

# Local action to improve neighbourhood air quality

**A review by the:** CLAHRC NWC Public Health Theme

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## WHAT IS NIHR CLAHRC NWC?<sup>1</sup>

The NIHR Collaboration for Leadership in Applied Health Research and Care for the North West Coast (CLAHRC NWC<sup>2</sup>) is undertaking an innovative programme known as the Neighbourhood Resilience Programme (NRP). NRP aims to shift the policy and practice focus beyond the resilience of people living in disadvantaged neighbourhoods, to engagement with neighbourhoods as *systems* and how the collective resilience of those living/working in neighbourhoods and that of the public, private and voluntary organisations, can be enhanced.

Just promoting individual or community resilience alone is not enough to improve the social determinants of health, rather enhancing resilience at a systems level is essential to releasing the collective capabilities of residents and the people providing and commissioning the services on which they rely.

The NRP operates in ten ‘Neighbourhoods for Learning’ (NsfL), chosen by our nine local authority partners<sup>3</sup> as ward-sized neighbourhoods with relatively poor health. The primary objective of NRP is to contribute to enhancing 'systems resilience' in these neighbourhoods, to improve the social determinants of health inequalities. We define resilient systems as:

...those that take action to enhance the personal and collective capacity of citizens and institutions to respond to and influence the course of social, economic and environmental change (Colussi, 2000<sup>4</sup>).

## INTRODUCTION

This very rapid review (VRR) of the evidence on air pollution<sup>5</sup> was conducted in response to a request from the Neighbourhood for Learning (NfL) in Old Swan (Liverpool) to support their programme of work aimed at improving Old Swan high street. The VRR focuses on two interlinked priorities:

- community involvement in air pollution issues and examples of neighbourhood initiatives to improve air quality;
- and UK local authority interventions to tackle air pollution, particularly those that support community-led action in this field.

It is important to note that by design VRRs are not intended to be comprehensive in nature, rather they provide a ‘snapshot’ of some of the available evidence on a tightly defined topic or set of topics.

## METHOD

The Web of Science (WOS) was used as the primary tool to search the current academic and research literature. This tool enables researchers to conduct comprehensive citation searches through access to multiple databases that reference cross-disciplinary research. The timespan for the searches encompassed the period between 2000-2017 to ensure that only the most up-to-date sources were identified.

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<sup>1</sup> All authors are funded/part funded by the National Institute for Health Research, Collaboration for Leadership in Applied Health Research and Care North West Coast (NIHR CLAHRC NWC). The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health.

<sup>2</sup> More information available at: <http://www.clahrc-nwc.nihr.ac.uk/index.php>.

<sup>3</sup> Lancashire County Council (has two neighbourhoods), Cumbria CC, Blackpool Borough Council, Blackburn with Darwen BC, Halton BC, Knowsley BC, Sefton BC, Liverpool City Council and Cheshire West and Chester Council.

<sup>4</sup> Colussi, M. (2000) *The Community Resilience Manual*. Canadian Centre for Community Renewal.

<sup>5</sup> This review is concerned with outdoor air pollution.

Abstracts of papers were rapidly reviewed to ascertain their relevance to the research focus. Those articles with an emphasis on local and community focused air quality/pollution projects or initiatives, especially within the UK, were the main focus of attention.

Using a basic search on the 'topic' field, 'refined' to encompass academic papers only, the keyword/phrase search terms used on the Web of Science system were:

*Search term: Community air quality project\**

This search returned 326 citations of which five were identified and informed the review (Dates searched: 21-23/08/17).

*Search term: Community air pollution project\**

This search returned 306 citations - one was identified and informed the review (Dates searched: 21-23/08/17).

As can be seen, initial searches on WOS produced a relatively poor return of relevant citations. Consequently, it was decided to conduct further searches using the key words utilising the Google Scholar search tool (also complemented by generic Google searches) to identify any relevant non-academic 'grey' literature and policy documents. These searches unearthed a range of 'non-academic' literature, mainly consisting of reports or case-studies of community air quality schemes, which are referenced in the footnotes of this review. A small number of additional references were also identified from 'snowballing' references in papers and reports that had been initially retrieved.

## BACKGROUND: WHAT IS AIR POLLUTION?

Air pollution has been described as 'Britain's forgotten public health crisis'.<sup>6</sup> At its most basic 'air pollution refers to substances in the air that harm human health, welfare, plant or animal life'.<sup>7</sup> Air pollution consists of:

... a mixture of gases and particles that have been emitted into the atmosphere by man-made processes. The combustion of fossil fuels such as coal, oil, petrol or diesel is the most significant source of the key pollutants<sup>8</sup> of concern to local authorities.<sup>9</sup>

Pollution from road traffic, especially from diesel emissions, is the main cause of poor air quality and 'can be responsible for up to 70% of air pollution.' If a person is in good health, moderate levels of air pollution normally do not have any serious health effects.<sup>10</sup> However:

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<sup>6</sup> The Chartered Institution of Water and Environmental Management, 2013. *Clearing the air. Priorities for reducing air pollution in the UK* (p.6). Available at: <http://www.ciwem.org/wp-content/uploads/2016/02/Clearing-the-Air.pdf>. Accessed on: 22/08/17. Also see: Moore, S. & Newey, G. (2012) *Something in the Air. The forgotten crisis of Britain's poor air quality*. Policy Exchange: London.

<sup>7</sup> Greater London Authority website, 2017. *Health and exposure to pollution*. Available at: <https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/health-and-exposure-pollution>. Accessed on: 22/08/17.

<sup>8</sup> While human (or anthropogenic) sources of pollution are the main causes of poor air quality, natural sources such as wind-blown dust, forest fires and volcanic eruptions can also cause or exacerbate air pollution.

<sup>9</sup> Air Quality England website, 2017. Available at: <http://www.airqualityengland.co.uk/air-pollution>. Accessed on: 21/08/17.

<sup>10</sup> DEFRA website. *Effects of air pollution*. Available at: <https://uk-air.defra.gov.uk/air-pollution/effects>. Accessed on: 21/08/17.

... elevated levels and/or long-term exposure to air pollution can lead to more serious symptoms and conditions affecting human health. This mainly affects the respiratory and inflammatory systems, but can also lead to more serious conditions such as heart disease and cancer. People with existing lung or heart disease are generally more susceptible to the effects of air pollution and are likely to see effects at lower concentrations.<sup>11</sup>

Air pollution in the UK has declined significantly since the introduction of clean air legislation in the 1950s.<sup>12</sup> Recently however, the rate of reduction has levelled off for ‘some pollutants such as oxides of nitrogen’ and ‘elevated pollution concentrations still occur in many urban locations in the UK’.<sup>13</sup> The two pollutants<sup>14</sup> currently causing the most concern to public health and environmental health professionals, and air quality campaign groups, are:

... microscopic airborne particles, known as particulate matter, and nitrogen dioxide. Particulate Matter (PM) is made up of tiny particles suspended in the air. Nitrogen Dioxide (NO<sub>2</sub>) is a gas caused by road vehicles and other combustion processes. NO<sub>2</sub> is extremely harmful to health and is associated with respiratory symptoms, inflammation of the lung lining and susceptibility to bronchitis.<sup>15</sup>

The number of estimated premature deaths caused by air pollution in the UK varies between 29,000<sup>16</sup> and 40,000<sup>17</sup> deaths annually. Even at the lower estimated level of 29,000 deaths per year, the impacts of poor quality air represent one of the most significant causes of preventable deaths in the UK. Certain vulnerable groups within the population are more susceptible to the effects of air pollution, including children (especially infants), older persons and those with medical conditions (e.g. people with asthma). In addition, particular social groups are also more at risk from the harmful impacts of air pollution, with low-income and ethnic minority groups the most disproportionately affected. This is because people on the lowest incomes tend to live in lower-quality environments that are more exposed to air pollution

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<sup>11</sup> Air Quality England website, 2017. Available at: <http://www.airqualityengland.co.uk/air-pollution>. Accessed on: 21/08/17.

