Crawley Borough Council

2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: September 2022

Information	Crawley Borough Council Details
Local Authority Officer	G. Narramore
Department	Environmental Health (Community Services)
Address	Crawley Borough Council, Town Hall, The Boulevard, Crawley, West Sussex, RH10 1UZ
Telephone	01293 438 000
E-mail	environmentalservices@crawley.gov.uk
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Executive Summary: Air Quality in Our Area

Air Quality in Crawley

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

As part of the Local Air Quality Management process (LAQM) required by the Environment Act 1995, the Council carries out an annual review and assessment of air quality in the borough to identify local air quality hot spots and pollution sources. Road traffic is the main source of (nitrogen dioxide) pollution in Crawley, and our network of monitoring sites measures concentrations along busy roads as well as at background locations and areas of specific interest (such as residential locations close to the airport), to give a broad picture of pollution levels across the borough.

Air Quality in Crawley is mainly good, with the exception of a small number of locations alongside busy roads where an air quality management area (AQMA) has been declared. The Council is working with its partners to produce an action plan (AQAP) which sets out ways to tackle pollution and target measures to improve air quality in these areas.

There are two national objectives for nitrogen dioxide (NO_2). These are for the average level over a year, which should be below 40 $\mu g/m^3$, and the average level for one hour,

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[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

[3] Defra. Air quality appraisal: damage cost guidance, July 2021

[4] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

which should be below 200 μg/m^3. Most of our NO_2 monitoring is done using diffusion tubes which can't measure hourly average, so guidance developed by the Department for Environment, Food and Rural Affairs (DEFRA) estimates that if the yearly average is below 60 μg/m^3 it will meet the hourly objective of 200 μg/m^3. The annual average objective applies to residential, hospital and educational sites. The hourly average objective applies to these sites as well as busy streets and workplaces.

The measured results for 2021 NO_2 are set out in tables A.4 and B.1 of this report and show that national air quality objectives were met at all of Crawley's monitoring sites (although one site in the AQMA near Three Bridges station was borderline). The 2021 levels of nitrogen dioxide were generally slightly higher than in 2020, when Covid travel restrictions caused vehicle pollution levels to fall sharply, but still lower than pre-Covid levels. Trends in annual nitrogen dioxide concentrations can also be seen in Figures A.1.1 – A1.6 and show downward trends at all sites, including sites next to busy roads and close to the airport.

The measured results for 2021 particulate pollution (PM_{10} and $PM_{2.5}$) are shown in tables A.6 - A.8 of this report. These show that in 2021 levels of particulates were, below the objective levels, and also showing downward trends (Figures A.3 – A5).

The improvement in nitrogen dioxide levels and particulate pollution (PM_{10} and $PM_{2.5}$) reflects the pattern seen regionally and nationally as a result of tighter vehicle emissions standards and regulation. At a local level, actions taken to facilitate active travel through local infrastructure upgrades and traffic management measures, can bring about more targeted improvements.

Many of the solutions for tackling transport related air quality fall outside the powers of the council to implement. The council therefore works closely with its Highways Authority (West Sussex County Council) on many of the action plan measures, such as those in the Crawley Growth Programme and Local Cycling and Walking Infrastructure Plan (LCWIP) which are aimed at encouraging active travel and improving air quality. The council also works with its partners in neighbouring districts, Sussex-Air partnership, Environment Agency and other departments within the council including Planning, Economic Development and the Sustainability Team, who are involved in developing many of the action plan measures.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy[5] sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

The Council has taken forward a number of measures to target sources of pollution within the borough over the past reporting year, including:

- The Crawley Growth Programme Eastern Gateway Sustainable Transport Scheme - which has provided highways improvement for enhanced pedestrian and cycle access and improved connectivity in and round the town centre. This is helping promote active travel with benefits to health and wellbeing, as well as air quality.
- The Crawley Growth Programme Manor Royal Highways Improvement Scheme – which is providing enhanced pedestrian and cycle access across the business district and better connectivity, helping to encourage sustainable transport options for employees.
- Electric Vehicle Charging Point Project – working with WSCC the council has identified sites at residential locations (where there is no off-street parking), neighbourhood shopping parades and public car parks for electric vehicle charge points, and commissioned Connected Kerb to deliver the EV infrastructure.
- Successful joint bid with Sussex-Air for funding from Defra's 2021/2022 Air Quality Grant. £376k funding for Monitoring and Community Engagement Project.
- Defra–funded Air Quality Schools Project to raise awareness of air pollution and examine local solutions such as reducing traffic and replacing short journeys with active travel on "clean air routes" to avoid exposure to air pollution. In partnership

[5] Defra. Clean Air Strategy, 2019

[6] DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

with Sussex-air and Sustrans the project completed its third phase in 2021/22, engaging with 55,000 young people at 83 schools across the County. Crawley primary schools made up 45% of the new schools joining the project in 2021.

- Crawley Climate Emergency Action Plan, 'Action to Zero', was published on 24 November 2021 following Cabinet approval. The CEAP sets out how we will reduce emissions and meet our carbon reduction targets.
- Net Zero Collective Group - Crawley Homes (council owned housing) working with Southampton University on a research project to find the most efficient method of energy saving/carbon reduction in residential accommodation. The pilot project retrofit was completed in 2022. The project achieved energy savings of at least 25%, with associated reductions in both NOx (nitrous oxide) and Carbon emissions
- A successful bid for £4m of funding from Crawley Towns Fund to provide installation of cavity wall insulation to Pas 2035 standards for 248 blocks of flats (1511 flats) over 4 years. This work is part of the Councils drive to reduce carbon emissions, and also benefits background levels of NO_2.
- Ongoing assessment of planning applications for air quality impacts, including identifying where damage costs are needed for mitigation in accordance with national planning policy and Sussex Emissions and Mitigation Guidance.

Conclusions and Priorities

All monitoring locations met the annual mean air quality objective of 40 µg/m^3 in 2021. Although there were no exceedances, NO_2 concentrations along A2220 at Three Bridges and A2011 Crawley Avenue are still high, and these sites will therefore continue to be closely monitored in the coming years.

A slight increase in NO_2 concentrations was measured across most sites in 2021 compared to 2020. At background sites average increases of about 6% were seen and at roadside sites levels rose by about 9%. In the AQMA the increases were more erratic, ranging from no change on 2020 levels to a return to pre-covid levels.

The increase in traffic volumes in 2021 (as restrictions on travel lifted) account for the general up-turn in NO_2 concentrations. The variation seen in the AQMA appeared to relate more closely to the type of traffic seen on the routes with those routes influenced by commercial vehicles seeing slightly larger increases than commuter routes.

No monitoring sites within the monitoring network exceeded the air quality annual and one-hour mean objectives for NO_2 in 2021.

There were no exceedances of the annual mean and 24-hour objectives for PM_{10} in 2021 and annual mean $PM_{2.5}$ was well below the national limit value of 25ugm^3. The 5-year trend for both PM_{10} and $PM_{2.5}$ continues to be down.

Although there were no exceedeances of the AQO for NO_2 or particulates in 2021, NO_2 levels continue to be high (within 10% 0f the AQO) along some busy roads in the AQMA. No changes to the exisiting AQMA are currently proposed, however, the situation will continue to be reviewed and assessed through the laqm process to determine if the trend of reduced NO_2 concentrations is maintained in future years.

Crawley Borough Council's priorities for the coming year are:

- Complete baseline studies, modelling and public consultation for the new AQAP.
- Community engagement through Defra grant funded Schools Air Quality Awareness project and EV Taxi project
- Preparing responses to the planning consultation for air quality and mitigation measures to offset the environmental impacts for the Gatwick Northern Runway DCO application
- Ongoing work with Development Control to identify damage costs and mitigation for air quality impacts from new development in accordance with national planning policy and Sussex Emissions and Mitigation Guidance
- Review and update the monitoring network to respond to local developments and identify pollution hotspots across the borough.

The principal challenges and barriers to implementation that the council anticipates facing are:

- Identifying schemes that can generate a measurable improvement in air quality and which are feasible, deliverable and funded.
- Increasing developmental pressure impacting action plan measures
- Securing resources and/or funding streams to implement air quality measures

Local Engagement and How to get Involved

Crawley is one of the smallest local authorities in Sussex covering an area of 45 km^2. Despite its size, it attracts a high level of incoming commuter traffic, as well as many local

car journeys. A large percentage of local traffic are journeys of less than 2km, and 58% of car trips are under 5km. These high volumes of traffic on our local roads cause congestion and contribute to worsening air quality. However, since many journeys are short, there is opportunity to improve local air quality by switching to sustainable transport options such as walking, cycling, public transport or car sharing.

Many of our action plan measures include schemes that are aimed at infrastructure improvements to reduce congestion, improve sustainable transport options and encourage modal shift. Awareness raising to support behavioural change is an important part of this process, and local engagement is integral to, not only understanding the needs of the community, but also for informing the public and stakeholders of proposed improvements.
In developing our air quality action plan it is important to work closely with interested parties, including Community groups, Elected Members, Transport Planners, Planning Policy and Development control. Although Covid restrictions have prevented some of our promotional work over the last 2 years, we are planning to resume our Junior Citizen event this year, which engages with all Crawley's primary schools through interactive scenarios on air quality. We are also continuing our Defra funded air quality Schools Project for another 2 years, and running public awareness campaigns for annual events such as Clean-Air day and Breath Easy week via the West Sussex news journal "Connections", digital advertising boards on Manor Royal business district and on local radio Spirit FM. The Sussex-air website also provides detailed information to the public on local air quality, news updates, educational resources, and links to other services such as air Alert.

In addition to the initiatives the council is taking to tackle air quality, there are lots of ways we can get involved and take action on a personal level to improve air quality in Crawley:

Walk or cycle: Replacing car journeys by walking or cycling to reduce traffic volume and emissions. These active transport options also have proven physical and mental health benefits.

Take public transport or car-share: For longer journeys consider car share or public transport, such as bus, coach or train.

Ultra-Low Emission Vehicle (ULEV): With the end of the sale of new petrol and diesel cars in the UK by 2030 as we shift away from internal combustion engines, many people may consider buying an electric or hybrid vehicle when replacing their car.

If a car journey is necessary: try to drive in an eco-friendly style

- Drive smoothly and try not to accelerate or brake hard.

- Maintain your car to reduce harmful emissions
- Check tyre pressure is correct to minimise fuel use and emissions.
- Limited use of the air conditioning reduces fuel consumption and emissions
- Turn off engine when car stationary. Idling vehicles release lots of exhaust emissions.

Go for local produce: Long distance transport creates more air pollution.

Local authority engagement with decision makers and the public: The council publishes information on its website (www.crawley.gov.uk) and local magazine More information on local air quality in Crawley can be found at:

Air Quality Monitoring in Crawley

Sustainable Transport in Crawley

The Crawley Growth Programme

airAlert

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Crawley Borough Council with the support and agreement of the following officers and departments:

Gill Narramore - Environmental Health Department, Community Services

Head of planning - Planning and Economic Development

Economic Regeneration Manager - Planning and Economic Development

Planning Policy Manager - Planning and Economic Development

Sustainability Manager - Planning and Economic Development

Fleet manager – Amenity Services

Energy Efficiency Officer - Crawley Homes

Sussex-air Quality partnership

West Sussex County Council's (WSCC) Highways, Transport and Planning

Following Defra's appraisal this ASR will be passed to approval by West Sussex Public Health.

If you have any comments on this ASR please send them to Gill Narramore at:

Address: Town Hall, The Boulevard, Crawley, West Sussex, RH10 1UZ

Telephone: 01293 438 000

Email: gill.narramore@crawley.gov.uk

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1 Local Air Quality Management

This report provides an overview of air quality in Crawley during 2021. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Crawley Borough Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Crawley Borough Council can be found in Table 2.1. The table presents a description of the AQMA that is currently designated within Crawley Borough Council. Appendix D: Maps of Monitoring Locations and AQMAs provides maps of AQMA and also the air quality monitoring locations in relation to the AQMA. The air quality objective pertinent to the current AQMA designation is as follows:

- NO_2 annual mean

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Crawley AQMA	11.03.21 (Amended)	NO_2 Annual Mean	Land and residential properties surrounding the Hazelwick Roundabout. The AQMA was further extended in March 2021 to include land and residential properties surrounding Three Bridges Station as described in Schedule 2 to the Order.	NO	41µg/m^3	39µg/m^3	Crawley Air Quality Action Plan	AQAP

☒ **Crawley Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date**

☒ **Crawley Borough Council confirm that all current AQAPs have been submitted to Defra.**

2.2 Progress and Impact of Measures to address Air Quality in Crawley

Defra's appraisal of last year's ASR concluded:

The report is well structured and provides the information specified in the Guidance.

1. Trends are presented and discussed, and a robust comparison to air quality objectives is provided.

***Response**: This year's report continues to report in detail on the trends in air quality in Crawley and how they relate to the air quality objectives.*

2. The Council has taken the decision to add five new diffusion tube sites to their monitoring network in locations where planned developments might affect the local air quality. This decision is supported.

***Response**: Following a review of our monitoring network, and considering Gatwick Airport's northern runway expansion plans, a new monitoring site was added at a residential location north of the airport at Povey Cross Road.*

3. The Council has provided a list of measures to tackle $PM_{2.5}$ emissions with detailed comments. The Council has also started undertaking $PM_{2.5}$ monitoring with the new FIDAS $PM_{2.5}$ automatic monitor installed at Gatwick Airport in March 2020. Although, the measured annual mean for $PM_{2.5}$ for 2020 is below the objective at 8 ug/m^3. This is encouraging to see as it shows the Council's commitment to achieving the measures to improve air quality. It is recommended to present data obtained from this monitor in next year's report.

***Response**: A full year's $PM_{2.5}$ monitoring data is presented and discussed for 2021*

4. However, it should be noted that the results from sensor or light scattering monitoring techniques should be treated with caution, as outlined in section 7.163 of LAQM.TG(16).

***Response**: The precautionary advice given in 7.174 of LAQM.TG(22) has been noted and although the Palas Fidas 200 PM10 data can be used without the need for correction, the advice given for PM2.5 has been applied. The 2021 PM2.5 data has therefore been corrected for slope by dividing by 1.06*.

5. Council has plans to renew and update the AQAP based on the extension of the AQMA. It is understood that COVID-19 has caused hindrance due to limited resources within the team. Any progress with the AQAP should be reported in next year's ASR.

***Response**: The Council is actively engaged in tackling air quality issues and promoting sustainable strategies to improve air quality within the borough. Section 2.2 outlines in detail the measure we have progressed over the reporting year. However, progress on the action plan is still behind schedule.*

6. A detailed COVID report has been submitted alongside the report. This report breaks down the trends in pollutant levels in different areas within the Council and shows reduction in traffic volumes by approximately 60% in the region. The report supports maintaining the lockdown behavioural change in a sustainable way by means of reducing vehicle use and adopting alternative forms of transport such as cycling and walking. The Council is already working on some of these measures which is commended.

***Response**: The Council is continuing its work through the Crawley Growth Programme and LCWIP plans to improve sustainable transport infrastructure and encourage active travel.*

7. Hazelwick AQMA's date of amendment has not been updated on DEFRA's website. Please therefore update as appropriate.
   The AQMA name on Table 2.1 needs to be updated to 'Hazelwick AQMA' instead of Crawley AQMA.

***Response:** The new AQMA name is "Crawley AQMA" which has changed to reflect the wider area of than just the locality of Hazelwick.*
The date of amendment and new shapefile for Crawley's AQMA has been submitted to Defra. At the time of writing this had not been updated on the Defra AQMA website, but email response received from LAQM-portal admin team has confirmed that the amendment will be published within the next update cycle of their website.

8. The AQMA map presented in Figure D.1 needs to be updated to show the extension of AQMA. The report would also benefit from having addition 'zoomed-in' maps which clearly show all the monitoring sites. Currently, as there are 52 sites shown in a single map, the labels are not shown for all sites.

***Response**: The AQMA map presented in Figure D.1 has been updated to show the extension of AQMA. The monitoring site map has been updated to provide more detailed site location maps for all sites.*

Progress Summary of Crawley Borough Council's Action plan Measures

Crawley Borough Council has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 34 measures are included within Table 2.2, with the type of measure and the progress Crawley Borough Council have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in Crawley Borough Council's air quality pages of the Council's website.

Key completed measures are:

- Crawley Growth Programme - Eastern Gateway Public Realm and Sustainable Transport. Highways improvement to deliver enhanced pedestrian and cycle access and improve connectivity in and round the town centre. The Project was completed on time and the scheme opened to the public Summer 2022

Key outcomes from measure: encourage modal shift and reduce vehicle emissions

- Crawley Growth Programme - Manor Royal Highway Improvement Scheme – to deliver better connectivity and enhanced pedestrian and cycle access across the business district. Construction of Phase 1 works commenced January 2022 to provide junction improvements at County Oak/London Road, upgraded crossing units, signal heads, lane markings and a new bus stop. Works completed August 2022

Key outcomes from measure: encourage modal shift and improved traffic flow and reduce vehicle emissions

- WSCC Electric Vehicle Strategy 2019-2030. The strategy aims to encourage and support the adoption of electric vehicles within the county. The objectives are to ensure sufficient charging infrastructure in place to support the vehicle charging and ensure renewable energy sources are used.
  Since 30% of households in Crawley have no access to off road parking this creates a barrier to switching to EV. As a result, Crawley is identified in the strategy as a priority area for EV infrastructure.
  https://www.westsussex.gov.uk/media/13766/electric_vehicle_strategy.pdf
  During the reporting year 2021/22 the Council, in partnership with WSCC, commissioned Connected-Kerb to deliver the EV infrastructure network across the borough. Work was completed on identifying charge point locations at public sector car parks, community facilities and neighbourhood Parades (first phase: Dobbins Place, Grattons Park and Maidenbower Place). Consultation has also started to identify residential on-street locations to help residents without off street parking to switch to electric.

Key outcomes from measure: encourage modal shift and reduce vehicle emissions
The Strategy sets a target for 70% of new cars in the County to be electric by 2030.

- 2021/22 Defra–funded Air Quality Grant – successful joint bid in partnership with Sussex-air for funding from Defra's 2021/22 air quality grant. The joint bid achieved funding of £376,800 for monitoring and community engagement projects. The funds have been allocated to three project areas:
- Monitoring - sensors upgrade to monitor particulate matter (which requires match funding from participants).
- Community Engagement - extending the contract with our delivery partners Sustrans to continue our schools project until 2024.
- Community Engagement - work with taxi operators in West Sussex to facilitate a transition to electric vehicles by identifying an infrastructure that is convenient, reliable and works for the taxi trade. The outcomes of the study will be fed into the EV infrastructure network scheme managed by Connected Kerb to provide the technical and financial assessments for installations at the proposed sites.

Key outcomes from measure: Modal shift /Reduced vehicle emissions

- Defra–funded Air Quality Schools Project – joint project with Sussex-air to deliver the "Air-Mazing Journeys" schools project completed its third phase 2021/22.

- The Project was delivered on behalf of the Sussex authorities by Sustrans, working with schools across Sussex to raise awareness of air pollution, and examine local solutions such as reducing traffic and replacing short journeys with active travel on "clean air routes" to avoid exposure to air pollution.
- To date the project has engaged with 55,000 young people at 83 schools across the County. In 2021/22, 45% of primary schools joining the project were from Crawley.

Key outcomes from measure: Awareness raising/ behavioural change/modal shift

- Crawley Climate Emergency Action Plan, 'Action to Zero', published on 24 November 2021 following Cabinet approval. The CEAP sets out how we will meet our carbon reduction targets.

