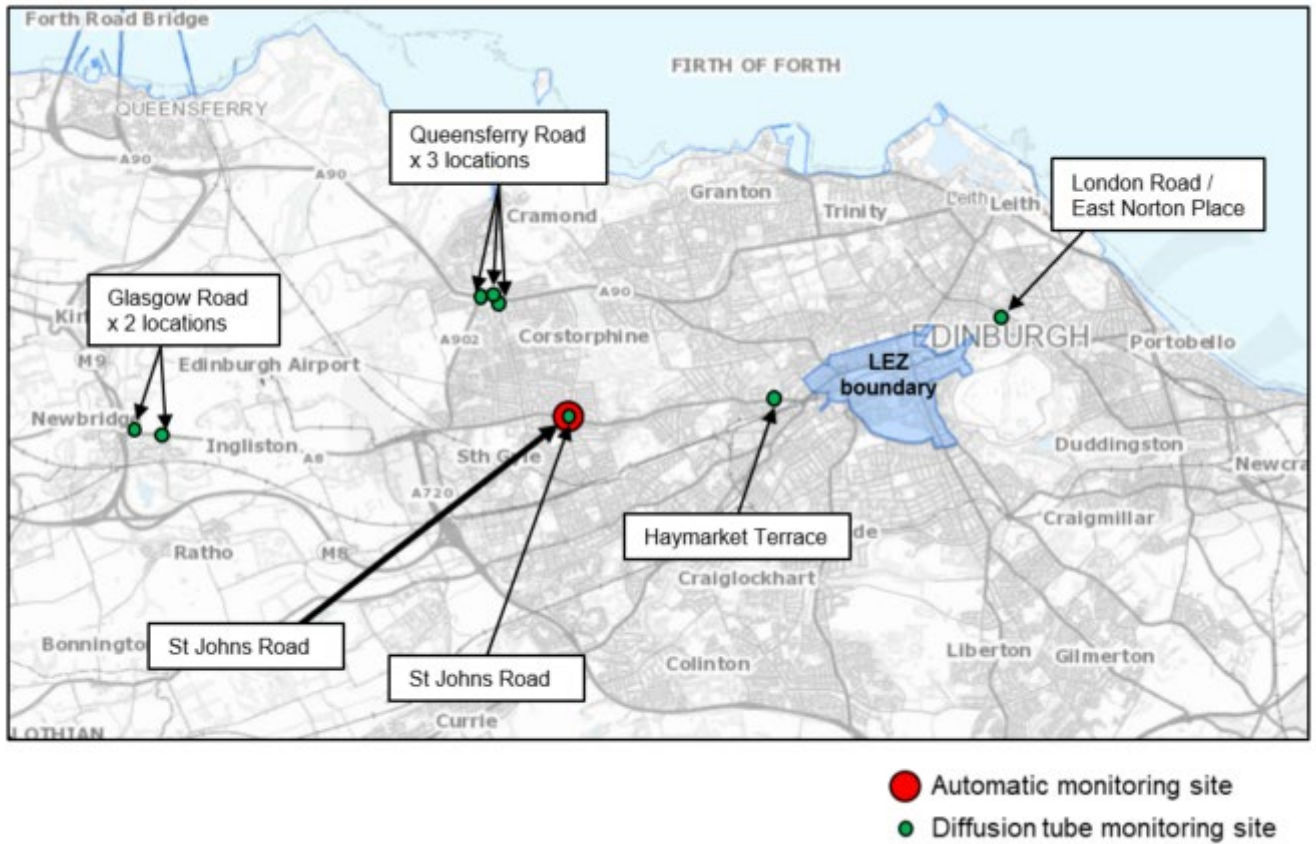
¹⁰⁴ Due to the large number of diffusion tube sites in Scotland, this diffusion tube map has been designed using a cluster system. This system groups multiple sites found in a specific area into one point with the number of sites within that area stated within the point.

Annex 5 Map showing the AQMA boundary and the approved LEZ boundary in Dundee, along with monitoring sites locations (outwith the LEZ boundary) where annual mean NO₂ exceedances were recorded in 2019



Sources [Air Quality Management Area map | Dundee City Council](#)
[Dundee Low Emission Zone Scheme | Dundee City Council](#)

Annex 6 Map of approved LEZ boundary in Edinburgh along with monitoring sites locations outwith the LEZ boundary where annual mean NO₂ exceedances were recorded in 2019



Source [About the LEZ – The City of Edinburgh Council](#)

List of Abbreviations

ANPR	Automatic Number Plate Recognition
APR	Annual Progress Report
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
ATC	Automatic Traffic Count
AURN	Automatic Urban and Rural Network
CAFS	Cleaner Air for Scotland
CAZ	Clean Air Zone
COMEAP	Committee on the Medical Effects of Air Pollution
Defra	Department for Environment, Food and Rural Affairs
ECJ	European Court of Justice
EU	European Union
ESS	Environmental Standards Scotland
FCAQSG	Fife Core Air Quality Steering Group
LAQM	Local Air Quality Management
LA	Local Authorities
LEZ	Low Emission Zone
PM	Particulate Matter
PG	Policy Guidance
NAEI	National Atmospheric Emissions Inventory
NHS	National Health Service
NMF	National Modelling Framework
NLEF	National Low Emissions Framework
NO ₂	Nitrogen Dioxide
NO _x	Oxides of Nitrogen
O ₃	Ozone
PCM	Pollution Climate Mapping
RB	Rural Background
S	Suburban
SAQD	Scottish Air Quality Database
SEPA	Scottish Environment Protection Agency
SG	Scottish Government

SO ₂	Sulphur Dioxide
TACTRAN	Tayside and Central Scotland Transport Partnership
TG	Technical Guidance
UB	Urban Background
UI	Urban Industrial
UK	United Kingdom
UKAS	United Kingdom Accreditation Service
UKSC	United Kingdom Supreme Court
UT	Urban Traffic
WHO	World Health Organisation

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