<sup>12</sup> This was ‘The 1956 Clean Air Act’ that was introduced in response to the ‘Great London Smog’ during December 1952 (Moore, S. & Newey, G. (2012) *Something in the Air. The forgotten crisis of Britain’s poor air quality*. Policy Exchange: London). Approximately 4,000 people are estimated to have died from the immediate effects of the smog. Thousands more are believed to have died in subsequent weeks and months after the smog event. Bell M.L, Davis D.L. *Reassessment of the lethal London fog of 1952: novel indicators of acute and chronic consequences of acute exposure to air pollution. Environmental Health Perspectives* 2001; 109 (Supple 3): 389-94.

<sup>13</sup> Air Quality England website, 2017. Available at: <http://www.airqualityengland.co.uk/air-pollution>. Accessed on: 21/08/17.

<sup>14</sup> Other significant pollutants are: oxides of nitrogen (NO<sub>x</sub>), ozone, volatile organic compounds (VOCs) and ammonia (‘which requires further control’). The Chartered Institution of Water and Environmental Management, 2013 (CIWEM) *Clearing the air. Priorities for reducing air pollution in the UK*. Available at: <http://www.ciwem.org/wp-content/uploads/2016/02/Clearing-the-Air.pdf>. Accessed on 23/08/17.

<sup>15</sup> Healthy Air Campaign website, 2017. *The Healthy Air Campaign is tackling the public health crisis caused by air pollution. What causes the problem?* Available at: <https://www.healthyair.org.uk/the-problem/>. Accessed on 23/08/17.

<sup>16</sup> Healthy Air Campaign website, 2017. *The Healthy Air Campaign is tackling the public health crisis caused by air pollution. What causes the problem?* Available at: <https://www.healthyair.org.uk/the-problem/>. Accessed on 23/08/17.

<sup>17</sup> Royal College of Physicians. *Every breath we take: the lifelong impact of air pollution*. Report of a working party. London: RCP, 2016. Available at: <http://www.ciwem.org/wp-content/uploads/2016/02/Clearing-the-Air.pdf><https://www.healthyair.org.uk/the-problem/>. Accessed on 23/08/17.

(Royal College of Physicians, 2016<sup>18</sup>). The fact that air pollution has significant social and geographical dimensions that disproportionately impacts the health of some communities, is confirmed by the House of Commons Library (2015: 204)<sup>19</sup> who state that:

Deprived areas in cities typically experience heavier than average traffic. As a result, the detrimental effects of air pollution tend to have a greater impact on people living in deprived urban areas, who already suffer disproportionately from health inequalities.

Furthermore, the financial costs of air pollution are significant to the UK economy with estimates ranging between £9-19 billion per year, ‘a figure comparable to the economic cost of obesity’.<sup>20</sup>

## THE ROLE OF LOCAL AUTHORITIES<sup>21</sup>

Local authorities in the UK have a statutory responsibility under the provisions of the Local Air Quality Management (LAQM)<sup>22</sup> legislation for ‘the management of local air quality, including the requirement to regularly review and assess ambient air quality standards and objectives as prescribed by national regulation.’<sup>23</sup> The LAQM process is ‘defined through the Environment Act 1995, regulations, Secretary of State’s guidance notes, and informal guidance documents’.<sup>24</sup> In locations where air quality fails to meet UK air quality standards, a local authority is required to declare an Air Quality Management Area (AQMA) that ‘must at least encompass the geographical area affected’.

Specific statutory duties and wider powers available to local authorities in this field include<sup>25</sup>:

- ‘Undertake roadside vehicle emissions checks in AQMAs and issue fixed fines to drivers whose vehicles do not comply with emissions limits.
- Make Traffic Regulation Orders (TROs) to regulate traffic. For example, a local authority can impose a TRO to restrict the amount and type of traffic in busy shopping areas.
- The Clean Air Act 1993 gives local authorities the power to control and deal with dark smoke and harmful fumes from chimneys and industrial and trade premises.

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<sup>18</sup> As research by the RCP points out: ‘This inequality is not necessarily an injustice, provided that the levels of exposure are not hazardous and that deprivation does not increase vulnerability; however, neither of these conditions seems to apply’ (p. 75). Royal College of Physicians. *Every breath we take: the lifelong impact of air pollution*. Report of a working party. London: RCP, 2016. Available at: <http://www.ciwem.org/wp-content/uploads/2016/02/Clearing-the-Air.pdf><https://www.healthyair.org.uk/the-problem/>. Accessed on 23/08/17.

<sup>19</sup> House of Commons Library (2015) *Key issues for the Parliament 2015*. Available at: <https://www.parliament.uk/business/publications/research/key-issues-parliament-2015/>. Accessed on: 23/08/17.

<sup>20</sup> Transport & Travel Research Ltd (TTR) and Transport Research Laboratory (TRL) (no date) *Air Quality in the City Regions. A Transport Toolkit*. Available at: <http://www.urbantransportgroup.org/system/files/general-docs/Air%20quality%20toolkit%2011.08.14%20v2.pdf>. Accessed on 24/08/17 (p.6).

<sup>21</sup> See Appendix One below that sets out the ‘governance’ of air pollution/quality in the UK.

<sup>22</sup> DEFRA Website, 2017. *Public Health: Role for local authorities*. Available at:

<https://laqm.defra.gov.uk/public-health/roleforlas.html>. Accessed on: 24/08/17.

<sup>23</sup> IES (2014) *Air Quality and Planning in Local Authorities*. IES: London (p.4).

<sup>24</sup> NSCA (no date) *Air Quality Management Areas: A Review of Procedures & Practice for Local Authorities*. (p.3) Available at: <http://www.environmental-protection.org.uk/wp-content/uploads/2013/07/AQMAprocedures.pdf>. Accessed on 29/08/17.

<sup>25</sup> Information in this section is taken from the Law and Your Environment website. Available at: <http://www.environmentlaw.org.uk/rte.asp?id=35>. Accessed on: 24/08/17.



- Local authorities also regulate small industries which cause air pollution. Before a small industry can operate, it must obtain an environmental permit from the local authority, which sets out air quality standards under the Industrial Emissions Directive.’

Practical decisions relating to air quality are primarily a matter for local authority Environmental Health departments, particularly in relation to air quality monitoring and matters such as local emissions and pollution regulation. Local authority Public Health departments have responsibilities for raising awareness of the health impact of poor air quality and the support measures available to reduce levels of pollution.

The practical measures that are available to local authorities to address air pollution and improve population health include:<sup>26</sup>

- ‘Encouraging schemes like ECOSTARS<sup>27</sup> that recognise excellent levels of environmental and energy saving performance for the vehicles that operate within their area.
- Introducing intelligent transport systems (ITS) that maximise the efficiency of the highway network and also give real time information on traffic delays and journey times, car parking availability, and bus arrival times; together, these allow people to make better informed travel choices and also reduce traffic emissions. An example is Bracknell Forest Council’s: *Intelligent Transport Systems (ITS) Strategy Implementation Plan (2011)*.<sup>28</sup>
- Incorporating air quality into planning considerations for new developments and refurbishments in Council strategies such as Local Development Frameworks.<sup>29</sup>
- Promoting active travel, energy efficiency and sustainable transport to residents and businesses and putting in the necessary infrastructure to enable people to reduce the emissions they produce.
- Localism and community engagement to involve local communities and neighbourhood groups in the decision-making process will widen the understanding of air quality issues associated with public health.’