Key outcomes from measure: Target to reduce emissions by 50%, and as close to net zero as possible by 2030 and to reach net zero by 2040. Reduced emissions also benefit background levels of NO_2

- CBC/Net Zero Collective Group Research Project – working with Southampton university to survey and monitor the retrofit of 10 Crawley council properties (from mixed housing stock) to identify the most efficient and effective methodology for the retro fit and monitor the level of energy savings/carbon reduction in residential accommodation. The pilot project retrofit was completed 2022, and although still at monitoring stage, early findings have identified energy savings of at least 25%. And refined a retrofit methodology that conforms to Pas 2035 standards. The pilot will continue for a further 25 properties in 2022.

Key outcomes from measure: Reduce emissions, carbon reduction and NO_2 resulting in improved air quality

- Crawley Homes pas2035 Programme of Energy Saving/Carbon Reduction - retrofit across Crawley council's property portfolio to pas2035 standard. Using social housing de-carbonisation funding (SHDF), external cavity wall insulation was installed at 68 properties in Broadfield and Bewbush. This work was completed in 2022.
- A successful bid for £4m of funding from Crawley Towns Fund was completed in 2022. This resource will fund the installation of cavity wall insulation to 248 blocks of flats (1511 flats) over 4 years. Work has commenced (2022) on surveys to each block.

Key outcomes from measure: Reduce emissions, carbon reduction and improve air quality

Crawley Borough Council expects the following measures to be completed over the course of the next reporting year:

- Crawley Growth Programme Manor Royal Highways Scheme: Phase 2 construction works commenced 2022. This phase is for public realm improvements from Manor Royal to Gatwick Road roundabout, construction of a new bus/cycle lane along Manor Royal and improved crossings at County Oak Way and Metcalf Way. This scheme is expected to complete 2023 (although this may be outside of the ASR 2022/23 reporting year).

Expected impact of measure: encourage modal shift and reduce vehicle emissions

- Defra funded 2021/2022 Air Quality Grant project - Crawley, working with its partners in Sussex-air, aim to deliver a taxi engagement project to facilitate a transition to EV vehicles by licensed taxi drivers. The study will identify targeted infrastructure that works for the taxi trade and help support the council's taxi licensing policies. The outcomes of the study should be completed 2023 and will provide input for the work being done by Connected Kerb for charge point installations across Crawley and West Sussex.

Expected impact of measure: encourage modal shift and reduce vehicle emissions

- Gatwick Development Consent Order (DCO) – Gatwick's Northern Runway expansion plan Development Consent Order process, should complete the next stage of its progress through the planning process during the next reporting year, with the production of its Environmental Statement. Although the final decision will be made by the Secretary of State, the council's input into this process is important in highlighting/ challenging issues relating to the environmental impact of these proposals in Crawley and the surrounding areas, and specifically the expected consequences for air quality and climate change. During the next reporting year the council will be preparing its responses to the proposals through written representations, local impact reports and statements of common ground, as well as discussing mitigation principles to offset the air quality impacts of the proposals.

Expected impact of measure: emissions mitigation

- Crawley Homes pas2035 Programme of Energy Saving/Carbon Reduction - retrofit across Crawley council's property portfolio to pas2035 standard.

Crawley council aims to secure SHDF Wave 2 funding for £3m. If successful, surveying and programming of retrofit for 400 Crawley homes will be rolled out. Following the successful bid earlier this year for £4m funding from Crawley Towns Fund to install cavity wall insulation to 248 blocks of flats, the scheme, which commenced 2022, is expected to be completed in 2023.

Expected impact of measure: Reduce emissions, carbon reduction and improve air quality

Crawley Borough Council's priorities for the coming year are:

- Update air quality modelling and source apportionment for the AQMA to help inform the revision of the Air Quality Action Plan
- Seek further grants/funding streams to support air quality action plan measures.
- Continue working through the Planning/Development Control system to secure air quality mitigation from new development
- Preparing responses to the Gatwick DCO through written representations, local impact reports, statements of common ground and proposals for mitigation measures to offset the air quality impacts of the proposals.
- Continue community engagement through educational/promotional events to raise awareness of air quality issues, including the annual Clean Air day, Breath Easy and Junior Citizen as well as Defra funded Sussex-Air Community Engagement projects (Schools and Taxi projects)
- Review and update the monitoring network to respond to local developments and identify pollution hotspots across the borough.

Crawley Borough Council worked to implement these measures in partnership with the following stakeholders during 2021:

- CBC Planning
- CBC Sustainability Officers
- CBC Housing and Amenity Service
- Sussex-air Partnership
- Neighbouring Local Authorities
- WSCC Highways Authority
- Environment Agency

The principal challenges and barriers to implementation that the council anticipates facing are:

- Identifying schemes that can generate a measurable improvement in air quality and which are feasible, deliverable and funded.
- Increasing developmental pressure which may impact action plan measures and offset improvements in emissions gained from societal change and vehicle technology. The cumulative impact of these developments may extend compliance with AQ objectives within the AQMA.
- Many of the solutions for tackling transport related air quality fall outside the powers of the council to implement. The council continues to work in cooperation with these stakeholders and decision-making bodies to implement action plan measures.
- The effects of the pandemic on the economy continues to have an impact in progressing some policy decisions which underpin air quality measures. The council continues to seek funding opportunities and grants to implement its action plan measures and support its partners.

Progress on the following measures has been slower than expected due to:

- Crawley Growth Programme – whilst all of the projects are ongoing and none have been dis-continued, a number of schemes fell behind schedule as a consequence of Covid, and some continue to experience delays in scheme delivery times of 1-2 years.
- The Gatwick DCO has diverted staff resources away from other ongoing work projects over the last 12-18 months. As a result, progress on developing the council's action plan has been delayed
- The economic impact of Covid on the taxi trade in Crawley which relies heavily on Gatwick airport, has meant that plans to implement a new policy on emission standards for licensed hackney carriages and private hire vehicles has been delayed further this reporting year. A revised proposal was agreed at Licensing committee in April 2022 which will aim to maximise the financial incentives and support available to the Trade whilst further work to include a more robust emissions strategy as part of the ongoing Policy review continues.
  The Council will also actively encourage the Trade o consider electric and hybrid alternatives and replacement vehicles by means of community engagement delivered through the Defra funded taxi project.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Crawley Borough Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of Crawley AQMA.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Crawley Growth Programme Three Bridges railway station Interchange improvement schemes	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2019 Design Stage	Delivery programme for scheme extended to 2025. Anticipate construction commencing 2023/24 (Extended from 22/23)	Coast to Capital Local Enterprise Partnership WSCC/ CBC	LEP/ WSCC/ CBC	No	Fully funded	Estimated £2.94m Full scheme cost review currently being undertaken prior to planning application being submitted	Planning application due late 2022/early 2023 (Extended from Q4 2021)	Reduced vehicle emissions Medium/ High	Modal Shift/ Improved traffic flow (Greatly improved cycle/ pedestrian route connections + traffic management upgrades)	Following extension of AQMA into Three Bridges, AQ assessment undertaken. Concluded AQ impacts within AQMA negligible and overall impact of scheme proposals on local aq not significant. Planning application being prepared for late 2022/early 2023	Scheme comprises: New station forecourt, relocated bus shelters, improved cycle and pedestrian route connections, new taxi rank, waiting area and car drop off, highway junction traffic light upgrades, new 'eastern 'access to the station comprising a vehicle drop off point and pedestrian access to platforms
2	Crawley Growth Programme Three Bridges Stations EV Parking/ charging points	Promoting Low Emission Transport	Priority parking for LEV's Procuring alternative Refuelling infrastructure to promote EV recharging	2020 Design Stage	Delivery of scheme extended to 2025 Anticipate construction commencing 2023/24. (Extended from late 2022)	LEP/ WSCC/ CBC	LEP/WSCC/ CBC	No	Fully funded	> £1m	Awaiting submission of pre app expected Q4 2022/23 (Extended from Q4 2021)	Reduced vehicle emissions Medium	Modal Shift	A full scheme review completed 2020 Information being put together for pre-app – expected Q4 2022/23 Planning application expected Q1 2022 – but implementation unlikely before 2023/24 (Extended from 2022/23)	Increase supply electric vehicle points/ parking bays at the station (20 in total) identified in response to increase demand.
3	Crawley Growth Programme Station Gateway - public realm/ highway improvement scheme including car free residential/ commercial development	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2019 Design/ Approval/ Planning Stage	Phased delivery programme for scheme extended to 2025.	Coast to Capital Local Enterprise Partnership WSCC/ CBC/ Private Developer (Aurora Group)	LEP/ WSCC/ CBC/ Aurora Group	No	Fully funded (Public /Private funded scheme)	£5.4m	Planning Approval (reserved matters) April 2021	Reduced vehicle and housing energy emissions Medium/ High	Low Emission/car free Housing Modal Shift/ Improved traffic flow	Crawley BC granted planning permission April 2021. Current intention to proceed with public realm and highways improvements ahead of the private developer (residential led) scheme. CBC leading design development underway ahead of a planning application submission in late 2022/early 2023 (Extended from Q4 2021)	Progress slowed in 2021 as a result of the pandemic and furloughing of key staff within Arora group.
4	Crawley Growth Programme Eastern Gateway - highway improvement scheme to deliver better connectivity and enhanced pedestrian and cycle access	Transport Planning and Infrastructure	Other (see comments section)	2020 Design Stage	Works completed Q3 2022.	WSCC	LEP/ WSCC/ CBC	No	Fully Funded	Revised cost £9.15m (previous estimate £8.8m)	Commenced (June 2021)	Reduced vehicle emissions Medium/ High	Modal Shift/ Improved traffic flow	Project was completed on time and the scheme opened to the public Q3 2022	Delivered improved connectivity, enhanced pedestrian/cycle access to Town Hall, County Buildings, Telford Place and Crawley College. Scheme covers eastern half of The Boulevard, Exchange Road, southern end Northgate Avenue, College Road (including roundabout), Southgate Avenue, up to/ including Station Way. Scheme also connects to Station Gateway project
5	Crawley Growth Programme Manor Royal - highway improvement scheme	Transport Planning and Infrastructure	Other (see comments section)	2020 Design Stage	Construction of Phase 1 works commenced January 2022 and completed Q3 2022. Phase 2 works commencing Q3 2022 and due for completion 2023.	WSCC	LEP/ WSCC/ CBC	No	Fully Funded	Revised £3.981m (Previous estimate £3.31m) Phased delivery – Phase one £1.18m. Phase 2 incorporating the bus extension	Phase 1 completed Q3 2022. Phase 2 commenced construction Q3 2022	Reduced vehicle emissions Medium/ High	Modal Shift/ Improved traffic flow	Phase 1 works complete Q3 2022 delivered junction improvements at County Oak/London Road, upgraded crossing units, signal heads, lane markings and a new bus stop. Phase 2 works commenced Q3 2022 to include public realm improvements from Manor Royal to Gatwick Road roundabout, construction of a new bus/cycle lane along	Manor Royal highways improvement scheme to deliver better connectivity and enhanced pedestrian and cycle access across the Business district Covid has caused some delays re impact on construction Industry

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										project £2.8				Manor Royal and improved crossings at County Oak Way & Metcalf Way	
6	Crawley Growth Programme Town Centre Cycling & Walking Schemes connecting Eastern Gateway and Station Gateway with existing cycle route along High Street	Transport Planning and Infrastructure	Cycle network	2020 Design Stage	Planning application to be determined Q4 2022. Construction expected to commence early 2023, completion due Q3 2023. (Extended from 2021/22)	Coast to Capital Local Enterprise Partnership WSCC/ CBC	LEP/ WSCC/ CBC	No	Fully Funded	£1.1m	Public consultation completed. Planning application submitted Q3 2022.	Reduced vehicle emissions Medium/low	Modal Shift	Detailed design for the Western Boulevard scheme complete. Planning application submitted for determination Q4 2022. Estimated start date for construction Q1 2023 (Extended from Q1 2022)	Town Centre Cycling & Walking Scheme creates a single, safe and connected cycle route that runs around the town center. Western Boulevard scheme will connect Eastern Gateway to the High Street and deliver improvements to bus routes, walking & cycling infrastructure and public realm
7	Crawley's Declaration of Climate Emergency	Policy Guidance and Developmnt Control	Other policy	Declared 2019	Climate Emergency Action Plan approved and published Nov 2021 This will be followed by ongoing implementation	CBC	CBC	No	Fully Funded	Not known. Individual measures funded on project-by-project basis	Action Plan published Nov 2021	Target to reduce emissions by 50%, (previous target 45%) and as close to net zero as possible by 2030. To reach net zero by 2040 (previous target 2050)	Emissions balance sheet	2020 (Feb) Overview and Scrutiny Commission (OSC) recommendations for measures to ensure carbon reduction targets addressed within Council services. 2020 (Apr) Climate Change Impact Assessment for all new council services/ projects/ 2020 (Nov) Climate Emergency Advisory Group set up to implement OCS recommendations. 2021 (Sept) Draft CEAP to committee 2021 (Nov) Published CEAP	Crawley's CEAP includes: Reduce energy demand Transition to low carbon heat/ cooling Stop investment in technologies that leave a carbon legacy Promote & support innovation in delivery of low and zero carbon energy Development
8	Defra funded AQ project: Taxi Project	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging.	2021	2023	CBC/ SussexAir/ WSCC	Defra Grant Funded	Yes	Fully Funded Defra funding	Proportion of the £376k funding for the Monitoring and Community Engagement Project	Planning//Project development	Reduced vehicle emissions by facilitating the uptake of more EV vehicles.	Increase % of EV/ ULEV's by Taxis and private hire vehicles	Successful bid for the air quality grant. Contract awarded Q 2 Energy Saving Trust. Taxi engagement campaign set up to facilitate a transition to EV vehicles by taxi drivers. Next stage to implement the campaign through small focus groups	
9	Defra funded AQ project:	Public Information	Other (community Engagement – Schools)	Sept 2020	Project extended to 2024	SussexAir/ CBC/ Sustrans	Defra Grant Funded	yes	Fully funded Defra funding	Proportion of the £376k funding for the Monitoring and Community Engagement Project	Sustrans working with Sussex Air to deliver the programme to schools across the Sussex area	No direct impact but aiming for reduced emissions indirectly through behavioural change / Modal shift	Awareness raising/ Modal shift/ reduction in vehicle emission Sussex Air project targets are all output based. Sustrans also records behaviour change and knowledge surveys to measure impact of workshops on knowledge / understanding of air quality. 48% increase in Knowledge was recorded. Overall targets were exceeded	Between 2018-19, 2020-21 and 2021-22, Sustrans has delivered a school's air quality project for Sussex Air, funded by DEFRA. Sustrans worked with schools across Sussex in/ near AQMAs to raise awareness about air quality and ways to reduce air pollution through active travel. The project focussed on PM/NO_2 air pollution 55,000 school children across Sussex educated through the project. Twitter/newsletters used to communicate key information/ statistics/ links to video	The nature of engagement with schools changed due to Covid, and Sustrans have found that offering a hybrid of in person and online delivery works well. The next phase of the programme will continue to deliver a hybrid model to schools across the Sussex area, as well as working with local communities. Training up teachers, using diffusion tubes to analyse local air quality, campaigning and looking at local and individual lifestyle changes to improve air quality

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														resources and raise awareness of air quality in Sussex. .	
10	Air Quality and Emissions Mitigation Guidance for Sussex	Policy Guidance and Developmnt Control	Air Quality Planning and Policy Guidance	Revised Guidance April 2021 (Original Guidance 2013)	ongoing	CBC with Sussex-air (SAQP)	SAQP/CBC	NO	Fully funded	N/A covered by SAQP annual subscription	Implemented (ongoing updates)	Reduction in emissions from transport associated with new developmnt through mitigation Individual scheme emissions calculations undertaken	Conditions on planning applications to require: Assessment of emissions from development Damage cost calculation Scheme of mitigation for emissions mitigation	Air Quality and Mitigation Guidance incorporated in Crawley Local Plan referenced to developers in local list Updated draft published April 2021and currently being implemented	Development of the Guidance as Supplementary Planning Document (SPD) being considered – dependent on review of application across Sussex authorities
11	Crawley Local Cycling and Walking Infrastructure Plan (LCWIP)	Transport Planning and Infrastructure	Cycle Network	Published March 2021	Ongoing implementation (see comments)	CBC /WSCC	Various Towns Fund/ CGP/Active Travel fund/ S106/CIL	No	Not known. Individual measures funded on project by project basis	Not known. Costs on project by project basis	Published.	Reduced vehicle emissions No Target set	Modal shift	Published 2020 2021 WSCC reviewing LCWIP routes. 2021 Consultants identified (but not fully commissioned yet) to carry out further transport study to identify levels of mitigation/active travel needed to support LCWIP targets. Expect consultants to be appointed Q4 2022 and Transport study modelling work/report to be completed Q1/2 2023	LCWIP is plan for high quality network of 16 safe, convenient and attractive cycling /walking routes though Crawley. Various funding sources being sought to implement plan. LCWIP in Local Plan – developers required to mitigate impact thorough S.106/CIL contributions to LCWIP targets/ projects
12	West Sussex Walking and Cycling Strategy - Infrastructure upgrade to cycle path Southgate Avenue	Transport Planning and Infrastructure	Cycle Network	2019	Estimated 2023 (revised from 2022l)	WSCC	Fully Funded WSCC	No	Partial WSCC/ Grant funded (not yet awarded)	£500k	Signed off by WSCC – due to start 2023	Reduced vehicle emissions No Target set	Modal shift	Options appraisal to improve existing cycle path on Southgate Avenue commissioned in 2019 as part of implementation of West Sussex Walking and Cycling Strategy. Preliminary design not approved by CBC 2020 2021 CBC applying for active travel funding to enable full scheme 2021 2022 Funding not available – reduced scheme to proceed.	Progress delayed due to inadequate scheme design/ funding shortfall. 2022 Funding not found for full scheme so original WSCC scheme to proceed which has funding
13	New Directions for Crawley - Draft Transport and Access Strategy	Policy Guidance and Development Control	Other policy (see comments section)	2020 for Strategy	Action plan estimated 2023 followed by ongoing implementation	CBC/WSCC	WSCC/ CBC/various private/public/ funding sources	No	Not known. Individual measures funded on project-by-project basis	Not known. Costs on project-by-project basis	2022 Transport study consultants identified (not yet commissioned)	Reduced vehicle emissions No Target set	Modal shift / reduced traffic emissions	2020 Strategy adopted. 2021/22 Transport study consultants identified to undertake transport study/ modelling for scenario testing to inform measures for action plan and to feed into Local Plan Modelling will Look at impact of Low Traffic Neighbourhoods/ walking/ cycling/ access for CBC	The strategy document addresses issues and options for shifting from car to people-centred approach, mobility and access 10-year time action plan to be developed from New Directions strategy together with LCWIP - to inform emerging Local Plan to guide design and access elements of new low traffic developments
14	Draft local Plan 2020-2035 To provide detailed	Policy Guidance and	Air Quality Planning and Policy Guidance	Draft 2019	Adoption due 2022 (see comments section)	CBC		No	Fully Funded	Not Known	The council is reviewing its adopted Local Plan, having consulted on the Reg. 19	Reduced air quality impact through development	Emissions mitigation. Energy efficient housing	Draft Local Plan 2020-2035 completed and early engagement consultation September 2019.	The council is reviewing its adopted Local Plan, having consulted on the