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<sup>26</sup> DEFRA Website. *Public Health: Role for local authorities*. Available at: <https://laqm.defra.gov.uk/public-health/roleforlas.html>. Accessed on: 24/08/17.

<sup>27</sup> The ECO Stars Fleet Recognition Scheme is a free scheme that aims to help fleet operators improve efficiency, reduce fuel consumption and emissions and make cost savings. More information about the scheme can be found at the Ecostars website. Available at: <http://www.ecostars-uk.com/>. Accessed on: 30/08/17.

<sup>28</sup> Bracknell Forest Council’s ITS plan is available at: <http://democratic.bracknell-forest.gov.uk/documents/s47520/INTELLIGENT%20TRANSPORT%20SYSTEMS%20STRATEGY%20-%202011%20Amended%205%2012%2011.pdf>. Accessed on: 30/08/17.

<sup>29</sup> Mid-Devon District Council is an example of an authority that has incorporated air quality objectives into its planning frameworks. For instance, the Council has adopted a flow chart (derived from the California Resources Agency) which helps the Planning Department evaluate the significance of air quality impacts. More information is available at: [https://www.middevon.gov.uk/media/85182/air\\_quality\\_spd-adopted.pdf](https://www.middevon.gov.uk/media/85182/air_quality_spd-adopted.pdf). Accessed on: 30/08/17.

## RECENT INITIATIVES – THE UK GOVERNMENT’S CLEAN AIR PLAN (JULY 2017)<sup>30</sup>

The UK Government has recently established a £255m Implementation Fund to support local authorities to implement targeted initiatives designed to improve air quality. This funding will support Councils to conduct feasibility studies and to develop and deliver local action in this field. The Government will make £40 million available immediately to local authorities via the Clean Air Fund to support local air quality improvement initiatives. Possible interventions envisaged for the funding include:

... improvements to local bus fleets, support for concessionary travel and more sustainable modes of transport such as cycling, or infrastructure changes. These interventions could enable local authorities to avoid the imposition of restrictions on vehicles, such as charging zones.<sup>31</sup>

Local authorities will need to enter a competitive bidding process to access this funding.

## EXAMPLES OF LOCAL ACTION TO IMPROVE AIR QUALITY

### *1. Imperial County Community Air Monitoring Network<sup>32</sup>*

The Imperial County (California, USA) Community Air Monitoring Network<sup>33</sup> is a collaborative group composed of community, academic, non-governmental and government partners. They aim to ‘fill the need for more detailed data on particulate matter in an area that often exceeds air quality standards’. A ‘community-based environmental monitoring process’ is used, whereby the ‘community and researchers have specific, well-defined roles as part of an equitable partnership that also includes shared decision-making to determine study direction, plan research protocols, and conduct project activities.’ The Network is providing active ‘real-time’ monitoring of ‘particulate matter data from 40 low-cost sensors throughout Imperial County’. Members of the community contribute as ‘citizen-scientists in the monitoring, siting, and data collection process’. The long-term viability of the project remains a challenge, especially accessing the financial resources required to sustain the project once the current funding is ended.<sup>34</sup> Proponents of this scheme believe that community access to ‘real-time and

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<sup>30</sup> Information in this section is contained in: Defra/Department for Transport (2017) *UK plan for tackling roadside nitrogen dioxide concentrations: An overview July 2017*. HM Government: London. Available at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/633269/air-quality-plan-overview.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/633269/air-quality-plan-overview.pdf). Accessed on 24/08/17.

<sup>31</sup> Defra/Department for Transport, 2017: p.8.

<sup>32</sup> The information in this section is drawn from: English, P.B., Olmedo, L., Bejarano, E., Lugo, H., Murillo, E., Seto, E., Wong, M., King, G., Wilkie, A., Meltzer, D., Carvlin, G., Jerrett, M., and Northcross, A. *The Imperial County Community Air Monitoring Network: A Model for Community-based Environmental Monitoring for Public Health Action*. Environmental Health Perspectives, July 2017, Volume 125, Issue 7. Available at: [https://ehp.niehs.nih.gov/wp-content/uploads/2017/07/EHP1772.alt\\_.pdf](https://ehp.niehs.nih.gov/wp-content/uploads/2017/07/EHP1772.alt_.pdf). Accessed on: 28/08/17. Also see: Imperial County Community Air Monitoring Project. *Using low cost sensors to develop a community air monitoring network*. NIEHS Partnerships for Environmental Public Health Webinar, 24/08/17. Available at: [https://www.niehs.nih.gov/research/supported/translational/peph/webinars/air\\_monitoring/imperial\\_county\\_community\\_air\\_monitoring\\_project\\_using\\_lowcost\\_sensors\\_to\\_develop\\_a\\_community\\_air\\_monitoring\\_network.pdf](https://www.niehs.nih.gov/research/supported/translational/peph/webinars/air_monitoring/imperial_county_community_air_monitoring_project_using_lowcost_sensors_to_develop_a_community_air_monitoring_network.pdf). Accessed on: 01/09/17.

<sup>33</sup> The ‘components of establishing a community-based air monitoring network’ can be found in Appendix Two.

<sup>34</sup> It is funded by the National Institute for Environmental Health Science’s Research to Action Program.



neighborhood-scale data’ empowers communities and as such this approach can be an effective ‘agent of change’ in addressing air quality issues.

## **2. Raising awareness of air quality in communities - Clean Air Champions<sup>35</sup>**

The Clean Air Champions volunteer scheme developed by Sustrans<sup>36</sup> aims to empower communities to take action focused at ‘raising awareness and understanding of the problems around air quality as well as promoting a range of achievable activities that individuals can take to improve air quality in their area.’ The scheme was based in London, encompassing the Boroughs of Hackney, Havering and Redbridge. Over the six-months duration of the project, 21 Clean Air Champions were recruited, trained and supported. The Champions delivered over 60 activities and engaged with nearly 1,800 residents.

Champions took part in a range of activities. In Hackney, the three Champions engaged in activities including: an anti-idling campaign around Hoxton Square; ‘play out’ days on Roding Road; and ‘sound mapping’ of interviews in Hackney. In Havering, five champions sought to promote ‘adaptation, through giving out information and raising awareness’, including: a ‘school air monitoring project with Upminster Junior School’; attending local community events to promote cycling, walking; as well as ‘raising awareness of air quality’ more generally.

The Champions identified several barriers when delivering the project: the short duration of the project; sharing tasks with another champion would have helped with time management; while some Champions did not have the energy and time to organise events, preferring to adopt a supportive role. Sustrans claim that the project has been ‘successful in setting up a model for engaging with, recruiting and supporting volunteers in running local initiatives around the issue of air quality.’

## **3. Barnet and Harrow Councils - Cleaner Air and Air Champions projects**

The London Boroughs of Barnet and Harrow were successful in a joint bid for funding to the London Mayor’s Air Quality Fund. Two projects were funded between 2014 and 2016. These were the (1) North Finchley Cleaner Air and (2) Air Quality Champion projects. Combined, these projects formed the ‘Barnet and Harrow Cleaner Air Initiative’, the main aim of which was to improve air quality.

The key achievements of the Air Quality Champion project in Barnet included:<sup>37</sup>

- ‘Worked with 45 schools to deliver lessons about air quality, anti-idling initiatives and road safety/active travel schemes;
- Advised 189 drivers of anti-idling at 10 schools over seven days and in doing so prevented 64 instances of idling;
- Engaged with three local communities to monitor and map their local air quality.’

The main achievements of the North Finchley Cleaner Air project included:

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<sup>35</sup> Sustrans (2014) *Cleaner Air Champions. Pilot Project Report*. Sustrans: Bristol. Available at: [https://www.sustrans.org.uk/sites/default/files/images/files/volunteers/our-volunteers/1401\\_Cleaner%20Air%20Champions%20Report\\_final%20SJ%20V6.pdf](https://www.sustrans.org.uk/sites/default/files/images/files/volunteers/our-volunteers/1401_Cleaner%20Air%20Champions%20Report_final%20SJ%20V6.pdf). Accessed on: 04/09/17.

<sup>36</sup> Sustrans is a charity that promotes sustainable transport/travel.

<sup>37</sup> London Borough of Barnet. *London Borough of Barnet Air Quality Action Plan 2017-2022*. Available at: <https://www.barnet.gov.uk/citizen-home/environmental-health/air-quality/air-quality-action-plan.html>. Accessed on: 05/09/17.

- ‘Providing membership to an electric vehicle car club allowing Council staff and the public to use electric cars;
- Installation of a 40m long ‘ivy screen’ alongside a school playground bordering the A41 highway;
- 221 ‘nitrogen dioxide reducing trees’ planted in ‘air quality focus areas’;
- 1,600 secondary school pupils attended a ‘Go Your Own Way to School show’, that led to more young people making the effort to walk and cycle more for their health.’

#### **4. Air Quality Apprentice Scheme - Barnet and Harrow<sup>38</sup>**

There have been a number of Air Quality Apprentice schemes in London. The Barnet and Harrow project had £60,000 available to fund an apprentice (over three years) to engage with schools, residents and businesses with the aim of promoting ‘smarter travel’.<sup>39</sup> The apprentice also assisted schools with developing travel planning initiatives, as well as working with the public to perform science experiments measuring air pollution, target vehicle idling and promotion of safer cycling. Achievements included:

- ‘62 schools visited (double the target);
- Face to face engagement with 35 businesses;
- Advised 189 drivers of anti-idling at 10 schools over seven days, stopping 64 instances of idling.’

#### **5. Air Quality Community Engagement<sup>40</sup>**

Between 2013 and 2015 a project managed by Newcastle City Council and Groundwork North East and Cumbria sought to ‘communicate air quality and health issues through a social media and marketing campaign to actively engage the public to change their travel behaviour and improve their lifestyle.’

Central to the delivery of the project were Community Mentors who were trained to ‘communicate this message to the general public with the ultimate aim of gaining pledges to use sustainable transport once a week.’ A dedicated Facebook page provided information about walking, cycling routes, public transport and community events and local workshops. The project also monitored air quality. There is currently no information available about the overall impact of the project in relation to improving the health and wellbeing of communities.

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<sup>38</sup> Greater London Authority (2016) *Mayor’s Air Quality Fund supporting local action on air quality 2013-2016*. Greater London Authority: London. Available at: [https://www.london.gov.uk/sites/default/files/mayors\\_air\\_quality\\_fund\\_report\\_2016.pdf](https://www.london.gov.uk/sites/default/files/mayors_air_quality_fund_report_2016.pdf). Accessed on: 06/09/17.

<sup>39</sup> Local Government Executive (2013) *Barnet secures £260,000 from Mayor to improve air quality*. Available at: <http://www.localgovernmentexecutive.co.uk/greennews/barnet-secures-%C2%A3260000-mayor-improve-air-quality>. Accessed on: 06/09/17.

<sup>40</sup> Transport & Travel Research Ltd (TTR) and Transport Research Laboratory (TRL). *Air Quality in the City Regions. A Transport Toolkit* (p.29). Available at: <http://www.urbantransportgroup.org/system/files/general-docs/Air%20quality%20toolkit%2011.08.14%20v2.pdf>. Accessed on: 01/09/17.

## **6. Citizen Science Approaches - Mapping Air Pollution<sup>41</sup>**

In North Marylebone (London) a small community project was carried out to map the local impacts of air pollution. An NO<sub>2</sub><sup>42</sup> survey was conducted by residents who wanted to investigate how pollution affected air quality in their local area. Residents raised £500 from ‘Mapping for Change (a non-profit organisation) and the Dorset Square Trust to buy and set up NO<sub>2</sub> diffusion tubes at 50 locations around their streets for a month in July 2015’. The results indicated significant variations in pollution levels between streets in North Marylebone and ‘revealed how taking alternative routes could reduce personal exposure’ to poor quality air. This information was shared with schools in the vicinity. In 2017, additional funding secured from Councillors’ Ward Budgets enabled the pollution survey to be repeated and extended. This revealed an increase in pollution, the most likely source being a ‘new diesel-hauled train services into Marylebone Station’. Following up on this finding, ward Councillors contacted the rail company to address the issue of emissions from rail transport.

## **7. Raising awareness - the Manor House and Finsbury Park Air Quality Project<sup>43</sup>**

Haringey, Islington and Hackney Borough Councils in London share a common border in the Finsbury Park/Manor House area. Focused on this geography, a joint authority air quality project was developed and delivered to nine schools, three from each borough. The project was funded by the Mayor’s Air Quality Fund, and it aimed ‘to raise awareness of local air quality issues, inspire behaviour change and help protect those most vulnerable to poor air quality.’ In practical terms, the project was delivered through a series of school assemblies, lessons, workshops and citizen science activities. Part of the outputs of the project included ‘a legacy mapping project that has assisted families at those schools to travel in more sustainable ways and lead more active lifestyles.’ Programme evaluation responses were positive from both pupils and teaching staff.<sup>44</sup>

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<sup>41</sup> Information in this section is taken from: Westminster City Council (2017) *City for all. Report of the Air Quality Task Group June 2017*. Available at:

[https://www.westminster.gov.uk/sites/www.westminster.gov.uk/files/air\\_quality\\_task\\_group\\_report.pdf](https://www.westminster.gov.uk/sites/www.westminster.gov.uk/files/air_quality_task_group_report.pdf).

Accessed on: 24/08/17 (p. 14).

<sup>42</sup> Nitrogen Dioxide is a pollutant mainly resulting from combustion emissions associated with road traffic and energy production. ‘Inhaling high levels of NO<sub>2</sub> inflames the airways and long-term exposure can cause problems with breathing and affect lung function. Those most vulnerable include the young and elderly and people with existing lung conditions like asthma and chronic obstructive pulmonary disease (COPD)’ (p.4). See: D’Souza, S. (2015) *Report on a community-led survey of nitrogen dioxide (NO<sub>2</sub>) in north Marylebone*. The North Marylebone Traffic Group. Available at:

[http://www.stmarylebonesociety.org/picts/no2\\_survey\\_report.pdf](http://www.stmarylebonesociety.org/picts/no2_survey_report.pdf). Accessed on: 04/09/17.

<sup>43</sup> Information in this section can be found on the Haringey Council website, available at:

<http://www.haringey.gov.uk/business/licensing-and-regulations/environment-and-waste/pollution-control/pollution-control-local-air-quality#air-quality-project>. Accessed on: 24/08/17.