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	environmental policy and guidance through the development control process.	Development Control					CBC				draft Submission Local Plan June 2021. The review is to find a solution to water neutrality issues that have arisen due to Habitat Regulations. The council's adopted Local Plan (December 2015) remains up to date following its 5-year Review by Full Council in December 2020	control requiring adherence to air quality policy and emission mitigation	Good public/active transport links to reduce emissions	Public consultation January - March 2020. Reg 19 Consultation completed June 2021 2022 Review of Local Plan being undertaken to seek compliance with Habitat Regulations	Reg. 19 draft Submission Local Plan June 2021. Water neutrality has since emerged as an issue that must be addressed through the Local Plan to ensure its compliance with the Habitat Regulations, and this has resulted in significant delay to the Local Plan review timetable. An updated Local Plan timetable will be issued in due course.
15	WSCC Parking Standards Guidance	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Priority parking for LEV's	Approved 2019	ongoing	WSCC	WSCC	No	Fully Funded	Not known	Implemented	Reduced vehicle emissions Parking /EV parking standards Targets set in the guidance	future percentage increases in allocation for EV's and active transport	Targets for cycle storage and EV charging/ parking set by WSCC Parking Standards Guidance. CBC Parking Standards annex to the proposed submission draft local plan	The Guidance sets out parking standards, including targets for cycle storage and EV charging/ parking. Delayed due to Hold up with Local Plan
16	Electric Vehicle Strategy for West Sussex 2019-2030 EV Charge Point Project	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging	Approved 2019	ongoing	WSCC/ CBC	Funded via concession contract to be delivered by the preferred supplier. As such no capital funding requirement for Council	No	Fully Funded	Not known	EV infrastructure provider Connected-Kerb commissioned to deliver a district-wide electric vehicle charging point network Sites identified at CBC neighbourhood Parades: Dobbins Place Grattons Park Maidenbower Place Town center car parks 2022/23 Final consultation work to identify residential on-street locations	No emissions target set in Strategy. (Baseline: Transport contributes > third carbon emission across Crawley = 250 ktCO2 pA)	Increased uptake of electric vehicles and reduce vehicle emissions Increase % of charging points installed on streets WSCC modelled predictions estimates across West Sussex need 3,305 publicly accessible charging points by 2025, and 7,346 by 2030. To achieve 70% switch to EV cars by 2030	2020/2021 - CBC identified sites (irrespective of commercial viability) at: Residential locations with no access to off street parking and Commercial locations - Neighbourhood shopping Parades Q3 2021 - Procurement process for EV infrastructure provider process 2022 Contract with Connected Kerb to enable large scale roll out of public electric vehicle charge points across the borough within the next decade	WSCC EV Strategy target for 70% of new cars in the County to be EV by 2030. In CBC 30% of households have no access to off road parking = barrier to switch. Strategy aims to address barriers and encourage quick switch to EVs. Scheme will provide uplift in available EV charging infrastructure for CBC residents to incentivise EV uptake and reduce carbon/ aq emissions
17	School Travel plans	Promoting Travel Alternatives	School Travel Plans	2017	Ongoing	West Sussex County Council (WSCC)	WSCC	No	Fully Funded	Not Known	ongoing	Reduced vehicle emissions No Target set Medium/ low	Modal Shift %children travelling to school by sustainable means	Increase % Uptake	Helps reduce emissions during morning rush hour
18	Crawley Borough Council Staff Travel Survey	Promoting Travel Alternatives	Personalised Travel Planning	2020	Dec 2020	CBC	CBC	No	Fully Funded	Not Known	Survey completed Dec 2020 Draft Travel policy 2021	Reduced vehicle emissions No Target set	Modal shift/ staff travelling by sustainable means	Survey completed Dec 2020 Travel policy 2021 The Council's staff travel survey to inform the Staff Travel plan for new Town hall and development of travel policy measures for emerging Climate Emergency Action Plan	
19	CBC Travel Plans	Promoting Travel Alternatives	Workplace Travel Planning	2019	Estimated 2023 (revised from 2021) Ongoing implementation	CBC	CBC	No	Fully Funded	Not Known	Staff Travel Plan submitted through the planning process (new Town Hall planning application) 2021 and	Reduced vehicle emissions No Target set Medium/ low	% staff travelling by sustainable means	Draft Travel plan produced 2019 Staff travel survey 2020 used shape final plan	

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											conditioned in the planning consent Q2 2022 Expected implementation Q1/2 2023			Plan submitted with the planning application for new Town Hall development 2021 Travel plan conditioned under planning consent 2022	
20	easit Green Travel Network – easit discount (15%) staff rail/ 48% bus commuting available to Crawley staff/ businesses	Promoting Travel Alternatives	Promote use of rail and bus	2018	Ongoing	easit/CBC	easit/CBC or member company	No	Partial Funding	£2500 per yr for membership	ongoing	Reduced vehicle emissions No Target set Medium/ low	% staff travelling by sustainable means	10 registrations 2021/22	Council originally involved in funding the setting up of the scheme.
21	Crawley car club scheme with private sector partner	Promoting Travel Alternatives	Personalised Travel Planning	2019	Contract awarded 2021	CBC/ Private sector partner	Private sector partner/ S.106 contribution	No	Fully Funded	s.106 monies £20k Private sector contribution N/K	Contract awarded Co-Wheels	Reduced vehicle emissions No Target set Medium/ low	Reduction in private vehicle ownership	Contract awarded to supply and run EV car /car club at new Town Center residential development (Geraint Thomas House). Building completed – car club started 2022	.
22	Living Streets campaign - Information, events, and activities to promote walking	Promoting Travel Alternatives	Promotion of Walking	ongoing	Ongoing	WSCC Wellbeing/ Living Streets/ CBC	WSCC/ CBC	No	Fully Funded	Not Known	Implemented (annually)	Reduced vehicle emissions No Target set	Modal shift	Annual campaign event	Information, events, and activities aimed at council staff and local businesses
23	Residential and Business Travel plans	Promoting Travel Alternatives	Residential/ Business travel plans	ongoing	Ongoing	CBC	CBC	No	Fully Funded	Not Known	Implemented (individual developers/ businesses)	Reduced vehicle emissions No Target set	% development occupants (residents or staff) using sustainable transport modes	Developments of certain size required to implement Travel Plan	Implemented through Planning process - each application has its own target plan
24	Staff car loan - Council Vehicle procurement requires vehicle emissions limit eligibility for loan	Promoting Low Emissions Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles.	2000	Ongoing	CBC	CBC	No	Fully Funded	Not Known	Implemented /ongoing (individual applications)	Reduced vehicle emissions CO2 level of < 150 g/kg.	Minimum CO2 level of < 150 g/kg.	11 new-staff car loan applications 2021/2022	
25	Council Vehicle Fleet LEVs Fleet replacement prioritising uptake of EV/low emission vehicles	Promoting Low Emissions Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	ongoing	ongoing	CBC	CBC	No	Fully Funded (capital replacement budget)	Not Know	Funding identified/ tender awarded.	Reduced vehicle emissions	Modal shift to LEV/ Zero emissions	Play Services diesel van replaced with electric van 2021. 2 Neighbourhood Services road sweepers replaced with diesel (Euro VI) rather than EV as previously proposed - due to council budget squeeze EV were deemed too expensive	
26	CBC Staff Bicycle Loan Scheme	Promoting Low Emissions Transport	Prioritising uptake of low emission vehicles	2015	ongoing	CBC	CBC	No	Fully Funded	Not Known	Implemented /ongoing (individual applications)	low	Modal shift from private vehicle to bicycle	No new loan awarded 2021/22	CBC staff loan to buy Bike
27	CBC Staff Bike to Work Scheme	Promoting Low Emissions Transport	Prioritising uptake of low emission vehicles	2015	ongoing	CBC/Cycles scheme	Cycles scheme	No	Fully Funded	Not Known	Implemented /ongoing (individual applications)	low	Modal shift from private vehicle to bicycle	5 new applicants 2021/22	Bike Hire Scheme CBC/Partnership with “Cyclescheme” which allows employees to purchase bike through other shop outlets
28	Junior Citizen Event - educational programme on environmental issues, safety and citizenship, including “Air	Public Information Promoting Travel Alternatives	Other (interactive games and Awareness raising)	1990	Ongoing 2020 Junior Citizen event will not go ahead this year due to Covid restrictions	CBC	CBC	No	Fully Funded	£8k	Postponed Sept 2021 due to Covid – expected to go ahead Q42022	No Target set	Education and Modal Shift	Annually approximately 1200 KS2 (Yr6) pupils per year attend the event which has been running for over 30 years. The event was postponed last year due to uncertainty/ not enough lead in time to	Educational programme “Air quality in our local area” delivered through eco-action games and small discussion groups.

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	quality in our local area"													organise the event – but is to resume 2022.	
29	Emission Standards for Licensed Taxis	Promoting Low Emissions Transport	Taxi emission incentives	2020	Due to be adopted 2021/22 and implemented from 2022/23 Delayed (see Comments)	CBC	Individual operators' capital replacement/ alternative funding sources	No	Fully / or partially grant funded	Not Known (Renewal purchase costs on individual basis)	2020 Policy update not formally adopted due to Covid impact on taxi trade. Outcome of 2021 review of policy/ consultation with taxi trade: Policy was updated 1st April 2022, with strategies to improve vehicle emissions and general standards but not currently to adopt new licensed taxis zero emission capable (ZEC) from 2022	Target still for Zero emissions by 2030	Following post Covid consultation Original indicators: new taxis zero emission capable (ZEC) from Q2 2022/ existing taxis retrofitted to Euro 6 Q4 2022 Diesel phased out 2027 dropped in favour of all new taxis to meet Euro 6 from Q2 2022	Changes to policy on emission standards agreed at licensing committee April 2022. Further work to include more robust emissions strategy as part of ongoing Policy review will be taken to Licensing Committee in Q4 2022, covering engine size, emissions and vehicle age limits	Introduction of tougher emission controls on Taxi trade seen as a financial burden on post-Covid Taxi Trade resulting in impaired progress on the introduction of the 2020 Policy
30	LED lighting installation Programme	Promoting Low Emission Plant	Shift to installations using low emission fuels	2012	Ongoing LED Replacement scheme when lights fail replaced with LED	CBC	CBC	No	Fully funded	Costed on a project by project basis	ongoing	LED replacement: 40% reduction weekly wattage (> 50k watts)	45% Reduction in CO2 Emissions by 2030 100% Reduction in CO2 Emissions by 2050	Ongoing programme of LED lighting installation in communal areas of flats and sheltered blocks. 2022 New additional programme to be started to fit Battery Storage in communal blocks already supplied with a Solar PV system.	
31	airAlert Pollution Warning Service for people with asthma, COPD, or cardio problems. Voice call, text, or email sent to warn of high pollution and advise action to manage health	Public Information	Via other mechanisms SMS/ Mobile phone App/ Email	2006	ongoing	SAQP	SAQP	No	Fully funded	£4.2k	implemented	Health based service No Target set – but raises awareness of health impacts of pollution – manage chronic health conditions and drive behavioural change.	Uptake: Subscription numbers to the alert service	Over 800 registered subscribers. No direct emissions reductions but health benefits from direct application of monitoring data and raises awareness of air quality	Following 2021 consultation with Sussex authorities in decision was made to continue running the service
32	Anti-idling promotion - Installation of anti-idling signs at Crawley's level crossing sites	Traffic Management	Anti-idling enforcement	Original signage 2003 Additional signage 2019	planned for 2020/21	SAQP/WSCC/CBC	SAQP funded by Sussex-air Defra funded anti idling around schools (2019)	yes	Fully funded	Exact cost not known (proportion of £25k for anti-idling campaign)	Completed	No Target set	Local air quality monitoring	Installation of additional anti-idling signs by WSCC for Crawley's level crossing sites completed 2020	
33	Public Health Information/ Awareness Campaigns promoting sustainable modes of travel to staff and public:	Public Information	Other – see comments	Ongoing	Annual events - ongoing	CBC/WSCC/SAQP	CBC/ WSCC/ SAQP	No	Fully Funded	Not Known	Implemented (annually)	Campaign to raise awareness of health impacts of pollution, drive behavioural change and promote clean air	Engagement/number of pledges for behavioral change/ modal shift Take-up of initiatives Website hits Increase in air alert subscribers	Joint working with WSCC/SAQP/ Public Health/ CBC EH and Sustainability Teams to support campaigns and promotion of air Alert through social media posts on: Clean Air Day June 2022 Breathe Easy Week 17 to 23 June 2022 Car free week 1-31 July 2022	Public awareness campaign through editorials and advertisements in WSCC Connections and social media posts. Due to Covid restrictions public events were not possible this year

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	Clean Air Day Event and Breath Easy Week											No Target set		Cycle to Work Day 6 August 2022 Love Your Lungs Week | British Lung Foundation (blf.org.uk) https://www.blf.org.uk/take-action/campaign/loveyourlungsweek	
34	Net zero Collective Group Energy saving/carbon reduction in residential accommodation	Promoting Low Emission Plant	Shift to installations using low emission fuels for stationary and mobile sources	2020	Ongoing retrofit programme	CBC /Net Zero Collective/ University of Southampton	CBC/ LEP funding for green retrofitting. 2021/22 Wave 1 of SHDF (Social housing de-carbonisation fund)- 2021/22 Crawley Towns Fund see progress/ comments)	No	Fully Funded (see Comments)	Estimate £20K per property SHDF £690k Crawley Towns Fund £4m	Programme of retrofit across property portfolio to add pas2035 additional measures: Insulation (cavity wall0 Insulation, external wall) Insulation (timber framed properties) Top-up loft insulation Air source heat pumps and Solar with battery Removal of gas supply https://netzerocollective.co.uk/	Aiming for net zero	Lower energy bills Reduce carbon footprint - measured by EPC rating before and after retrofit. Toolkit developed by Southampton Uni to calculate EPC (Future industry standard) for decarbonisation/ Energy efficiency	2021/22 10 pilot property research study (mixed variety housing stock) by university of Southampton to monitor energy efficiency and find most cost-effective methodology for retrofit. 2021/22 10 pilot properties retrofit completed Still at monitoring stage of research but early findings found real energy savings of at least 25% 2022 Continuing pilot for further 25 properties 2022 2022 external cavity wall insulation 68 properties in Broadfield and Bewbush completed (using shdf wave 1 funding) 2022 Successful bid for £4m funding from Crawley Towns Fund to install cavity wall insulation to 248 blocks of flats (1511 flats) over 4 years. Work has commenced 2022 on surveys to each block. 2022 applied for further SHDF wave 2 funding for £3m to continue retrofit installations to 400 properties over 2 years	CBC putting forward selection of Council properties to enable research into the most efficient / effective method of decarbonising UK homes/ buildings and maximise the social value of investment. LEP funding through Town Investment plan to train/ retrain local heating engineers in new technologies and fund green retrofit. Aiming for eligibility for Green Homes Grant Local Authority Delivery (GHG LAD) 2023. Seeking solutions to overcome current barriers to funding stream - due to requirement for completion timescales which currently not achievable due to retro fit supply chain. Going forward CBC's aiming for new housing development to passive house standard (Pas 2035) to avoid retrofit and achieve Net zero CBC contractors for Crawley Homes (Mears and Waites) are now Pas 2035 accredited and will be responsible for surveying/coordinating and installing retrofit to Pas 2035 standard from March 2023.

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Those most at risk from air pollution are the young and elderly and those with predisposed medical conditions, which may be exacerbated by elevated levels of air pollution.

PHE have produced a Public Health Outcomes Framework (PHOF) which identifies an indicator for the fraction of mortality attributable to particulate air pollution in each authority in the UK. Using this framework it is possible to compare the values for Crawley to regional and national values, as well as other nearby authorities in Sussex.

In Crawley, the latest (2020) estimated fraction of mortality attributable to long-term exposure to particulate pollution was 6.2% (this is the value using a new method which has adjusted up the values across the whole of the UK.).

The mortality attributable to particulate pollution in Crawley has remained the same as the previous year (5.4% comparing values calculated using the old method) indicating there has been no worsening of particulate pollution in the area.

These indicators are calculated for all local authorities in England, and Crawley's level (6.2) places it in a similar position to other urban centres in the region such as Reigate (6.2) Brighton (6), and Worthing (6), but below the higher mortality values attributable to PM in major cities such as London (7.8%)

Crawley borough council is working towards reducing $PM_{2.5}$ in our local area through measures aimed at reducing emissions from a range of sources in the area, including transport, industrial processes and domestic burning.

The council is taking the following measures to address $PM_{2.5}$:

1. Smoke Control Areas (SCA) in Crawley: Almost all of Crawley (with the exception of Gatwick Airport and some newer areas of development of the outskirts of the borough) are designated as a SCAs. These areas were declared by Smoke Control Orders during the late 1950s and 1960s (after the public health crisis arising from the

smogs of the 1950s) when Crawley was a rapidly expanding new town. The regulation of smoke emissions by means of controls on the solid fuel appliances and the type of fuel burnt within the SCA, will reduce the impact of PM2.5 emissions in the borough. However, as the popularity of wood burners has increased in recent years, complaints of smoke from wood burners has also risen, due mainly to the burning of waste and unseasoned wood. The need to educate a new generation of solid fuel owners was therefore identified, and a “clean burn” campaign was launched in 2020 through a Defra grant funded project ‘Clean Burn Sussex”. The campaign aims to raise awareness and encourage the choice of cleaner fuels to reduce particulate emissions from domestic burning. The council has updated smoke control and domestic burning guidance on its website linking to the Clean Burn campaign.

2. Regulation of Industrial Process: Control emissions of $PM_{2.5}$ from mineral processes such as concrete batching, concrete crushing and road-stone coating.
3. Air Quality Action Plan: Many of the action plan measures listed in Table 2.2 promote low emission travel alternatives (e.g., cycling, walking, electric vehicles, car sharing etc) and the Crawley Growth Programme infrastructure projects help facilitate modal change, which together work to reduce particulate emissions.
4. Policy Measures: These include procurement of low emission vehicles and tightening the emissions standards for licensed taxis
5. Local Plan Policy: Requirement to adhere to the Sussex Air Quality and Emissions Mitigation Guidance document to reduce and, where that is not possible, mitigate emissions.
6. Local Transport Plan: Traffic management measures to reduce congestion, improve traffic flow and reduce road traffic pollutant emissions (including $PM_{2.5}$)
7. Monitoring: Direct monitoring of $PM_{2.5}$ has been undertaken in Crawley since a new particulate analyser (FIDAS) was installed at the continuous monitoring station at Gatwick Airport in March 2020. This monitoring capability will assist in assessing $PM_{2.5}$ levels in our local authority. The measured annual mean for $PM_{2.5}$ in Crawley 2021 was 8.2ug/m^3 (adjusted as per guidance in 7.174 of LAQM.TG (22) see Section 3.2.3).

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

This section sets out the monitoring undertaken within 2021 by Crawley Borough Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2017 and 2021 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Crawley Borough Council undertook automatic (continuous) monitoring at one site during 2021. Table A.1 in Appendix A shows the details of the automatic monitoring sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. The Sussex-air page presents automatic monitoring results for Crawley Borough Council, with automatic monitoring results also available through the UK-Air website.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Crawley Borough Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 51 sites during 2021. Table A.2 in Appendix A presents the details of the non-automatic sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. annualisation and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2021 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

The data in Table B.1 shows that air quality in Crawley is mainly good. There is no evidence that the hourly objective for NO_2 was being exceeded at any sites across Crawley in 2021 (indicator level annual means > 60µg/m^3) and the annual mean objective of 40µg/m^3 was achieved at most monitoring locations, with the exception of three sites next to busy roads (CR63, CR93 and CR101). All these sites were roadside locations, meaning they are located closer to the road than to houses, and therefore are not truly representative of residential exposure because pollution concentrations decrease with distance from the source. In order to account for this falling off in pollution concentration, an adjustment is made (Appendix C) to provide a more representative estimation of exposure. After applying this fall-off adjustment, there were no exceedances at the point of relevant public exposure at the sites. However, site CR93 (within Crawley's AQMA) was 39.4µg/m^3 which is borderline exceeding the annual mean objective for NO_2 (40µg/m^3) indicating there are still areas of concern in Crawley's AQMA in 2021.