<sup>44</sup> PWLC Projects website: *Manor House and Finsbury Park Air Quality Programme for Schools*. Available at: <http://www.pwlcprojects.co.uk/portfolio-item/manor-house-and-finsbury-park-air-quality-programme-for-schools/>. Accessed on: 05/09/17.

## **8. Wiltshire County Council - tailored community air quality action plans<sup>45</sup>**

The Council's county wide network of Area Boards<sup>46</sup> have provided the 'platform for creating local community groups with an interest in improving air quality within their area.' Each Area Board with an Air Quality Management Area (AQMA) in its geography has or will establish an air quality working group<sup>47</sup> to develop an individual community air quality action plan specific to its locality.

A range of projects have been initiated based on this work including: 'planting, business and school travel planning' and 'increasing the profile of cycling and traffic surveys'. These initiatives have informed individual Air Quality Action Plans (AQAPs).<sup>48</sup> The Council commissioned a website, providing data from 'real time air quality monitoring equipment' and the site also contains 'health information and a text alert system called "Know and Respond," which will help those with respiratory conditions plan their time and safeguard their health when air quality is poor.' In addition, the Council has provided Area Boards with air quality data and information to assist them with 'the production of Community AQAPs and Community Neighbourhood Plans.' Examples of actions set out in an AQAP (City of Salisbury<sup>49</sup>) include: further pedestrianisation of city centre; promotion of smarter travel choices, (e.g. walking/cycling); developing low cost Air Quality monitors; supporting wider car club development through the planning process including using S106 funding; enhancements to existing green infrastructure; and mapping of existing tree cover, as well as local tree planting sessions.

## **9. Developing innovative digital technology to improve air quality<sup>50</sup>**

In the city of Plymouth, a project developed a cheap air quality monitor that 'when worn transmits data on PM2.5 and PM10 particulates to an 'app' on a mobile phone, which collects the data and sends it along with time, date and location to the cloud.' The aim is to 'update the collected data onto a real-time map of Plymouth highlighting pollution hotspots.'

It was identified that the Council held large amounts of air quality data that were not being properly utilised. The Council approached local companies to explore what might be achieved by using the data. The Council established a partnership with a local Community Interest Company, the Real Ideas Organisation (RIO). RIO is working with schools to undertake a 'citizen science' project, which will involve pupils collecting and analysing data to inform possible actions to address air quality. The project is currently at a 'trial phase with the technology company testing the personal monitors it has created

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<sup>45</sup> Information in this section is from: *Wiltshire County Council. Air Quality Action Plan for Wiltshire, 2015.* Available at: <http://www.wiltshireairquality.org.uk/assets/documents/action-plans/Final%20draft%20Air%20Quality%20Action%20Plan%20D16140%20to%20DEFRA.pdf>. Accessed on: 23/08/17.

<sup>46</sup> There are 18 Area Boards in Wiltshire. Membership includes: Councillors, Community Area Managers, Democratic Service Officers, and a member of the Council's Cabinet. There are also NHS, fire and emergency services, police, Town and Parish Councils, Community Area Partnerships and other groups represented on the Boards.

<sup>47</sup> The composition of the air quality groups 'varies according to the aspirations of each of the community areas.' They report to their respective Area Boards.

<sup>48</sup> Examples of local air quality plans are available at: <http://www.wiltshireairquality.org.uk/air-quality/community-action-plans>. Accessed on: 23/08/17.

<sup>49</sup> The Salisbury AQAP is available at: <http://www.wiltshireairquality.org.uk/assets/cms/salisbury-community-air-quality-action-plan-august-2015.pdf>. Accessed on: 05/09/17.

<sup>50</sup> The information in this section can be found in: The Chartered Institute of Environmental Health. *Harnessing the power of technology: improving air quality in Plymouth.* Available at: <http://www.cieh.org/media/news/harnessing-air-pollution-technology-plymouth.html>. Accessed on: 05/09/17.

to see how the data they provide compares with the far more high-tech black smoke monitors.’ In addition, a ‘prototype website containing the data that has been collected during the testing period’ has also been established. The project aims to gain a better understanding of the effects of air pollution across the city, so future air quality initiatives can be better targeted.

### ***10. South-East London Residents Study - measuring exposure to air pollution***<sup>51</sup>

This was a pilot study for the ‘Breathe London’ project, which sought further understanding among South-East London residents in relation to their potential personal exposure levels to air pollution on a daily basis. The study involved seven residents from south London ‘carrying portable pollution (black carbon) monitors and GPS watches as they went about their normal daily activities.’ These volunteers included people from a range of backgrounds including a pensioner, a cycle courier, an ambulance driver and a school pupil. The results revealed the differential impacts of exposure to air pollution on people’s daily lives, including:

- ‘Over a 24-hour period, the ambulance driver was exposed to the highest levels of pollution due to traffic exhaust emissions entering the cab of his vehicle.
- The pollution levels the cycle courier was exposed to during the day were half those of the ambulance driver.
- Despite its location in central London, the lowest pollution levels were within the office worker’s building.
- More than a quarter of the toddler’s total exposure for the day occurred in just two hours, during the journey to and from her nursery in a push chair.
- The school pupil was exposed to more pollution travelling on the bus, than walking home along quieter streets.
- The pensioner’s exposure levels were relatively high as he travelled around London more than the other volunteers.’

The results of the study were presented at a public meeting in January 2013. The South East London Air Quality Community Group used the findings to inform future air quality studies and to develop advice to help the public reduce their personal exposure to airborne pollutants. The study was funded by the GSTFT/KCL NIHR Biomedical Research Centre.

### ***11. Sheffield: East End Quality of Life Initiative (EEQOLI) - Air Quality Network***<sup>52</sup>

The initiative operates through a ‘community advocacy and research role’ designed to ‘give practical support to community forums in Tinsley, Darnall, and Handsworth.’ It co-ordinates a city-wide community network monitoring air quality, more specifically, EEQOLI supports community groups to monitor nitrogen dioxide emissions by diffusion tube.<sup>53</sup>

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<sup>51</sup> Environmental Research Group, King’s College London website. *South-East London Residents Study*. Available at: <http://www.breathelondon.org/south-east/project/south-east-london-residents-study>. Accessed on: 23/08/17.

<sup>52</sup> Information in this section can be found on the Initiative’s website, available at: <http://www.sheffieldeastend.org.uk/>. Accessed on: 24/08/17. Also: Parry, N. and Rimmington, B. *Citizen science - local air quality; local action*. Chemical Hazards and Poisons Report, September 2013, 45-46. Available at: [http://www.sheffieldeastend.org.uk/CHaP\\_report\\_23\\_v3%2045-46.pdf](http://www.sheffieldeastend.org.uk/CHaP_report_23_v3%2045-46.pdf). Accessed on: 05/09/17.

<sup>53</sup> Sheffield City Council manages the analysis, the quality assurance and quality control of the diffusion tubes.

The initiative began in 1998 in response to community concerns about air pollution (especially NO<sub>2</sub>) and its impact on health and quality of life in the local area. The air quality network has subsequently been extended to other parts of Sheffield and it brings together ‘local forums, environmental groups, neighbourhood watch groups, and secondary schools.’ The initiative works closely with Sheffield Public Health, who fund the work.