2021 Background NO_2 in Crawley

There were no exceedances of the annual or hourly mean objectives for NO_2 at background sites in Crawley in 2021.

Fig 3.1

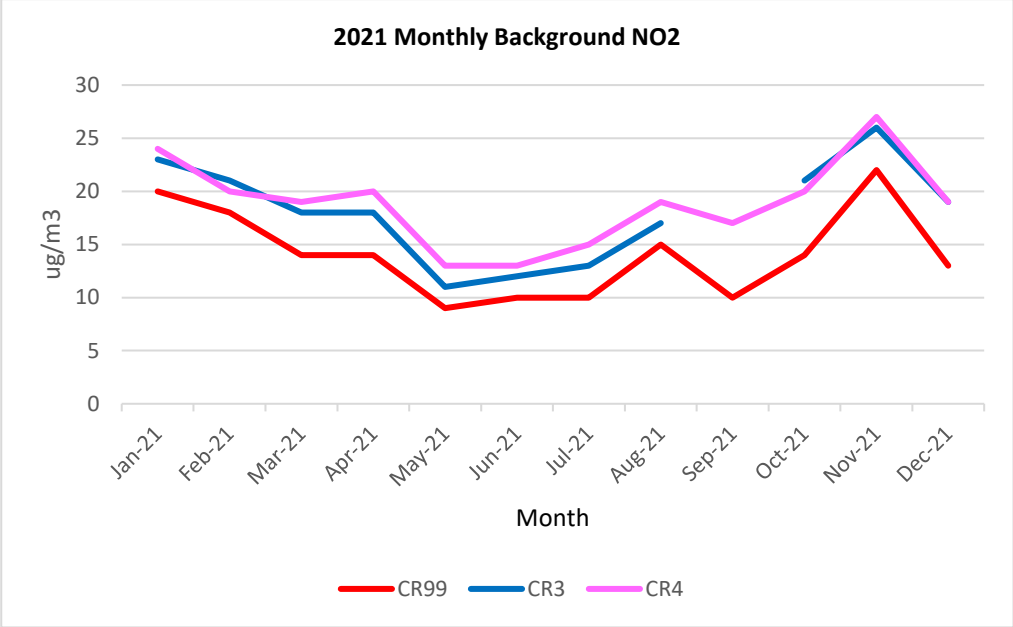


Fig 3.1 shows the monthly trend in NO_2 at three long term background sites in Crawley during 2021. All these sites were below the 40µg/m^3 annual mean objective.

Fig 3.2

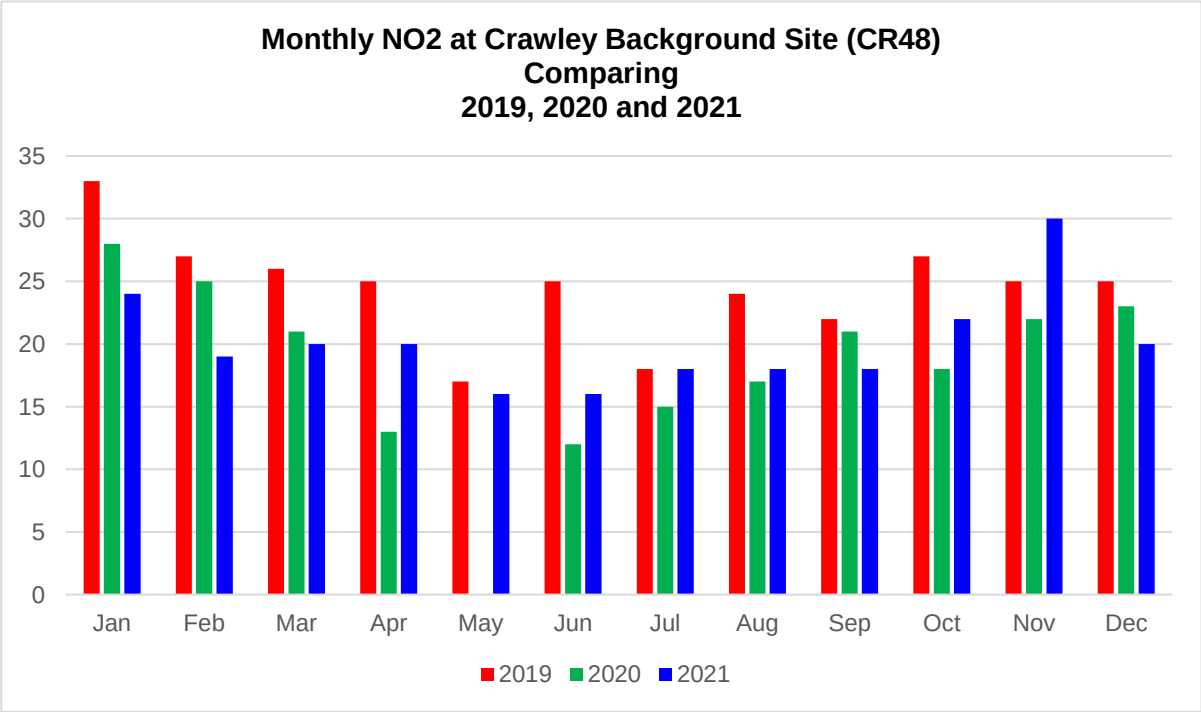


Fig 3.2 compares monthly NO_2 at a long-term background site in Crawley (CR48) from 2019 to 2021. This site is typical of the pattern of measured NO_2 seen at background sites in Crawley over this period, which saw an average drop in NO_2 levels of about 18% in 2020 compared to 2019 pre-covid levels as a direct result of fewer vehicles on the roads. By 2021 most background sites continued to record NO_2 concentrations below pre-covid levels, with NO_2 on average still 12% lower in 2021 compared to pre-covid 2019 levels.

2021 NO_2 Gatwick Airport

There were no exceedances of the annual or hourly mean objectives for NO_2 at the Gatwick East monitoring site (CA2) in 2021.

Fig 3.3

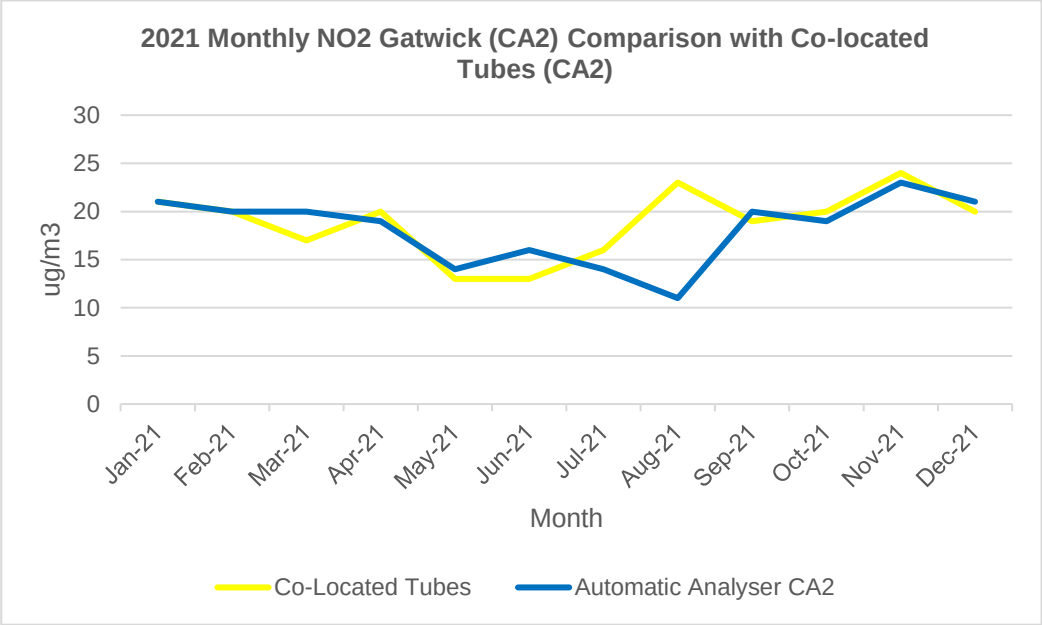
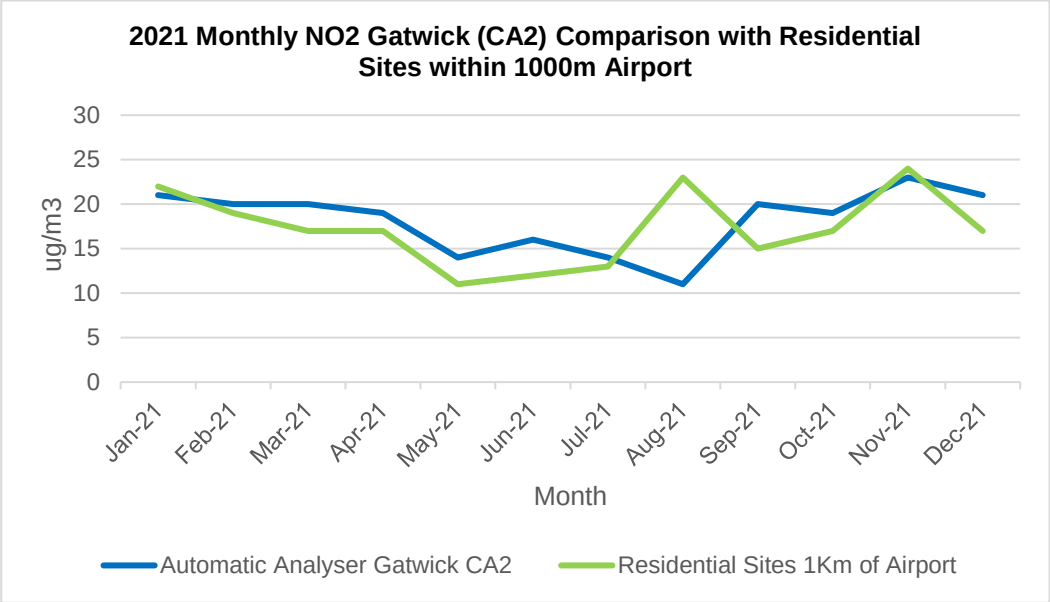


Fig 3.3 indicates that the co-located diffusion tube data at the CA2 site showed good correlation with the continuous data (with the exception of August 2021). The results show comparable annual means (18.8µg/m^3/18.2µg/m^3), and the same trend pattern.

Determining relevant exposure at residential properties within 1000m of the airport is one of the assessment criteria required for authorities with a major airport within their boundary.

Fig 3.4 presents the 2021 monitoring data for residential properties within 1000m of Gatwick. The data shows there were no exceedances of the objective in 2021 and levels closely follow the same trend pattern as the airport data.

Fig 3.4

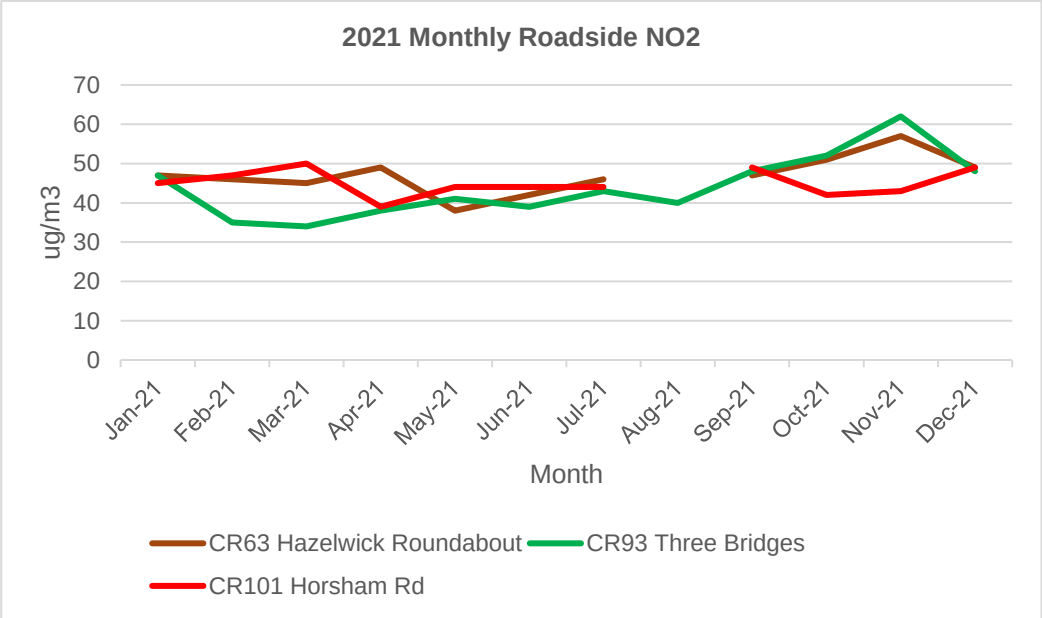


2021 Roadside NO_2 in Crawley

There were no exceedances of the hourly mean objectives for NO_2 at any of the roadside monitoring sites in Crawley in 2021. Three sites (CR63, CR93 and CR101) exceeded the annual mean objective of 40µg/m^3, but after fall off with distance adjustments there was no relevant public exposure (see Appendix C Table C.4).

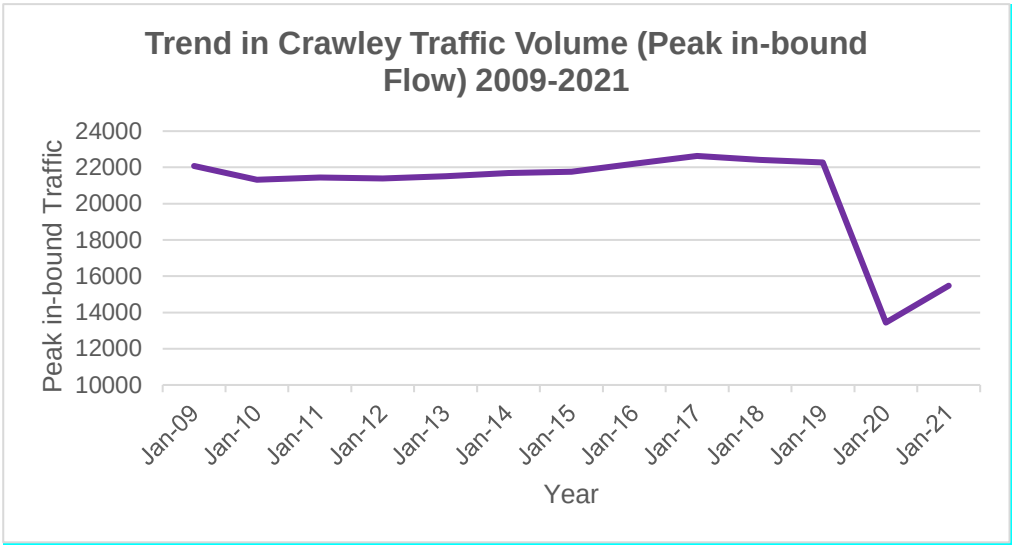
Fig 3.5 shows the monthly trend in roadside NO_2 at three sites in Crawley with exceedances of the annual mean objective of 40µg/m^3 in 2021.

Fig 3.5



Traffic volume data for Crawley shown in Fig 3.6 below shows peak am in-bound traffic flow. The data gives an indication of year-on-year trends in inbound traffic flow only (it is not a measure of the total volume of traffic travelling through Crawley).

Fig 3.6 Crawley Traffic 2009-2021 (Indicative trends for in bound am peak flow)



Department for Transport (DfT) national data, suggests reductions in vehicle traffic of up to 70% were experienced across the UK during 2020 as a result of Covid restrictions. Fig 3.6 indicates that in 2021 traffic was increasing but still significantly reduced compared to pre-Covid levels.

Figs 3.7 – 3.9 below show NO_2 levels at 3 busy roadside sites in Crawley over the last 3 years comparing concentrations before, during and after Covid restrictions were introduced.

Fig 3.7 CR63 Hazelwick Roundabout

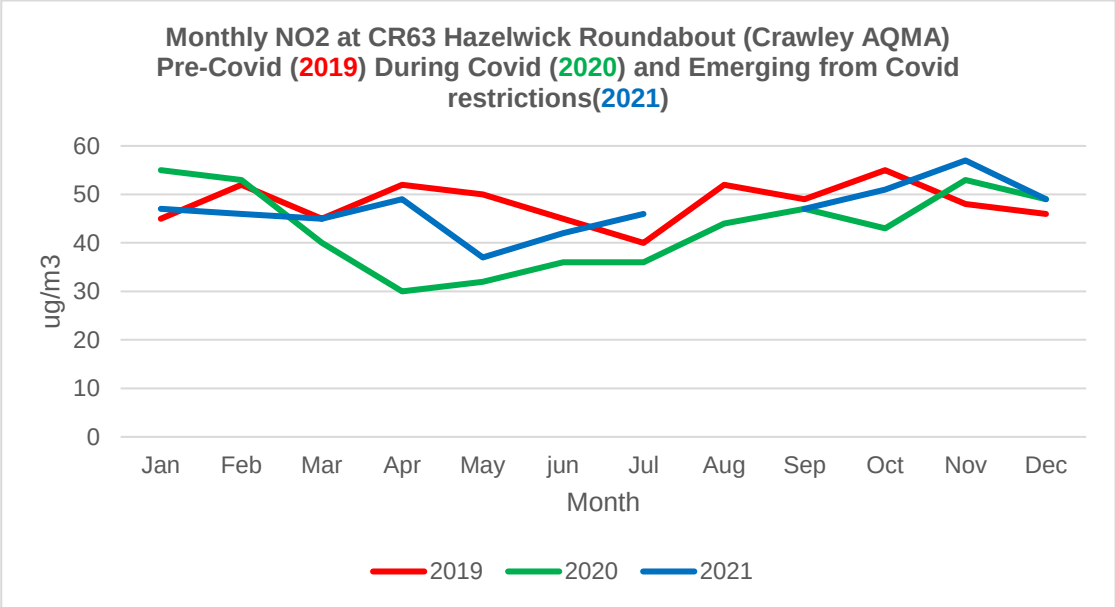


Fig 3.8 CR93 A2220 Three Bridges

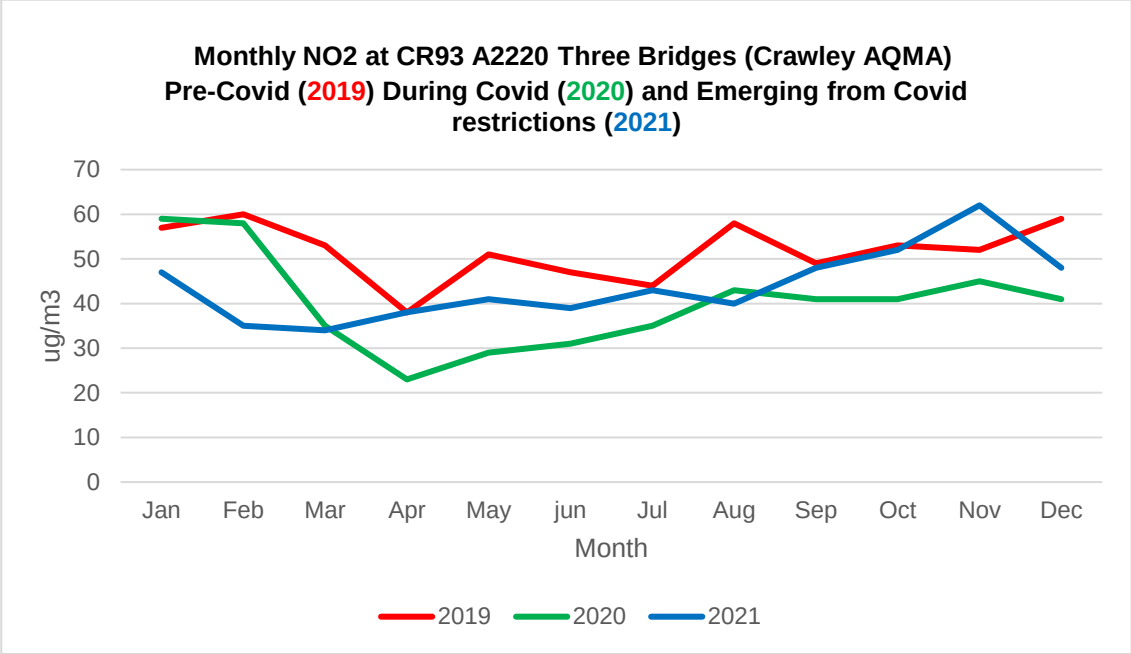
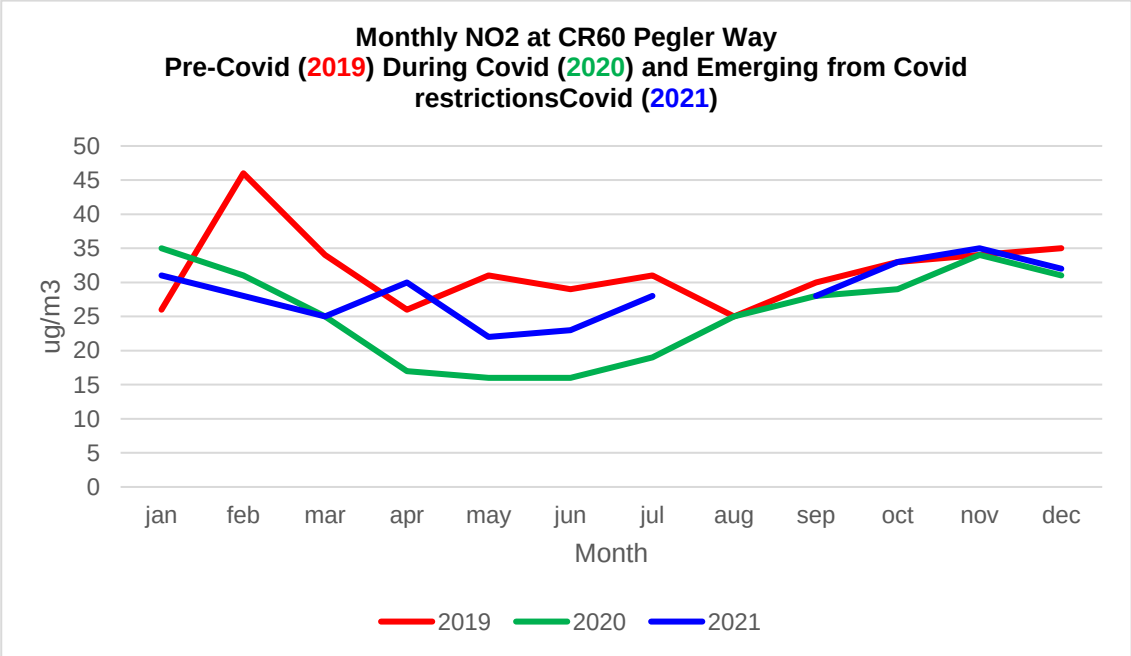


Fig 3.9 CR60 A2219 Pegler Way

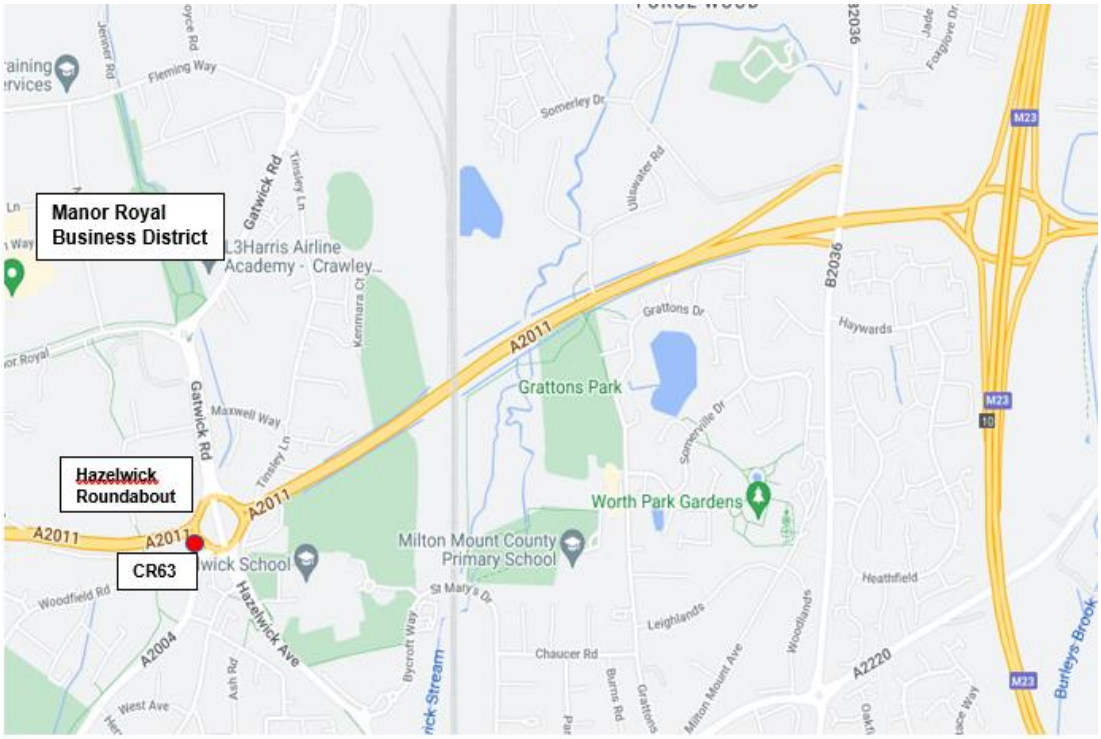


Most roadside sites in the borough saw an average drop in NO_2 levels of about 20% in 2020 compared to 2019 pre-covid levels as a direct result of fewer vehicles on the roads. By 2021 NO_2 at most roadside sites was increasing, but still below pre-covid levels, with some remaining at 2020 levels.

The CR63 monitoring site at the Hazelwick roundabout on A2011 Crawley Avenue (Fig 3.7) showed a smaller NO_2 reduction of 10% in 2020, and by 2021 NO_2 had returned to

2019 levels. The A2011 is the main highway into/out of Crawley from the M23 and also feeds into Crawley's Manor Royal business district (fig 3.10) which has a large number of warehouse/logistics distribution centres. These facilities carried on running, with increased demand, during the lockdown period of 2020, and this has continued as the shift to online retail remains high. In the last 2 years, the number of new distribution centres on Manor Royal has increased significantly, with 28 new centres built or proposed across 10 sites. The route from the business district to M23 passes through the Hazelwick area of Crawley's AQMA and the cumulative impact of a large number of these developments in the area may delay compliance with AQ objectives within the adjacent AQMA.

Fig 3.10 Manor Royal Business District in relation to CR63 Monitoring Site Hazelwick Roundabout, A2011



By contrast the CR93 monitoring site on A2220 close to Three bridges main line London to Brighton rail station (Fig 3.8) showed an above average drop of 23% in NO_2 levels in 2020 compared to 2019, and this only increased by 9% by 2021. This smaller bounce back may reflect the shift in working patterns as more employees choose to work from home resulting in less commuter traffic along this route. Fig 3.11 shows the location of the CR93 monitoring site in relation to Three Bridges Station.

Fig 3.11 Three Bridges Station in relation to CR93 Monitoring Site, A2220

2021 NO_2 in Crawley AQMA

There were no exceedances of the annual or hourly mean objectives for NO_2 at sites with relevant exposure within the AQMA in 2021, but CR93 close to Three Bridges station was close to exceeding the air quality limit for NO2 despite traffic levels remaining 15 % lower than at pre-Covid levels. It remains to be seen if commuter traffic to Three bridges station will return to pre-Covid levels.

Although there were no exceedeances of the AQO for NO_2 in 2021, levels continue to be high (within 10% 0f the AQO). Therefore no changes to the exisiting AQMA are proposed unless a continuing trend of reduced NO_2 concentrations is maintained in future years.

3.2.2 Particulate Matter (PM_{10})

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

A particulate monitor has been permanently located at Crawley's automatic monitoring station (CA2) on the eastern boundary of Gatwick airport for 19 years. A new particulate monitor which measures both PM_{10} and $PM_{2.5}$ at the same time (Palas FIDAS) was installed at the beginning of March 2020 to replace the existing TEOM monitor.

The FIDAS has been certified in the UK for use without the need for correction for PM_{10} data ($PM_{2.5}$ data requires correction – see 3.2.3 below). The 2021 PM_{10} results are presented in Appendix A.

The annual average for PM_{10} in 2021 was 18ug/m3 and there were no more than 35 exceedances of the 50ug/m3 daily mean objective during the year. The Monitoring results therefore show compliance with both the annual and 24-hour mean objectives in 2021, and also over the previous 5 years (Appendix A, Table A.6 and A.7).

The annual mean PM_{10} concentration recorded in 2021 showed an increase of 16% in relation to the previous year, but a decrease of 14% in relation to 2019.The site shows a continuing overall downward trend in measured concentrations of PM_{10} over the last five years. However, in the past 5 years, the site has exceeded the 15µg/m3 annual mean for particulate matter (PM_{10}) recommended by the World Health Organisation .

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years.

Since the installation of the new particulate monitor in 2020 the council has been able to carry out real-time monitoring for $PM_{2.5}$. Before 2020, annual mean $PM_{2.5}$ was estimated from the TEOM PM_{10} measurements (CA2) using a local ratio of $PM_{2.5}$ to PM_{10}, following the method described in Box 7.7 of Technical Guidance TG (16).

Although the FIDAS has been certified in the UK for use without the need for correction for PM_{10} measurements, precautionary advice given in 7.174 of LAQM.TG (22) requires $PM_{2.5}$

data to be corrected for slope by dividing by 1.06. This correction has therefore been applied to $PM_{2.5}$ data reported in in Appendix A (Table A.8)

The annual average for $PM_{2.5}$ in 2021 was 8.2ug/m3 and concentrations over the previous 5 years have all been well below the national limit value of 25µg/m^3.

The site shows a continuing overall downward trend in measured concentrations of $PM_{2.5}$, however, the results remain above the WHO-recommended annual mean guideline value of 5µg/m3.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CA2	Gatwick East	Other/ Industrial	529417	141496	NO_2 PM_{10} $PM_{2.5}$	NO	Chemiluminescent/ FIDAS	63m	7m	1.8

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable

Table A.2 – Details of Non-Automatic Monitoring Sites

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
CR1	High Street	Roadside	526799	136785	NO_2	N	15.8m	1.75m	N	2.0
CR3	Birch Lea	Urban background	528438	138392	NO_2	N	6.85m	0.5m	N	2.0
CR4	Headley Close	Urban background	529864	138204	NO_2	N	14.8m	0.5m	N	2.0
CR48	Lynhurst Cottage	Urban background	527110	139530	NO_2	N	0m	21m	N	1.5
CR49	Charlwood Nursery	Urban background	526320	139860	NO_2	N	0m	36m	N	1.5
CR50	Rowley Cottage	Urban background	527810	139929	NO_2	N	0m	75m	N	1.5
CR51	Balcombe Road	Urban background	529490	141460	NO_2	N	0m	21m	N	1.5
CR52	Gatwick East, (Tri-location)	Other/ Industrial (AQD2008)	529417	141496	NO_2	N	63m	7m	Y	1.5
CR53	Gatwick East, (Tri-location)	Other/ Industrial (AQD2008)	529417	141496	NO_2	N	63m	7m	Y	1.5
CR54	Gatwick East, (Tri-location)	Other/ Industrial (AQD2008)	529417	141496	NO_2	N	63m	7m	Y	1.5

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
CR 55	Tinsley Close Fence (11)	Roadside	528446,	138085	NO_2	Y	1.13m	5.7m	N	2.0
CR 60	Peglar Way	Roadside	526759	136948	NO_2	N	6.5m	2.31m	N	2.0
CR62	Tinsley Close (10)	Urban background	528438	138088	NO_2	Y	0m	13.6m	N	2.0
CR63	Woodfield Lodge (Roundabout)	Roadside	528153	137912	NO_2	Y	30m	7.4m	N	2.0
CR64	Woodfield Lodge (Northgate Ave)	Roadside	528150	137825	NO_2	Y	4.57m	1.5m	N	2.0
CR66	Brighton Rd (Rail crossing)	Roadside	526743	136346	NO_2	N	0.5m	1.2m	N	2.0
CR69	Tinsley Close Facade(11)	Urban background	528443	138082	NO_2	Y	0m	9.3m	N	2.0
CR72	Burlands	Urban background	525534	138472	NO_2	N	6.75m	1.3m	N	2.0
CR74	Tinsley Green Radford Road	Roadside	528978	139599	NO_2	N	31.5m	1.8m	N	1.5
CR75	Steers Lane	Roadside	529335	139589	NO_2	N	18.6m	2m	N	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
CR76	Hazelwick Court	roadside	528292	137810	NO_2	Y	10.3m	1.3m	N	2.0
CR77	Hazelwick Ave (Bays)	Roadside	528362	137812	NO_2	Y	6.34m	2.3m	N	2.0
CR78	Ferndown	Urban background	530037	138553	NO_2	N	0m	40m	N	2.0
CR79	St Hildas Close	Urban background	529312	138534	NO_2	N	0m	12m	N	2.0
CR80	Saxon Road	Urban background	530424	136521	NO_2	N	0m	8.7m	N	2.0
CR81	Bolton Road	Urban background	529047	134474	NO_2	N	0m	12.8m	N	2.0
CR85	Tinsley Lane Flats	Urban background	528295	138009	NO_2	Y	32m	9.4m	N	2.0
CR86	Crown Buildings The Boulevard	Roadside	526878	136821	NO_2	N	13.8m	0.5m	N	2.0
CR87	Broadway bus shelter	Roadside	526908	136754	NO_2	N	3.5m	0.5m	N	2.0
CR88	Filbert Crescent	Urban background	525489	136573	NO_2	N	0m	5.4m	N	2.0
CR89	Dalewood Garden	Urban background	527715	137893	NO_2	y	0m	13.8m	N	2.0
CR91	Ocean Hse, Hazelwick Ave	Roadside	528681	137177	NO_2	Y	4.7m	0.5m	N	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
CR93	St Marys Drive	Roadside	528895	137115	NO_2	Y	1.5m	1.8m	N	2.0
CR94	Station Hill	Roadside	528841	137069	NO_2	Y	5.45m	3.45	N	2.0
CR95	Daniels Hse, Worth Park Ave	Roadside	528882	137086	NO_2	Y	5.44m	2.2m	N	2.50
CR96	Pound Hill Junior School	Roadside	529125	137196	NO_2	N	35m	3.58m	N	2.0
CR97	Daisy Chain Nursery Haslett Ave East	Roadside	528603	136950	NO_2	Y	3.52m	1.1m	N	1.5
CR98	Gatwick School Gatwick Road	Roadside	528515	139275	NO_2	N	12.6m	2.13m	N	2.0
CR 99	Furnace Farm Road	Urban background	528410	135628	NO_2	N	12.1m	1.5m	N	2.0
CR100	Horsham Road Level Crossing	Roadside	526326	136487	NO_2	N	2.08m	1.46m	N	2.0
CR101	Horsham Road A2220	Roadside	525679	135556	NO_2	N	8.91m	1.13m	N	2.0
CR102	Pease Pottage Hill A23	Roadside	526449	134139	NO_2	N	5.10m	4.45m	N	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
CR103	171 St Marys Drive	Urban backgound	528848	137802	NO_2	N	0m	12.6m	N	1.5
CR104	Southgate Ave	Urban backgound	527333	135 846	NO_2	N	0m	4.7m	N	1.5
CR105	102 London Road	Roadside	526940	137831	NO_2	N	10.1m	2.7m	N	2.0
CR106	147 London Road	Roadside	527000	138357	NO_2	N	5.94m	3.91m	N	2.0
CR107	Rusper Road	Urban backgound	524806	136822	NO_2	N	0m	10.5	N	1.5
CR 108	Belgrave Hse Station Way	Roadside	526901	136381	NO_2	N	4m	2.6m	N	2.0
CR 109	Moka Station Way	Urban backgound	527174	136357	NO_2	N	9m	14m	N	2.0
CR 110	Station car park	Roadside	526928	136356	NO_2	N	8m	3.6m	N	1.5
CR 111	Taj Car park	Roadside	526804	136375	NO_2	N	0m	2.4 m	N	1.5

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CA2	529417	141496	Other/ Industrial	96	96	28	25	25	17	18
LGW3*			Other/ Industrial	98	98	29	30	29	17	18
RG3**			Rural	99	99	14	16	15	10	10

(* LGW3 site located on-airport South Terminal runway – owned/operated by GAL - data presented here for the purpose of comparison)

(** RG3 site located southwest of runway in Crawley – owned/operated by RBBC - data presented here for the purpose of comparison)

☒ **Reported concentrations are those at the location of the monitoring site (annualised, as required), i.e. prior to any fall-off with distance correction.**

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CR1	526799	136785	Roadside	100	100	33	33	35	26	27.7
CR3	528438	138392	Urban background	100	100	22	20	21	16	17.3
CR4	529864	138204	Urban background	92	92	23	21	23	18	17.8
CR48	527110	139530	Urban background	92	92	27	25	25	19	19.2
CR49	526320	139860	Urban background	100	100	18	18	17	10	11.9
CR50	527810	139929	Urban background	92	92	21	21	21	17	17.7
CR51	529490	141460	Urban background	92	92	24	22	22	16	15.2
CR52	529417	141496	Other/ Industrial	100	100	30	24	26	18	17.9
CR53	529417	141496	Other/ Industrial	100	100	29	25	25	18	17.9
CR54	529417	141496	Other/ Industrial	100	100	29	25	25	18	18.1
CR55	528446,	138085	Roadside	100	100	**41**	**41**	**42**	36	35.0
CR60	526759	136948	Roadside	100	100	35	33	32	25	26.2
CR62	528438	138088	Urban background	100	100	**40**	38	**40**	34	33.8
CR63	528153	137912	Roadside	100	100	**52**	**52**	**49**	**42**	**42.2**
CR64	528150	137825	Roadside	100	100	**41**	**40**	38	30	30.6
CR66	526743	136346	Roadside	100	100	34	29	30	27	26.1