Air quality data has been utilised by local communities in Sheffield in the following ways:

- ‘Informed planning application concerns and environmental assessments;
- Articles in community newsletters;
- Supported requests for improvements to public transport;
- Used to comment on the Local Transport Plan;
- Used to support teaching of science in the National Curriculum Framework in Secondary Schools;
- Added to Sheffield City Council’s data in areas where there is no air quality monitoring;
- Raised awareness that many people are living in areas with poor air quality.’

The founders of the initiative claim that it has enabled local communities to participate in actions to improve their local environment and influence planning and policy decisions.

## **12. Close the door**<sup>54</sup>

The aim of the project was to monitor air pollution inside shops on a busy high street, and assess the extent to which pollution levels varied when the doors of shops were either left open or closed during working hours. The project was proposed by the Close the Door Campaign<sup>55</sup>, which is a non-profit group of volunteers who campaign to reduce energy consumption in the retail sector, especially when shop doors are left open during periods when retailers are using energy to heat or air-condition their premises. The project was undertaken with the co-operation of several retailers and organisations.<sup>56</sup>

The method employed by the project involved measuring black carbon, particulate matter (PM) and nitrogen dioxide (NO<sub>2</sub>), both inside and outside of four shops with different door opening policies over a six-week period. The four shops ‘were located within 50 metres of each other, on the same side of the street and with entrances directly onto the street.’ Furthermore, all the shops were ‘mechanically ventilated’. Monitoring was undertaken by staff who kept diaries identifying when shop doors were ‘open and closed and the flow of customers.’ Analysis of the results revealed that:

- ‘PM levels within those shops operating a closed door policy were 60% lower than those recorded on the street.

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<sup>54</sup> Most of the information in this section is taken from: Environmental Research Group, King’s College London website. *The Close Door Study*. Available at: <http://www.breathelondon.org/south-east/project/close-door-study>. Accessed on: 23/07/17.

<sup>55</sup> More information about the campaign is available at: <http://www.closethedoor.org.uk/>. Accessed on: 06/09/17. Also, see: Basarir, M. & Overend, M. (2010) *Interim Report on the Energy Appraisal of Retail Units: Assessing the effect of open doors on energy consumption and thermal comfort*. Prepared for the Close the Door Campaign. Available at: <http://www.closethedoor.org.uk/files/3713/5402/3915/basarir-report.pdf>. Accessed on: 23/07/17.

<sup>56</sup> These included: The Wolford Shop, Nespresso, Austin Reed/Viyella Flagship store, Charles Tyrwhitt, New West End Company, The Regent Street Association and Imperial College London.



- For those shops with open doors, the levels recorded inside the shops were 45% lower than the levels recorded outside the shop.
- The findings from the black carbon measurements were similar to the PM results.’

The project demonstrated that by simply closing a shop door, staff and customer exposure to air pollution was reduced. The Close the Door campaign have disseminated this information through a network of local authorities, Business Improvement Districts, community organisations, sixth form colleges and other ‘institutions supplying retail staff’.

### ***13. The Dog Kennel Hill Primary School study***

The aim of this pilot study was to ‘raise awareness of the children and parents from Dog Kennel Hill Primary School<sup>57</sup> to air pollution issues and their own exposure during the journey to and from school.’ The study was designed by a local residents’ association. The residents’ association was concerned that many of the children attending the Primary School tended to walk along the busy A2216 road, rather than taking alternative routes that were both safer and less affected by air pollution. With support from teachers, two classes were educated about the effects of air pollution. Air quality monitors were provided to pupils to carry with their parents/guardians along their usual walking, bus and car routes. The pupils also ‘marked their routes on maps and explored which routes they took and what the alternatives could be’. In addition, ‘members of the East Dulwich Regeneration Project carried out additional monitoring to contrast pollution levels on local main roads and alternative quiet or pedestrian routes to augment the children's monitoring.’

The results clearly demonstrated that those who walked on the main road exposed themselves to higher levels of air pollution compared with those who walked along quieter pedestrian routes. This was reinforced by a ‘simple graph produced from the data’ which made ‘it easy for the children and their families to relate the results closely to their daily activity.’ Several key conclusions were reached by the project team:

- ‘As they were directly engaged in the gathering of evidence, the children and their families could relate to the public health information being given to them.
- As the results were clear, straightforward and applicable to their neighbourhood, families could easily identify the places where pollution was worst.
- The findings were used by the residents’ association as evidence that walking routes should be an important aspect of estate planning regeneration projects.’

A subsequent study was conducted to assess whether children had changed their behaviour.<sup>58</sup>

### ***14. The Schools Cleaner Air Zones project - Kensington and Chelsea<sup>59</sup>***

The Schools Cleaner Air Zones project was developed to improve local air quality and raise awareness of air pollution amongst schools situated in or near to pollution hot spots. St Cuthbert with St Matthias Primary School participated in the project. The school is only 150 metres from the busy Warwick Road

<sup>57</sup> The school is situated on the border between East Dulwich and Camberwell in south London.

<sup>58</sup> Environmental Research Group, King’s College London. *The Dog Kennel Hill Primary School study*. Available at: <http://www.breathelondon.org/south-east/project/dog-kennel-hill-primary-school-study>. Accessed on: 23/08/17.

<sup>59</sup> Information in this section is taken from: The Royal Borough of Kensington and Chelsea (No date) *Schools Cleaner Air Zones Case Study: St Cuthbert with St Matthias Primary School*. Available at: <https://www.rbkc.gov.uk/sites/default/files/atoms/files/StCuthbertCaseStudy.pdf>. Accessed on: 06/09/17.

where elevated concentrations of NO<sub>2</sub> and particulate material (PM)<sup>60</sup> were detected. The aim of the project was to reduce exposure to these pollutants, especially in relation to school children and adults using the games area at the school, which is located close to the busy highway. In response, a green ‘screen’ was installed along the boundary wall that separates the school from the Warwick Road. A temporary air quality monitoring station was also installed at the school. Air quality monitoring found that there were ‘markedly lower’ pollution concentrations on the school playground resulting from the protective screening.

In addition, an air quality education programme was delivered to Year 5 and 6 pupils. The pupils also mapped routes to school that had the lowest levels of pollution and produced an animation/film to report the lessons learned from the air quality teaching programme.

### **15. School Streets Scheme (Hackney)<sup>61</sup>**

Hackney Council is currently introducing time limited closures of certain roads adjacent to schools as part of an innovative initiative to cut pollution and improve safety for children. The ‘School Streets’ pilot scheme will close specific roads to general traffic outside of five schools, turning the highways into ‘pedestrian and cycle only zones at set times in the morning and afternoon’. These closures last between 30-45 minutes, although the times vary based on the requirements of each school.

Signs placed at the entrance of the zones will inform drivers of the restrictions in place. ‘Non-registered vehicles’ entering the street during the times of operation are identified by camera and issued with a penalty notice. The cost of the fine is £130, reduced to £65 if it is paid within 14 days. Residents in the School Streets zones can register for an exemption (at no cost) allowing them to continue using their vehicles, as can business owners who need to operate in the zone. ‘Blue badge holders’ are also excluded from the scheme.

To deliver the scheme, Hackney Council is ‘introducing an experimental Traffic Management Order (TMO), which brings the change into force for a maximum period of 9 months.’<sup>62</sup> The project will be evaluated at the end of the trial period and based on the findings of the evaluation the Council will decide whether to make the scheme permanent.