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
CR69	528443	138082	Urban background	100	100	**42**	**40**	**44**	36	36.3
CR72	525534	138472	Urban background	92	92	15	15	13	11	10.9
CR74	528978	139599	Roadside	100	100	37	34	33	25	26.3
CR75	529335	139589	Roadside	83	83	23	21	23	17	18.8
CR76	528292	137810	Roadside	100	100	**40**	35	35	28	30.7
CR77	528362	137812	Roadside	100	100	39	35	35	28	30.9
CR78	530037	138553	Urban background	100	100	26	24	22	17	19.3
CR79	529312	138534	Urban background	100	100	27	25	25	20	21.2
CR80	530424	136521	Urban background	100	100	27	28	27	20	22.4
CR81	529047	134474	Urban background	100	100	25	24	22	16	17.0
CR85	528295	138009	Urban background	92	92	27[1]	30	30	31	28.3
CR86	526878	136821	Roadside	92	92	22[1]	26	27	24	21.2
CR87	526908	136754	Roadside	100	100	38[1]	38	39	29	31.3
CR88	525489	136573	Urban background	92	92	18[1]	26	25	21	21.6
CR89	527715	137893	Urban background	100	100	19[1]	22	22	17	19.0
CR91	528681	137177	Roadside	100	100	39[2]	34	32	28	29.7
CR93	528895	137115	Roadside	100	100	**65[2]**	**48**	**53**	39	**42.2**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
CR94	528841	137069	Roadside	100	100		26	27	18	25.0
CR95	528882	137086	Roadside	92	92		31	32	24	25.7
CR96	529125	137196	Roadside	100	100		30	27	22	21.7
CR97	528603	136950	Roadside	100	100		**41**	37	28	29.1
CR98	528515	139275	Roadside	100	100		35	34	27	29.2
CR 99	528410	135628	Urban background	83	83	20	17	15	13	13.5
CR 100	526326	136487	Roadside	100	100		30(1)	27	23	25.6
CR 101	525679	135556	Roadside	100	100		**54**(1)	**50**	**44**	**40.6**
CR 102	526449	134139	Roadside	100	100		37(1)	34	26	29.4
CR103	528848	137802	Urban background	100	100			21	13	16.5
CR104	527333	135846	Urban background	100	100			27	19	23.3
CR105	526940	137831	Roadside	100	100			**44**	36	36.4
CR106	527000	138357	Roadside	100	100			**46**	33	36.7
CR107	524806	136822	Urban backgound	100	83				14	16.3
CR 108	526901	136381	Roadside	100	83				19	25.6
CR 109	527174	136357	Urban backgound	100	83				20	23.9

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CR 110	526928	136356	Roadside	86	50				17	18.9
CR 111	526804	136375	Roadside	100	58				22	22.9

☒ **Diffusion tube data has been bias adjusted**

☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance correction**

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

Figure A1.1 Trends in Annual Mean NO_2 Concentrations: Gatwick Airport - comparison CA2, LGW3 and RG3

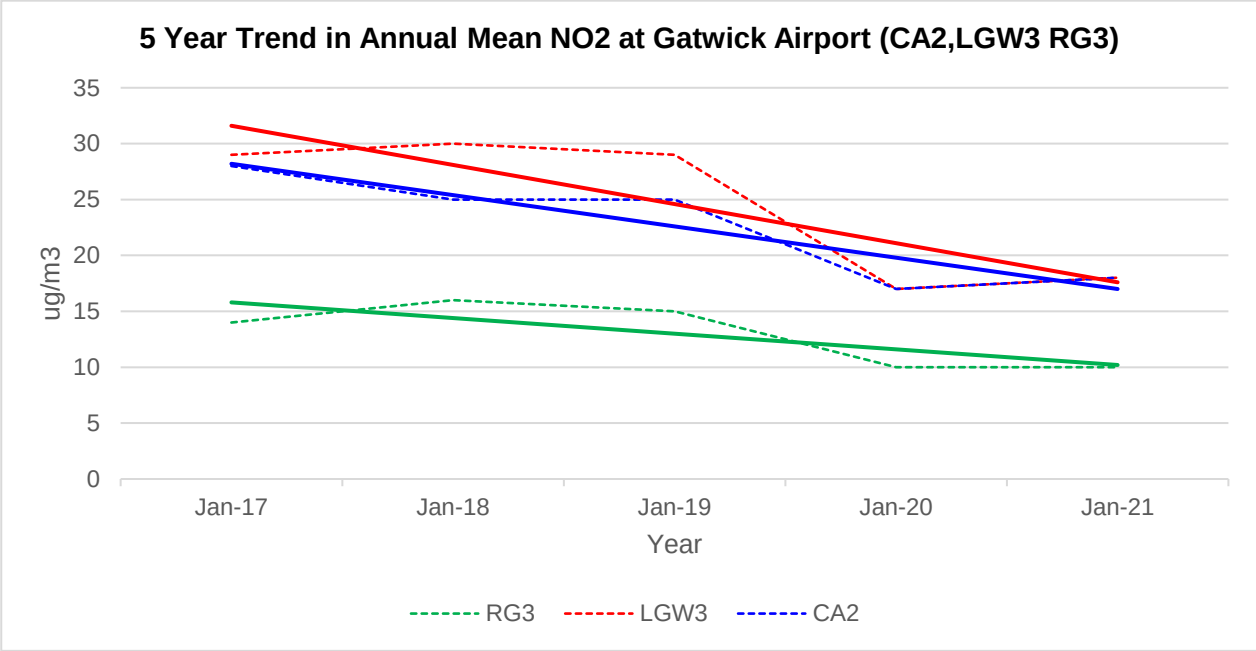


Figure A1.1 presents NO_2 annual mean concentrations for continuous automatic monitoring sites at Gatwick Airport, comparing Crawley's CA2 site (located east of the runway on the eastern airport boundary close to Balcombe Road residential properties) with GAL's LGW3 site (located on-airport at South Terminal runway) and RG3 (located southwest of the runway at Poles Lane in a rural area of Crawley)

A slight upturn in annual mean NO_2 was seen in 2021, but the 5-year trend continues to be downwards. Monitoring sites RG3, LGW3 and CA2 are located on a transect across the airport from southwest to northeast following the prevailing wind direction (south-westerlies) in the area. Comparing the monitoring data from these three sites gives an indication of the level of emissions "picked up" from the airport from southwest (RG3) to northeast (CA2).

The sharp falloff in airport concentrations in 2020 was a direct result of the almost total shut down of the aviation industry due to Covid which also helped to demonstrate the contribution on-airport emissions of NO_2 make to annual mean concentrations in the local area. Airport NO_2 fell to the same level as residential locations around the airport in the absence of airport activity in 2020.

Figure A1.2 Trends in Annual Mean NO_2 Concentrations: Gatwick CA2 Automatic Analyser Comparison CA2 Co-Located Diffusion Tubes

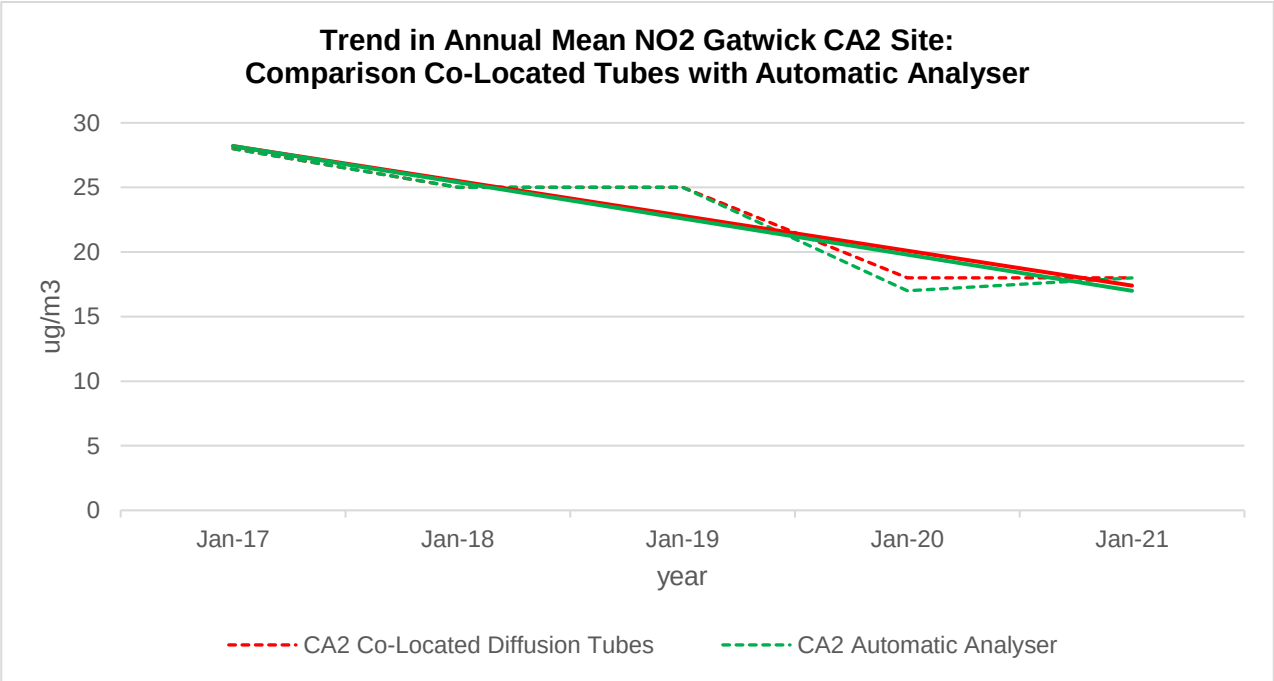


Figure A1.2 presents NO2 annual mean concentrations for triplicate co-located tubes with the automatic analyser at Gatwick CA2 site 2017 to 2021. The co-located diffusion tube data (CR52, CR53, CR54) show close correlation with the continuous data from the automatic analyser, and the same trend pattern for the long-term data. Both passive and continuous data shows a sharp fall-off in concentrations in 2020 as a result of the impact of Covid on road and air transport in the vicinity of the airport and a slight upturn in 2021 reflecting the increased activity as the airport industry recovered from travel restrictions imposed during the pandemic. There are no exceedances of the annual mean objective in 2021 and the long-term trend is downward.

Figure A1.3 Trends in Annual Mean NO_2 Concentrations: Gatwick (LGW3) Compared with Residential Sites within 1000m of Airport

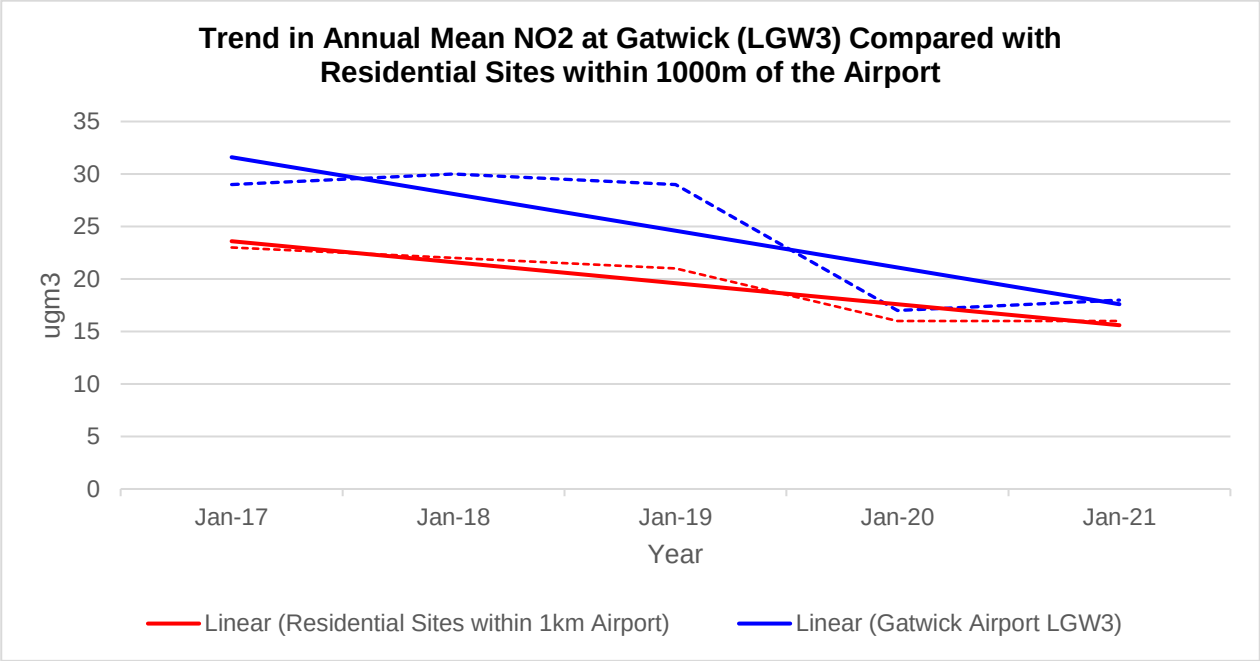


Figure A1.3 presents NO_2 annual mean concentrations for residential site located within 1000m of Gatwick airport compared to the concentrations at Gatwick's LGW3 2017 to 2021.

There are no exceedances of the annual mean objective in 2021, and both show a long-term downward trend.

Both airport and residential NO_2 showed a steep decline in concentrations in 2020 as a result of Covid restrictions on road and air transport. 2020 levels of NO_2 fell more dramatically at the airport than elsewhere in the borough, with measured airport NO_2 concentrations almost at the same level as those of residential locations for the first time since monitoring began (>20yrs), demonstrating the contribution on-airport emissions of NO_2 make to annual mean concentrations in the local area. The slight increase in NO_2 levels in 2021 reflects the increased road and air transport activity as travel restrictions began to ease.

Figure A1.4 Trends in Annual Mean NO_2 Concentrations: Background NO_2

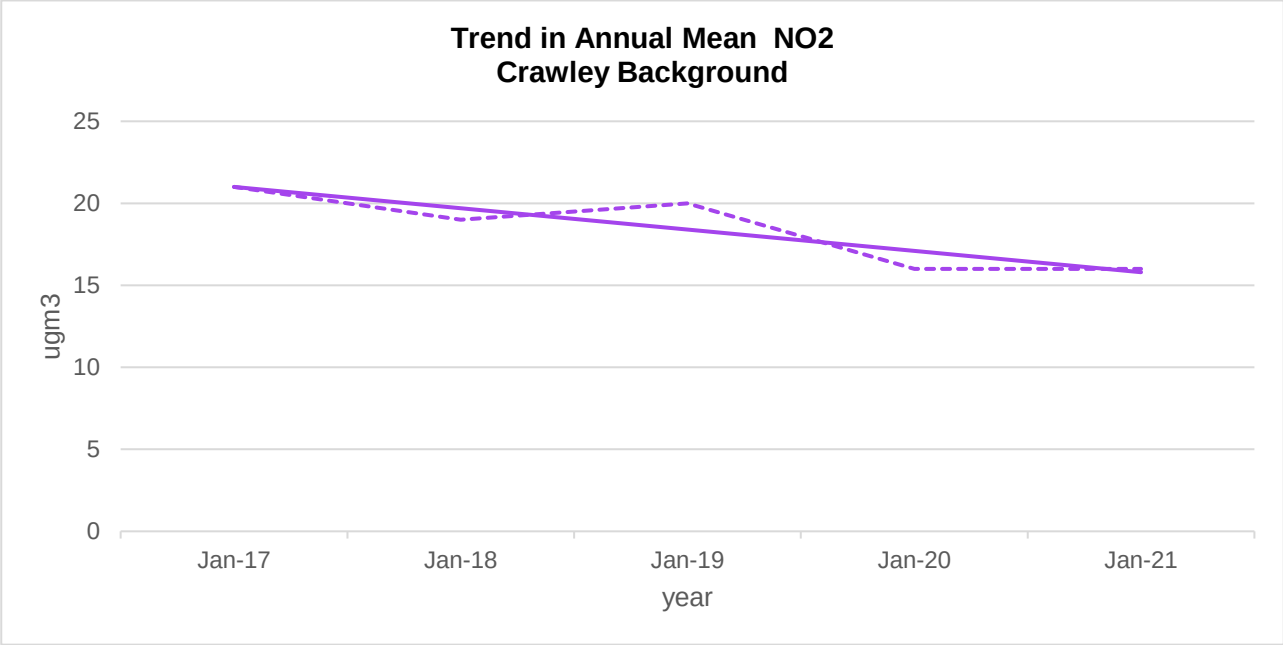


Figure A1.4 presents the 5-year trend in NO_2 annual mean concentrations for background sites in Crawley 2017 to 2021. The long-term trend shows a reduction in NO_2, reflecting the regional and national trend as policy, technological and societal measures have helped reduce background emissions. There were no exceedances of the annual mean objective at background sites in Crawley in 2021.

Prior to Covid, a flattening of the trend in background NO_2 was emerging, however, the unusually low concentrations in 2020 due to Covid have increased the downward slope. The trend will continue to be monitored and reviewed annually through the LAQM process to see how development and traffic pressures in the borough impact backgroundNO_2 levels in the post-covid recovery period.

Figure A1.5 Trends in Annual Mean NO_2 Concentrations: Roadside NO_2

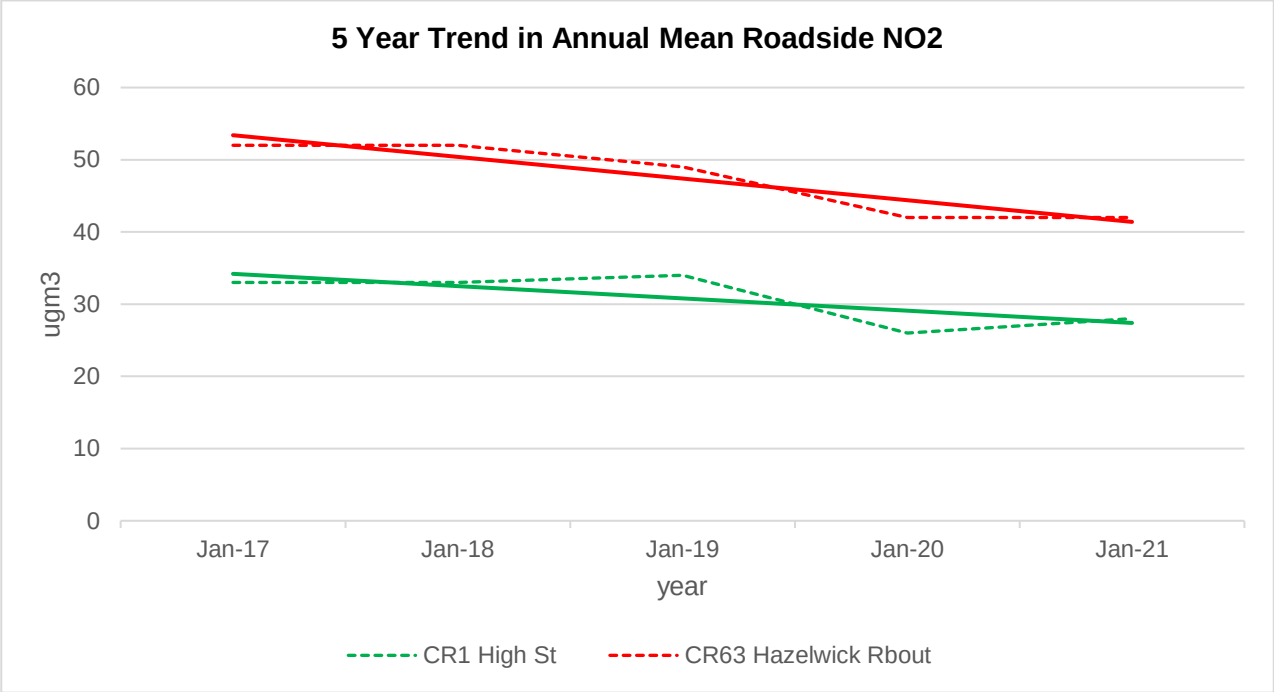


Figure A1.5 presents the 5-year trend in roadside NO_2 in Crawley 2017 to 2021. There were exceedances of the annual mean objective at three roadside sites in 2021, however, after adjustment for fall off with distance, there was no relevant public exposure. The long-term trend shows a reduction in NO_2 and a downward trend.