### **16. Brockley Green Transport Corridor (Lewisham)<sup>63</sup>**

The Brockley Green project aimed to raise the profile of air quality issues in the local area and actively engage with the community on this topic. The project had two elements: engagement with schools and the development of plans for an extensive redesign of public space in the area to enhance walking and cycling. Key achievements of the project were:

- Education programmes at five schools, including cycle training for 84 children;

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<sup>60</sup> These air pollutants originated primarily from road traffic.

<sup>61</sup> Information in this section can be found on the Hackney Borough Council website. *School Streets*. Available at: <https://www.hackney.gov.uk/school-streets>. Accessed on: 05/09/17. Information also taken from the Local Government News website. *Council closes school roads to cut pollution*. Available at: <https://www.localgov.co.uk/Council-closes-school-roads-to-cut-pollution/42902>. Accessed on: 05/09/17.

<sup>62</sup> Information in this section can be found on the Hackney Borough Council website. *School Streets*. Available at: <https://www.hackney.gov.uk/school-streets>. Accessed on: 05/09/17.

<sup>63</sup> Mayor of London (2016) *Mayor’s air quality fund supporting local action on air quality 2013-2016*. Available at: [https://www.london.gov.uk/sites/default/files/mayors\\_air\\_quality\\_fund\\_report\\_2016.pdf](https://www.london.gov.uk/sites/default/files/mayors_air_quality_fund_report_2016.pdf). Accessed at: 06/09/17.

- Development of ‘air quality art,’ which will be placed on street for the Brockley Art Festival;
- 180 m<sup>2</sup> green screen installed at Dalmain School;
- Design and consultation for a £1.7m public space scheme in Crofton Park.

An innovative feature of the project was the ‘air quality art’ developed by artist Tom Pearman, who was commissioned to ‘design a series of enamel signs to be located along the site, including Dalmain School, Crofton Park Library, Beecroft School, Stillness School, Brockley Barge Pub and the Broca Cafe.’<sup>64</sup> Each piece of artwork displayed a positive message about air quality, alongside the common strap line of ‘Cleaner Air’.



The aim of these artworks - alongside a public consultation and educational art workshops - was to ‘help foster a collaborative and creative approach towards promoting cleaner air quality.’<sup>66</sup> Influenced by this work, Lewisham Council revised their current Air Quality Action Plan.

### ***17. Public Spaces Protection Orders (PSPOs) targeting idling motorists – Hillingdon<sup>67</sup>***

The London Borough of Hillingdon have used Public Spaces Protection Orders to enforce anti-idling action on any Council owned, managed or maintained land in the Ward of Heathrow Villages. The prohibition is placed on motorists ‘leaving the engine of a stationary or parked vehicle running’ whilst in the designated area.

The PSPO came into effect in 2016 for a duration of three years and it is designed to prevent nuisance or problems that are deemed ‘detrimental to the local community’s quality of life’. Fixed penalty notices can be issued to those who do not comply with the Order.

<sup>64</sup> Information taken from Tom Pearman’s website, available at: <http://tompearman.co.uk/london-mayors-air-quality-funded-public-art-project-installed/>. Accessed on: 05/09/17.

<sup>65</sup> Images taken from Tom Pearman’s website, available at: <http://tompearman.co.uk/london-mayors-air-quality-funded-public-art-project-installed/>. Accessed on: 05/09/17.

<sup>66</sup> Information taken from Tom Pearman’s website, available at: <http://tompearman.co.uk/london-mayors-air-quality-funded-public-art-project-installed/>. Accessed on: 05/09/17.

<sup>67</sup> Information in this section can be found on the Hillingdon Council website, available at: <https://www.hillingdon.gov.uk/pspo>. Accessed on: 06/09/17.

## CONCLUSION

This document has produced a short overview of some of the local air quality initiatives/projects that have been delivered in localities in the UK and in other states. Many of these actions have been local authority-led or funded. It is evident that many of these initiatives have been small-scale (arguably micro-scale) projects that have been targeted at air pollution ‘hotspots’ or tightly defined geographical areas such as along busy highways, heavily used pedestrian routes (‘walking to school’ routes or high streets) and sensitive locations (e.g. primary schools and hospitals) that are affected by high concentrations of air pollution (usually emitted from vehicles). Overall, the key objectives of most air quality initiatives are to facilitate residents to engage in actions that will improve their local environment, influence planning and policy decisions, and become active citizens in air quality management.

Based on the information gathered by this very rapid review, it is possible to identify a range of common approaches to local air quality action.

There have been a multitude of initiatives targeted at streets adjacent to schools or at school routes (‘school runs’) where high concentrations of potentially hazardous air pollution have been detected. These have been designed to mainly protect children and others from the harmful effects of airborne pollution, primarily vehicle emissions.

Community or resident air monitoring regimes have frequently been used to engage residents in monitoring and identifying local pollution hotspots. These schemes have also been employed as a means of empowering communities and residents to initiate action more generally to improve air quality in their neighbourhoods. In addition, community air monitoring is often linked to citizen science approaches that have become more common in shaping public health practice in recent years.

To reduce exposure to harmful airborne pollutants by re-designing public spaces, some local authorities have implemented urban realm and infrastructure improvements in certain neighbourhoods, often with the aim of encouraging ‘active travel’ and facilitating walking on ‘cleaner air routes.’ Some Councils and their partners have deployed so-called ‘green screens’ or barriers to mitigate the impacts of airborne pollutants in sensitive locations, especially in cases where there is a need to protect vulnerable groups such as young children.

Various approaches have been adopted to raise public awareness of air pollution and its impacts. Awareness raising activities have taken the form of local air quality campaigns, public meetings/consultations or innovative approaches have been developed such as artworks displaying air quality messages. Related to this, targeted air quality educational programmes have also been a popular method of spreading knowledge about air quality issues within communities. School pupils, their parents/guardians and drivers in idling vehicles have often been the focus of these educational activities.

There are examples of local authorities that have used funds obtained from Section 106<sup>68</sup> planning agreements to support specific local air quality initiatives.

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<sup>68</sup> A Section 106 is a legal agreement between a developer seeking planning permission and the local planning authority, which is used to mitigate the impact of the development, often by providing a financial contribution to the Council to pay for infrastructure improvements such as roads, footways or play facilities.

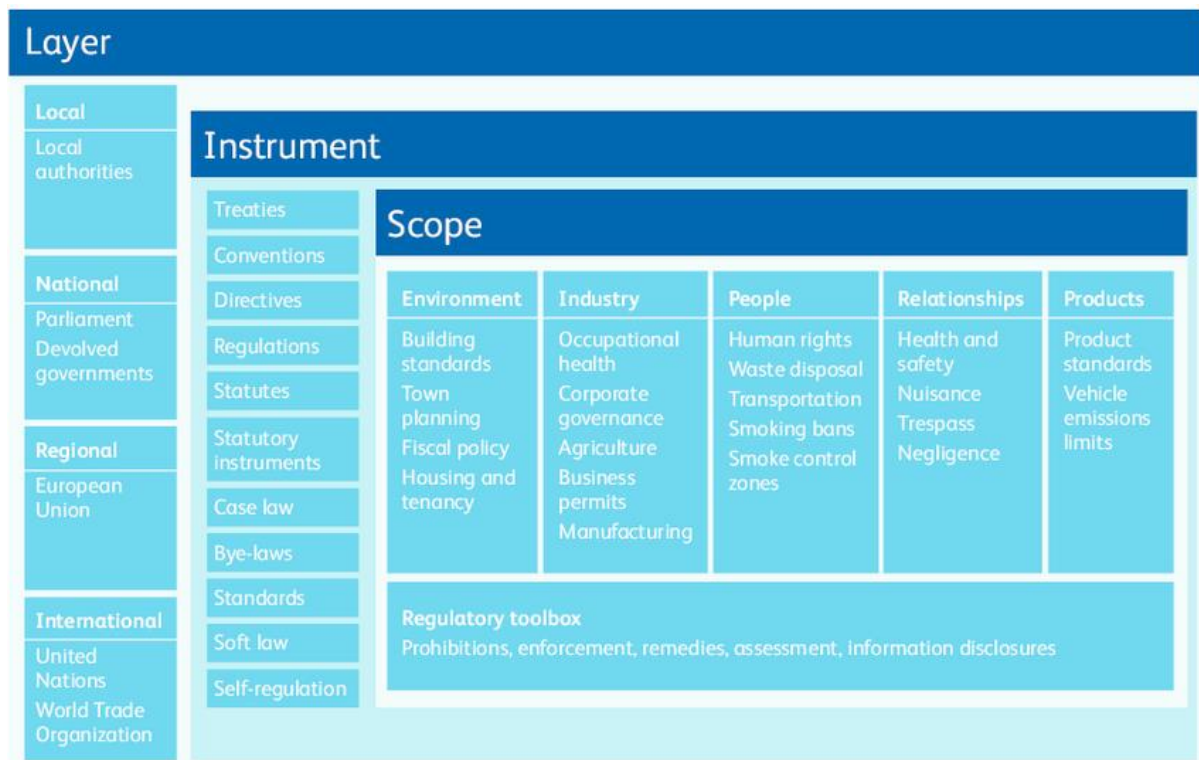
Some local authorities and their partners have recruited dedicated Air Quality Champions or Apprentices to deliver targeted local programmes of action to address air pollution problems.

More generally, closer working among local authority departments, especially transport/highways, planning, environment and public health teams would appear to be an effective approach to ensure that public health, transport and environmental projects consider air quality issues at the early stages of development.

What could be described as restrictive zoning approaches to enhancing air quality have been implemented in a small number of cases, for example preventing vehicles from using highways adjacent to schools during specific time periods or banning idling vehicles in certain locations.

It is important to note that many of the initiatives, projects and interventions identified in this review are targeted and geographically specific and as such they might not be easily replicable in other contexts and locations.

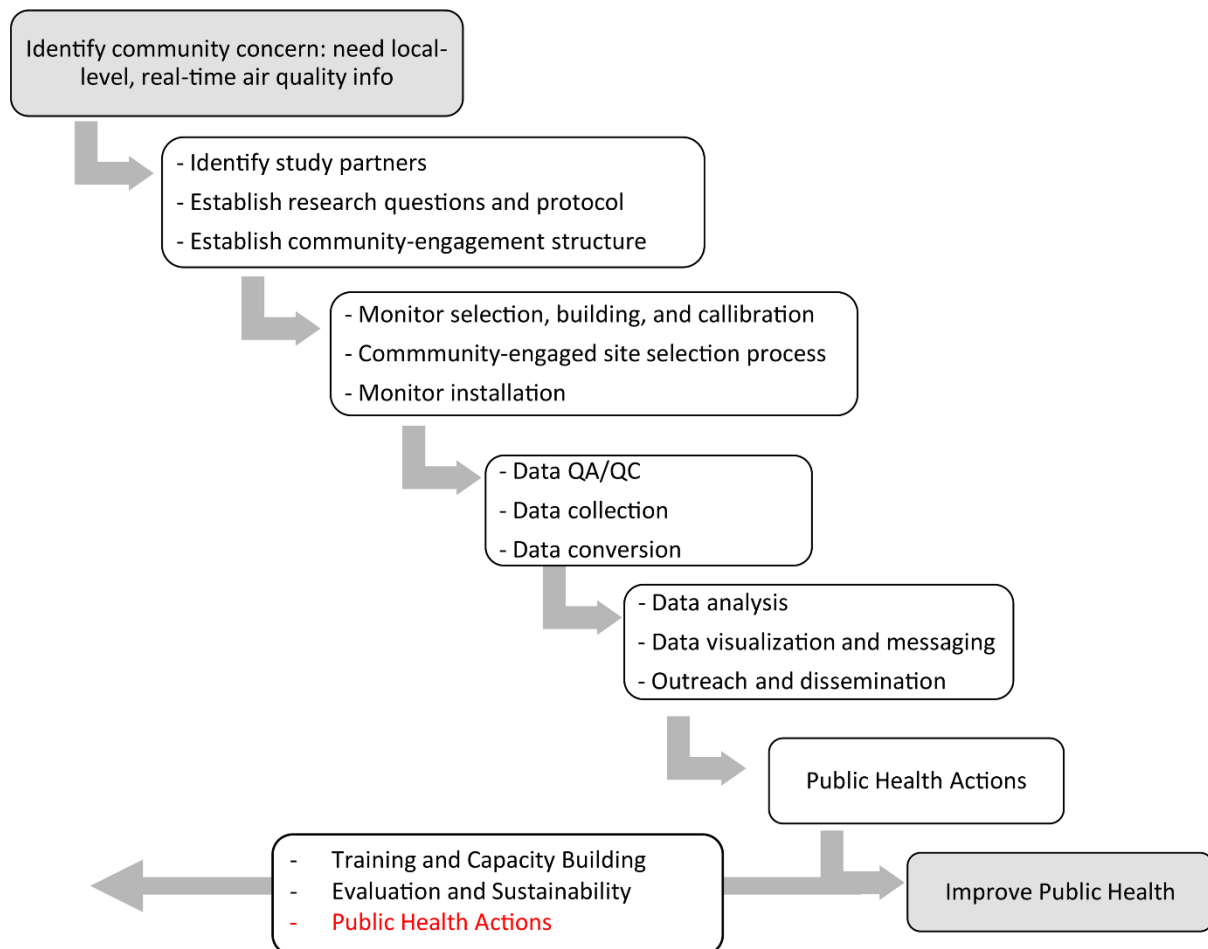
## APPENDIX ONE: THE REGULATORY FRAMEWORK FOR THE CONTROL OF AIR POLLUTION<sup>69</sup>



<sup>69</sup> Framework produced by Gokani, N. School of Law and Social Justice, University of Liverpool. Available at: [https://www.researchgate.net/figure/295626722\\_fig2\\_Fig-4-The-regulatory-framework-for-the-control-of-air-pollution-Courtesy-Nikhil-Gokani](https://www.researchgate.net/figure/295626722_fig2_Fig-4-The-regulatory-framework-for-the-control-of-air-pollution-Courtesy-Nikhil-Gokani). Accessed on: 25/08/17.



## APPENDIX TWO: COMPONENTS OF ESTABLISHING A COMMUNITY-BASED AIR MONITORING NETWORK<sup>70</sup>



<sup>70</sup> This diagram is contained in: English, P.B., Olmedo, L., Bejarano, E., Lugo, H., Murillo, E., Seto, E., Wong, M., King, G., Wilkie, A., Meltzer, D., Carvlin, G., Jerrett, M., and Northcross, A. *The Imperial County Community Air Monitoring Network: A Model for Community-based Environmental Monitoring for Public Health Action*. Environmental Health Perspectives, July 2017, Volume 125, Issue 7. Available at: [https://ehp.niehs.nih.gov/wp-content/uploads/2017/07/EHP1772.alt\\_.pdf](https://ehp.niehs.nih.gov/wp-content/uploads/2017/07/EHP1772.alt_.pdf). Accessed on: 28/08/17.