Prior to Covid the 5-year trend (2015-2019) showed an upwards trend at roadside sites, mirroring the upwards trend in road traffic volumes in Crawley until 2019. Following the unprecedented reduction in road traffic caused by travel restrictions in 2020 and to a lesser extent 2021, NO_2 levels have fallen steeply at roadside sites.

A slight increase in NO_2 levels was seen in 2021 as road traffic began to increase, however, 2021 traffic volumes were still low, and it is not yet known if the downward trend in NO_2 will continue if traffic volumes return to pre-Covid levels. In coming years other factors, such as cleaner engine technologies, societal change, carbon reduction etc, will influence air quality, and help mitigate rising traffic volumes. The trend will continue to be monitored and reviewed annually through the LAQM process.

Figure A1.6 Trends in Annual Mean NO_2 Concentrations: AQMA Residential Sites - CR69 adjacent to the A2011 Crawley Avenue and CR93 adjacent to the A2220 Three Bridges

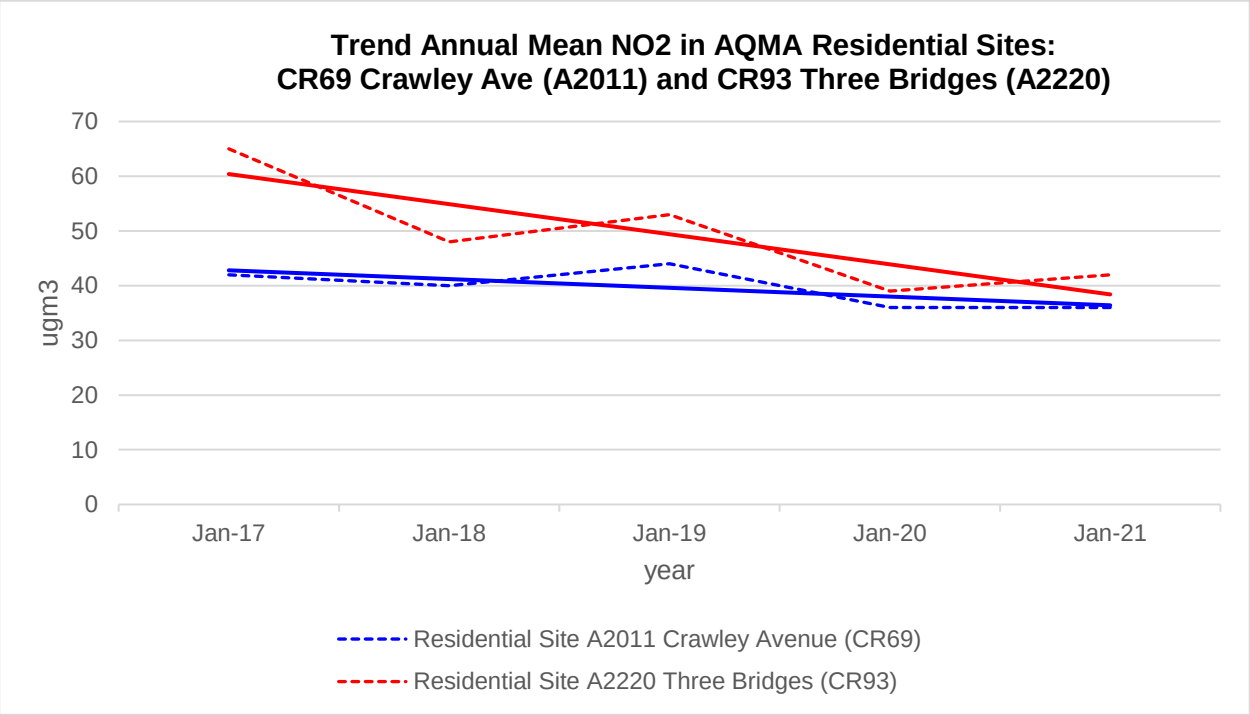


Figure A1.6 presents the trend in NO_2 annual mean concentrations at two residential sites in Crawley's AQMA: CR69 adjacent to the A2011, Crawley Avenue and CR93 adjacent to the A2220, Three Bridges.

The 5-year trend in NO_2 is downwards at both sites, and after adjustment for fall off with distance, there were no exceedances of the annual mean objective at any sites in the AQMA in 2021. However, despite showing a steeper decline in NO_2 since Covid, site CR93 is still borderline (39.4ug/m3) for exceedance of the annual mean objective for NO_2 and is showing a slight upturn in concentrations in 2021. Site CR69 showed no increase in NO_2 levels 2021 but is still within 10% of the air quality objective for annual mean NO_2.

Locations within the AQMA will continue to be monitored and reviewed annually through the LAQM process to assess trends.

Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

There have been no exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) over the past five years at Crawley's automatic monitoring station (CA2) on the eastern boundary of Gatwick airport. There have been no exceedances at Gatwick airports own monitoring station (LGW3) located on the Airport, close to the eastern end of the runway and to the A23.

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CA2	529417	141496	Other/ Industrial	Automatic	96	0	0	0	0	0
*LGW3			Other/ Industrial	Automatic	98	0	0	0	0	0
**RG3			Rural	Automatic	99	0	0	0	0	0

(* LGW3 site located on-airport South Terminal runway – owned/operated by GAL - data presented here for the purpose of comparison)

(** RG3 site located southwest of runway in Crawley – owned/operated by RBBC - data presented here for the purpose of comparison)

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m^3 have been recorded.

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CA2	529417	141496	Other/ Industrial	100	100	18*	18*	21*	15**	18**
*LGW3			Other/Industrial	99	99	19	19	14	14	14

(* LGW3 site located on-airport South Terminal runway – owned/operated by GAL - data presented here for the purpose of comparison)

* TEOM monitor data

** FIDAS Monitor data

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the PM_{10} annual mean objective of 40µg/m^3 are shown in **bold**.

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations

Figure A3.1 Trends in Annual Mean PM_{10} Concentrations: Gatwick Airport - comparison CA2 and LGW3

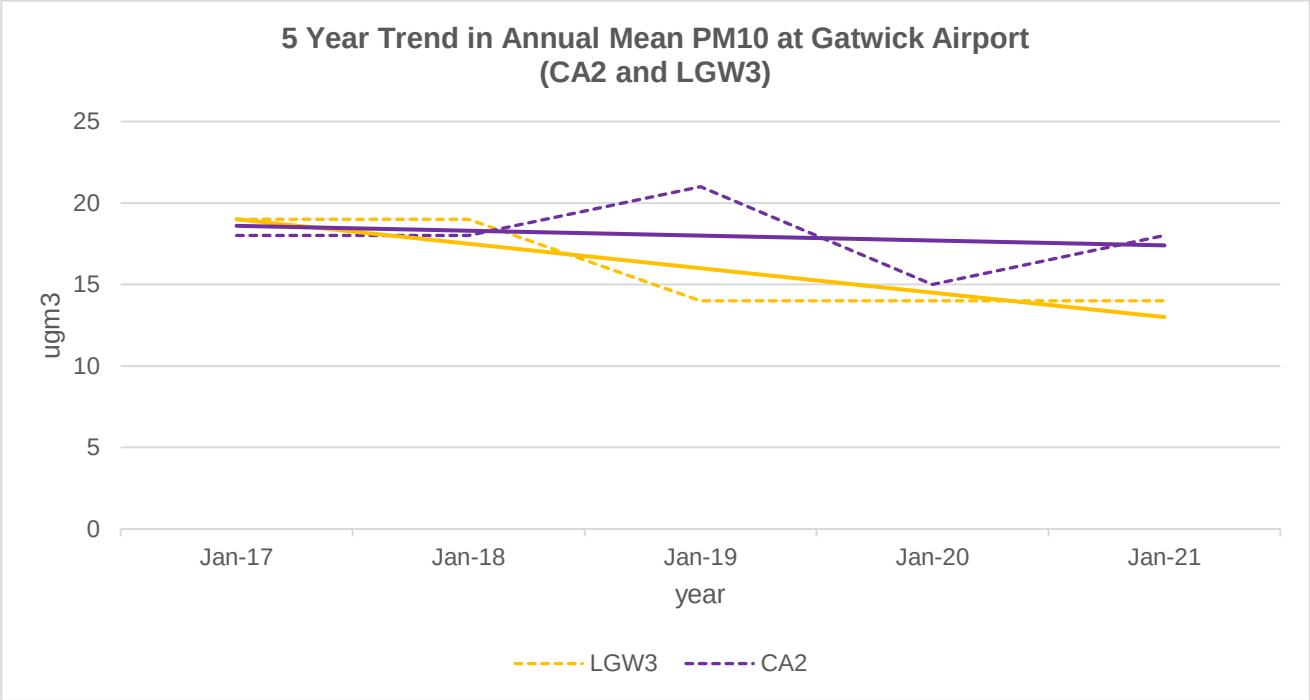


Figure A3.1 presents PM_{10} annual mean concentrations for continuous automatic monitoring sites at Gatwick Airport, comparing Crawley's CA2 site, located east of runway on the eastern boundary close to residential properties on Balcombe Road, with GAL's LGW3 site, located on-airport at south terminal runway. (RG3 located southwest of the runway at Poles Lane in a rural area of Crawley has no particulate monitoring).

There were no exceedances of the annual mean PM_{10} objective at either site in 2021. Both sites show a downward trend in measured concentrations of PM_{10} over the last five years. A new Fidas monitor was installed at the beginning of March 2020 to replace the old TEOM. For consistency all data is graphed, however, the data may not be directly comparable when using different measurement instruments (TEOM and FIDAS). A slight increase in PM_{10} concentrations was measured at Crawley's CA2 site in 2021 compared to 2020 levels. There was no increase in concentrations at Gatwick's LGW3 site in 2021.

Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CA2	529417	141496	Other/ Industrial	100	100	0*	2*	4*	4**	2**
LGW3			Other/Industrial	99	99	3	1	4	0	2

* TEOM monitor data

** FIDAS Monitor data

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m^3 have been recorded.

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.3 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m^3

Figure A4.1 Trends in Annual Mean PM_{10} Concentrations: Gatwick Airport - comparison CA2 and LGW3

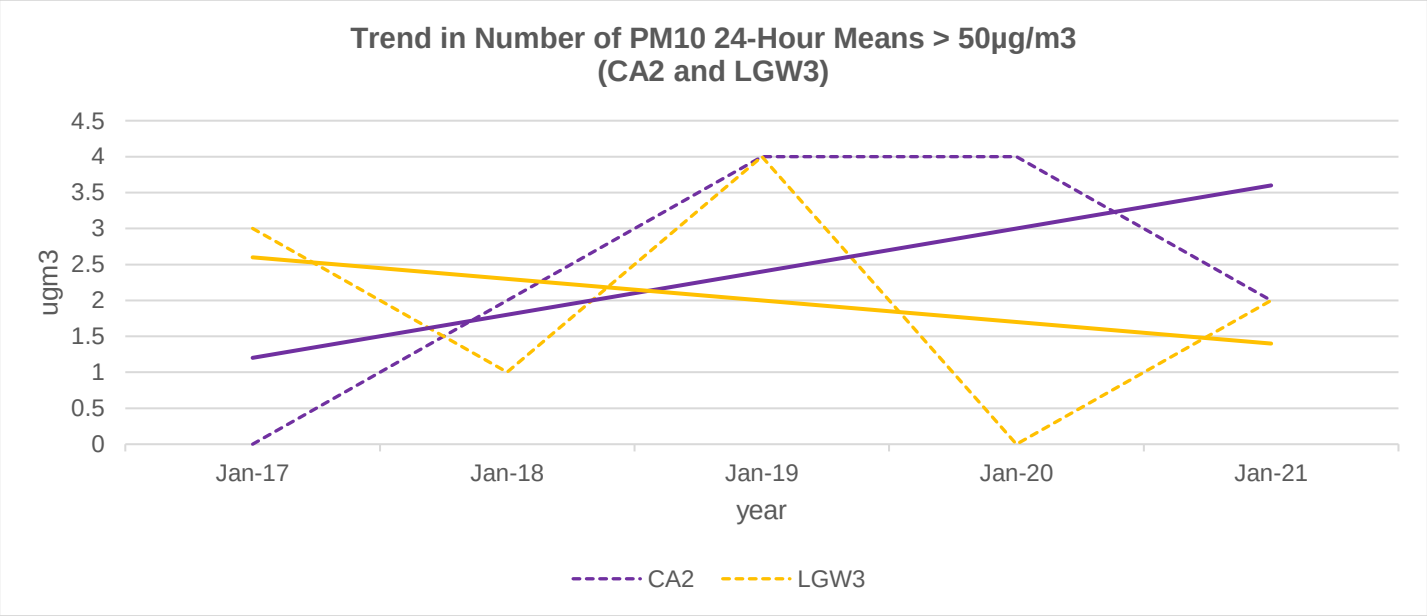


Figure A4.1 presents the 5 year trend in the number of 24-Hour Mean PM_{10} > 50µg/m^3 at the Gatwick East site (CA2) and Gatwick on-airport site (LGW3).

The on-airport site at the end of the runway (LGW3) shows a downwards trend and a reduction in the number of exceedances.

Site CA2 further away from the runway, to the east of the airport boundary and closer to the Balcome Road, shows an upward trend in the the number of exceedances of the 24-Hour Mean PM_{10} > 50µg/m^3 objective.

Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CA2	529417	141496	Other/ Industrial	100	100	10*	12*	15*	8	8
LGW3			Other/Industrial	99	99	-	8	9	8	9

***** Data for years 2017-2019 are estimated values calculated from the TEOM PM_{10} measurements (CA2) using ratio of $PM_{2.5}$ to PM_{10}, as per the Technical Guidance LAQM.TG16

Notes:

The annual mean concentrations are presented as µg/m^3.

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.4 – Trends in Annual Mean $PM_{2.5}$ Concentrations

Figure A5.1 Trends in Annual Mean $PM_{2.5}$ Concentrations: Gatwick Airport - comparison CA2 and LGW3

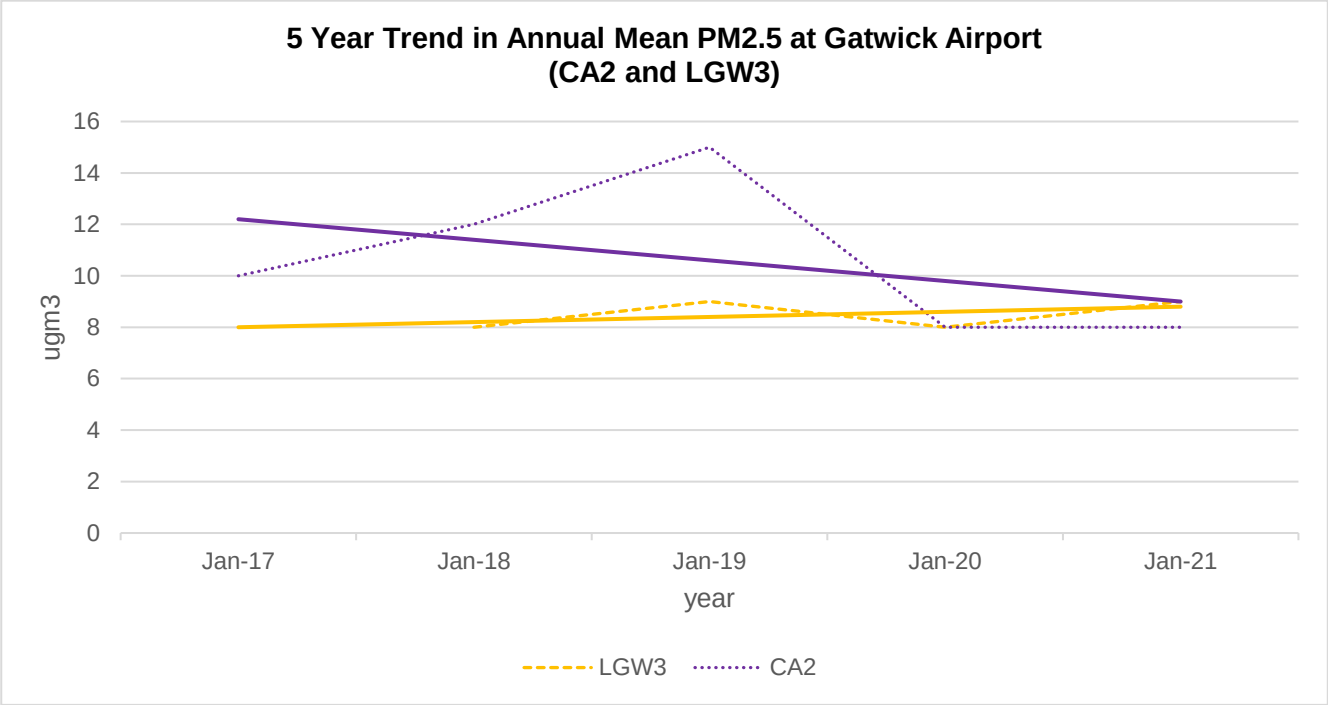


Figure A5.1 presents $PM_{2.5}$ annual mean concentrations for continuous automatic monitoring sites at Gatwick Airport, comparing Crawley's CA2 site (located east of runway on the eastern boundary close to residential properties on Balcombe Road) with GAL's LGW3 site (located on-airport at south terminal runway)

There were no exceedances of the annual mean $PM_{2.5}$ target value of 25ug/m3 at either site in 2021. Crawley's CA2 site shows a continuing overall downward trend in measured concentrations of $PM_{2.5}$ over the last five years. Gatwick's LGW site, shows a slight upward trendline

A new Fidas monitor was installed at theCA2 site March 2020 to replacing the TEOM which had been in place since 2006. For consistency all data is graphed, however, the data may not be directly comparable as prior to 2020 $PM_{2.5}$ concentrations were estimated from the CA2 TEOM measurements using local ratio of $PM_{2.5}$ to PM_{10} (Technical Guidance TG (16) methodology Box7.7).

Both sites have measured concentrations well below the national target value of 25µg/m^3 over the previous 5 years. The annual average $PM_{2.5}$ in 2021 was 8ug/m^3 at CA2 and 8ug/m^3 at LGW3, however, results remain above the WHO-recommended annual mean guideline value of 5µg/m^3.

Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.96)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
CR1	526799	136785	30.40	31.61	27.42	37.09	22.50	21.19	30.09	20.84	26.35	28.78	36.49	33.40	28.85	27.69		
CR3	528438	138392	23.07	21.11	18.39	17.88	11.35	12.22	12.61	16.49		20.85	25.56	18.67	18.02	17.30		
CR4	529864	138204	24.16	19.68	18.84	20.04	12.68	13.07	14.57	18.70	16.76	19.64	26.48	18.27	18.57	17.83		
CR48	527110	139530	24.16	18.69	20.26	19.47	15.49	16.43	18.30	17.48	17.59	21.95	29.83	19.86	19.96	19.16		
CR49	526320	139860			9.66	11.53	7.99	8.96	9.58	26.61	9.70	11.19	16.82	12.42	12.45	11.95		
CR50	527810	139929	21.13	24.18	19.49	23.17	5.27	11.62	12.85	28.51	15.04	16.35	23.35	19.91	18.41	17.67		
CR51	529490	141460	21.07	15.21	15.61	14.69	11.69	10.66	11.66	16.55	14.32	17.51	24.52	16.01	15.79	15.16		
CR52	529417	141496	20.48	19.57	16.04	19.01	12.50	13.54	15.84	22.85	19.41	19.90	24.89	20.37	18.70	17.95		
CR53	529417	141496	20.24	20.47	16.97	19.29	12.98	12.91	15.88	22.73	18.80	19.72	24.81	19.87	18.72	17.97		
CR54	529417	141496	20.88	20.21	16.87	20.15	13.30	13.50	16.56	22.20	19.49	20.43	23.31	19.28	18.85	18.09		
CR55	528446,	138085	35.90	**41.22**	31.22	39.54	34.06	36.47	39.85	20.22	43.32	42.62	35.30	37.30	36.42	34.96		
CR60	526759	136948	30.52	27.97	24.50	30.27	21.58	23.15	27.86	11.82	28.83	33.32	35.06	32.33	27.27	26.18		
CR62	528438	138088	36.49	38.51	32.19	37.73	32.31	35.01	**40.24**	13.72	**43.47**	**40.85**	35.52	35.85	35.16	33.75		
CR63	528153	137912	**47.27**	**46.25**	**44.67**	**48.93**	37.38	**41.73**	**46.18**	11.21	**47.36**	**51.02**	**57.09**	**48.50**	**43.97**	**42.21**	31.4	Receptor is > 20m further from kerb than monitor – treat result with caution
CR64	528150	137825	32.01	33.68	30.70	33.03	28.92	31.49	35.65	13.28	37.67	34.46	**40.88**	30.75	31.88	30.60		
CR66	526743	136346	31.33	28.83	27.62	29.72	21.56	23.82	26.18	9.79	27.53	32.66	37.86	29.08	27.17	26.08		
CR69	528443	138082	33.71	39.21	30.89	36.89	38.89	33.57	**42.06**	38.69	**43.52**	**44.09**	35.81	36.16	37.79	36.28		
CR72	525534	138472	15.70	15.97	10.55	10.98	7.68	7.63	9.11	7.97	10.05	12.73	15.19	12.67	11.35	10.90		
CR74	528978	139599	29.34	22.05	24.83	28.11	21.90	22.75	23.14	28.68	29.05	30.94	39.87	27.56	27.35	26.26		
CR75	529335	139589	23.15	19.74	18.74	19.71	15.16	16.01	15.08	16.37	19.74	22.69	29.17	19.01	19.55	18.77		
CR76	528292	137810	29.40	29.81	28.94	35.06	26.75	30.54	32.70	31.85	33.93	32.37	41.74	31.09	32.01	30.73		
CR77	528362	137812	34.46	29.18	29.37	31.24	26.05	27.93	31.93	30.68	34.75	35.33	44.92	30.25	32.17	30.89		
CR78	530037	138553	21.43	22.07	18.87	22.62	14.13	14.27	17.90	30.11	18.65	18.51	24.34	18.17	20.09	19.29		
CR79	529312	138534	25.21	23.46	24.24	28.64	16.31	19.43	23.29	8.12	23.27	21.00	30.43	21.08	22.04	21.16		
CR80	530424	136521	20.80	25.82	21.00	32.77	20.45	20.60	25.42	24.22	26.56	19.34	23.79	19.01	23.31	22.38		
CR81	529047	134474	19.77	16.73	16.23	20.00	15.10	13.92	17.20	16.86	18.60	19.00	20.97	18.50	17.74	17.03		
CR85	528295	138009	34.60	36.14	30.34	37.97	25.64	26.25	24.95	11.17	28.68	31.22	34.55	31.72	29.44	28.26		
CR86	526878	136821	26.09	22.46	22.28	23.26	16.94	17.85	18.85	14.19	21.45	25.29	31.35	24.71	22.06	21.18		
CR87	526908	136754	35.37	27.99	31.76	32.19	28.31	32.26	34.02	25.68	32.05	36.84	44.17	30.46	32.59	31.29		
CR88	525489	136573	22.16	28.71	22.87	33.18	18.52	20.90	24.01	10.18	24.23	21.88	21.63	21.21	22.46	21.56		
CR89	527715	137893	21.77	23.57	20.84	23.00	14.27	15.12	19.73	16.23	20.12	19.33	24.83	18.67	19.79	19.00		
CR91	528681	137177	33.29	28.99	28.48	32.08	25.21	27.16	29.11	28.80	30.62	32.73	42.23	32.05	30.90	29.66		
CR93	528895	137115	**46.46**	35.20	33.99	37.48	**41.28**	38.71	**42.68**	**40.35**	**48.44**	**52.19**	**62.27**	**48.02**	**43.92**	**42.16**	39.4	Predicted concentration at receptor within 10% of AQS objective
CR94	528841	137069	28.66	26.31	23.80	28.51	20.05	21.21		29.63	24.26	25.14	33.85	25.19	26.06	25.01		
CR95	528882	137086	28.49	25.96	23.29	25.82	21.93	23.09	26.18	29.08	28.58	28.44	33.91	26.49	26.77	25.70		
CR96	529125	137196	25.05	19.41	22.10	22.38	18.15	19.31	19.00	21.39	20.94	26.09	33.67	24.04	22.63	21.72		
CR97	528603	136950	28.25	35.93	28.07	31.44	20.30	28.98	32.06	21.41	27.05	21.24	55.81	33.56	30.34	29.13		
CR98	528515	139275	36.69	31.41	36.56	29.44	24.76	27.81	26.12	12.41	28.85	35.15	43.35	32.68	30.44	29.22		
CR 99	528410	135628	19.57	17.89	14.28	13.60	9.35	9.90	9.96	14.73	10.25	14.15	21.52	13.19	14.03	13.47		
CR100	526326	136487	23.64	28.23	25.49	33.12	20.24	25.58	26.37	19.04	28.11	28.40	33.05	28.30	26.63	25.57		
CR101	525679	135556	**44.99**	**46.87**		**49.52**	39.06	**44.01**	**44.12**	14.10	**48.53**	**41.65**	**43.39**	**49.42**	**42.33**	**40.64**	28.0	
CR102	526449	134139	33.31	26.70	29.48	31.97	25.08	31.91	30.34		29.25	26.16	41.43	31.15	30.60	29.37		
CR103	528848	137802	19.97	16.22	15.68	15.41	11.69	10.97	12.91	32.20	14.28	17.44	23.46	15.50	17.10	16.41		
CR104	527333	135846	24.63	24.34	22.26	25.60		19.43	21.06	33.25	21.38	24.27	27.14	23.31	24.20	23.30		
CR105	526940	137831	**48.93**	38.74	**40.28**	36.05	34.54	34.00	37.29		39.74	**40.13**	23.09	**44.45**	37.90	36.40		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.96)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
CR106	527000	138357	**41.02**	**42.12**	36.76	39.54	32.28	36.06	35.95	25.09	**41.33**	**41.87**	**45.03**	**41.33**	37.52	36.02	32.6	
CR107	524806	136822	18.54	20.21	15.51	18.94	12.50	12.73	13.70	18.56	15.95	17.64	21.81	17.68	16.50	15.84		
CR108	526901	136381	25.24	25.25	21.26	28.80	16.35	17.93	19.90	37.66			57.51	17.05	27.06	25.97		
CR109	527174	136357	26.73	24.98	21.97	22.71	17.02	18.74	19.66	20.70	20.87	24.34	31.75	49.19	24.70	23.71		
CR110	526928	136356	22.08	22.50	18.71	26.04	13.89	9.53	17.24	18.50	19.78	19.52	28.51	20.45	19.08	18.31		
CR111	526804	136375	27.16	25.47	23.59	26.20	18.62	21.79	23.84	13.86	25.22		31.00	26.14	23.64	22.70		

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1**

☒ **Local bias adjustment factor used**

☐ **National bias adjustment factor used**

☒ **Where applicable, data has been distance corrected for relevant exposure in the final column**

☒ **Crawley Borough Council confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

New or Changed Sources Identified Within Crawley Borough Council During 2021/22

There are a number of significant new or ongoing developments within the borough which may cumulatively contribute to pollution sources in the area. These include:

Commercial/Industrial Development, Manor Royal Business District (adjacent to the Hazelwick AQMA) - Planned development or currently under construction.

Commercial development currently under construction:

- The Office Crawley Business Quarter, Manor Royal Business District: 1No. Storage and Distribution Warehouse Facility (Class B8) - construction started 2021
- Former GSK Site, Napier Way, Manor Royal Business District: 3 No. Storage and Distribution Warehouse Units (Class B8) – construction started 2021
- Vanguard House, Churchill Court, Manor Royal Business District: 2 No. Storage and Distribution Warehouse Units (Class B8) –construction started 2021/completed 2022
- Former Alpha-LSG, Faraday Road: 1 No. Storage and Distribution Warehouse Units (Class B8) –construction started 2022
- The Base, Fleming Way, Manor Royal Business District: 2 No. Storage and Distribution Warehouse Units (Class B8) –construction started 2022
- EasiStore, Office Park, Balcombe Road: 1 No. Storage and Distribution Warehouse Units (Class B8) –construction started 2022

Commercial development coming forward 2022/23:

- Hydehurst Lane, Manor Royal Business District: 3 No. Storage and Distribution Warehouse Units (Class B8) – awaiting planning decision

- Former Car Supermarket site, Fleming Way, Manor Royal Business District: 2 No. Storage and Distribution Warehouse Units (Class B8) – awaiting planning decision
- Crompton Way, Manor Royal Business District: 3 No. Storage and Distribution Warehouse Units (Class B8) – awaiting planning decision
- Land at Jersey Farm, Manor Royal Business District: 1 No. Storage and Distribution Warehouse Units (Class B8) – planning permission given but construction not started
- Manor Royal District Heating Network: Two energy centres: one with ground source heat pump and one with low NOx gas boiler - feasibility study stage

Residential Development - Key Housing Sites: Sites identified as key housing sites in the Local Plan Map as planned development or currently under construction.

Residential development currently under construction:

- Zurich House, East Park, Southgate (59 dwellings) –construction started 2020 still ongoing (progress slowed due to Covid)
- Steers Lane Phase 1 (185 dwellings) – construction started 2021
- 42-44 Brighton Road (20 dwellings) – construction started 2022
- Station Gateway, Belgrave House (33 dwellings) - construction started 2022
- Station Gateway, Overline House (commercial units) - construction started 2022 (residential units awaiting planning permission due to water neutrality issue)

Residential development coming forward 2022/23:

Over the last reporting year the issue of water neutrality has emerged as an issue for residential development in the borough that must be addressed through the planning process to ensure its compliance with the Habitat Regulations. This is currently delaying the progress of most major residential development in Crawley.

- Longley House (120 dwellings) – Planning permission given construction due 2022/23
- Breezehusrt Drive (85 dwellings) – Planning permission given construction due 2022/23
- Ambulance Station site, Ifield Avenue (44 dwellings) - awaiting planning permission (delayed due to water neutrality issue)

- Station Gateway, Mokka Site, (152 dwellings) - awaiting planning permission (delayed due to water neutrality issue)
- Land East of Tinsley Lane (150 dwellings) – awaiting planning permission (delayed due to water neutrality issue)
- Steers Lane Phase 2 (60 dwellings) - awaiting planning permission (delayed due to water neutrality issue)
- Town Centre, The Boulevard: Phase 2 (182 dwellings) - awaiting planning permission (delayed due to water neutrality issue)

Major Planned development – Development schemes assessments / EIA due to size and impact on the local area.

Crawley Growth Programme:

- £60m investment programme (public and private) to deliver infrastructure improvements and growth/regeneration to sites in the town centre and Manor Royal business district, including; delivery of 11,300m^2 office/industrial space at the Nova site London Road, 1,000 new homes in Crawley town centre by 2030, new Crawley railway station and sustainable transport infrastructure (bus, cycle routes and pedestrian walkways). Phased development. Some schemes completed, others in development/design or awaiting planning permission

Forgewood residential neighbourhood:

- Ongoing development of new neighbourhood, including 2000 new residential units, local shops, amenities, community centre, school and realignment of surrounding roads. The Forgewood development was agreed on appeal before the Hazelwick AQMA was declared. The development has been under construction since 2016 and is expected to be completed/ fully operational 2024/25.
  Construction Phase 1B (neighbourhood centre and residential) about to start 2022 and Phase 4B (residential units) due to start 2023

West of Ifield urban development project

- Homes England to redevelop 194 hectares of land west of Ifield within the administrative area of Horsham District Council (HDC) and Crawley Borough Council (CBC) for residential mixed-use neighbourhood. The scheme will include up to 4,000 homes, community infrastructure, commercial units and the creation of a new road

including a bridge across the River Mole. As a project identified with a potential to impact air quality, the development will be subject to an EIA (as it is of a type falling within Schedule 2 of Town and Country Planning (Environmental Impact Assessment) Regulations 2017). The Scoping consultation has been completed but planning delayed due to water neutrality issue.

Gatwick Northern Runway Expansion

- The Gatwick Northern Runway Expansion Development is currently going through the Consent Order (DCO) process. The Proposed Development includes alterations to the existing northern runway to provide dual runway operations and enable increased capacity at the airport. The potential passenger throughput with development is predicted to be 74 million passengers per annum (mppa) by 2038. This represents a 13mppa increase above the “without development” potential of the single runway airport.
  The proposals include construction works over a 15-year period, increased on-airport car parking for 18.5 k more vehicles and a 70% increase in surface access including passenger numbers, cargo freight and employment traffic.
  Gatwick’s preliminary air quality assessment findings predicts negligible impacts at all receptors for NO_2, PM_{10} and $PM_{2.5}$ in 2029 and 2032 and no significant air quality effects expected for 2029 and 2032 at human receptors.
  The council is awaiting more detailed information in the form of the Environmental Statement (ES), when it will be considering how the additional emissions created by the scheme will impact Crawley’s air quality and in turn how mitigation measures can be implemented to offset the air quality impacts of the proposals.

All new developments are examined through the planning system and where necessary air quality assessments and mitigation are required in order to offset the impacts of existing and new sources of pollution on future residents.

In addition, diffusion tube monitoring within the AQMA and surrounding areas will measure the effects of new developments and new pollution sources, allowing the council to identify pollution hotspots and assess long term trends. These results are reported annually through the LAQM process.

Additional Air Quality Works Undertaken by Crawley Borough Council During 2021

Crawley Borough Council has not completed any additional works within the reporting year of 2021

Work on developing the Air Quality Action Plan to reflect the extended area was due to start in 2021, but baseline studies and source apportionment work to underpin this work has been delayed due to the impact of major projects.

QA/QC of Diffusion Tube Monitoring

All diffusion tube monitoring data has been ratified following the methods described in LAQM.TG(16) A quality assurance/quality control (QA/QC) programme including field duplicates and blanks and instrument calibration with standard gases has been followed (AEAT, 2000).

The NO_2 diffusion tube analysis was carried out and analysed by Gradko Environmental (part of Gradko International Ltd) .The QA/QC methodology for Gradko Environmental Ltd is given below:

Tube Preparation: The preparation of the tubes is done using 20% Triethanolamine / 80% Deionised Water. The preparation procedures adhere to the guidance detailed in the document 'Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance for Laboratories and Users', Issue 1a Feb.2008 (issued by AEA Energy and Environment).

Analysis Methods: Analysis of the NO_2 diffusion tubes is carried out using colorimetric techniques in accordance with Gradko International Ltd UKAS accredited (ISO/IEC 17025) internal laboratory procedures. The details in these procedures adhere to the DEFRA 'Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance for Laboratories and Users, Issue 1a Feb 2008', issued by AEA Energy and Environment.

Quality Control Procedures: All tube components are maintained in a high state of cleanliness. New absorbents are prepared by the Laboratory and checked for levels of contamination.

The diffusion tubes are prepared in a dedicated clean laboratory and stored under refrigerated conditions to maintain stability. A sample of each batch of tubes prepared is

checked by the analyst for blank levels. If the tubes are stored for more than one week, a further sample is taken and checked for any increases in blank levels. If the levels reach a pre-determined value, the batch of tubes is discarded.

Method Calibration: A full five to seven (dependant on range of concentrations being measured) point calibration is carried out monthly using NIST certified nitrite standards. The linear graph acceptance is r^2 = 0.999. At the start of every batch of tubes analysed, two nitrite standards are run to check the accuracy of the calibration graph, this is repeated at the end of the analysis run. Statistical graphs are maintained using the plots of the daily standard results and the acceptance criteria achieved before an analysis run is made. An instrument calibration is run every two months using certified optical filters plus an annual preventative maintenance programme carried out by an external engineer is in operation.

Quality Assurance: The laboratory has a fully documented Quality Management System which has been assessed and accredited by UKAS (Accreditation No. 2187). A copy of the Quality Manual Contents Index is available on request.

Quality Control Procedures are supplemented by the use of external proficiency schemes such as W.A.S.P administered by Health and Safety Laboratories at Buxton and the NETCEN U.K. NO2 Field Inter-comparison project administered by National Physical Laboratories (NPL),

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Crawley's monitoring network recorded data capture of >75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG22 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

The national bias adjustment factor is 0.84 which has been obtained from the spreadsheet version 06/22, for Gradko diffusion tubes (20% TEA in water) using 34 studies.

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 06/22

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of September 2022
LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1:	Step 2:	Step 3:	Step 4:
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor3 shown in blue at the foot of the final column.
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data2	If you have your own co-location study then see footnote4. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By1	Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m3)	Automatic Monitor Mean Conc. (Cm) (µg/m3)	Bias (B)	Tube Precision5	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2021		Overall Factor3 (34 studies)				Use		0.84

The local bias adjustment factor was derived from the co-located diffusion tubes (prepared and analysed by Gradko) at the Gatwick East continuous analyser site (CA2). Details of the co-location study are present in below.

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm-3	Tube 2 µgm-3	Tube 3 µgm-3	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	01/01/2021	31/01/2021	20.5	20.2	20.9	21	0.3	2	0.8
2	01/02/2021	28/02/2021	19.6	20.5	20.2	20	0.5	2	1.2
3	01/03/2021	31/03/2021	16.0	17.0	16.9	17	0.5	3	1.3
4	01/04/2021	30/04/2021	19.0	19.3	20.2	19	0.6	3	1.5
5	01/05/2021	31/05/2021	12.5	13.0	13.3	13	0.4	3	1.0
6	01/06/2021	30/06/2021	13.5	12.9	13.5	13	0.4	3	0.9
7	01/07/2021	31/07/2021	15.8	15.9	16.6	16	0.4	3	1.0
8	01/08/2021	31/08/2021	22.9	22.7	22.2	23	0.3	2	0.9
9	01/09/2021	30/09/2021	19.4	18.8	19.5	19	0.4	2	0.9
10	01/10/2021	31/10/2021	19.9	19.7	20.4	20	0.4	2	0.9
11	01/11/2021	30/11/2021	24.9	24.8	23.3	24	0.9	4	2.2
12	01/12/2021	31/12/2021	20.4	19.9	19.3	20	0.5	3	1.4
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
21.1	85	Good	Good
20.17	85	Good	Good
20.02	100	Good	Good
18.87	85	Good	Good
13.56	100	Good	Good
15.48	100	Good	Good
14.07	100	Good	Good
10.91	96	Good	Good
19.52	100	Good	Good
19.11	100	Good	Good
22.69	100	Good	Good
21.2	100	Good	Good
Overall survey -->		Good precision	Good Overall DC

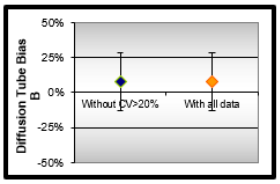
Site Name/ ID:

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

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.96 (0.8 - 1.2)
Bias B	4% (-17% - 25%)
Diffusion Tubes Mean:	19 µgm-3
Mean CV (Precision):	3
Automatic Mean:	18 µgm-3
Data Capture for periods used:	96%
Adjusted Tubes Mean:	18 (15 - 23) µgm-3

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.96 (0.8 - 1.2)
Bias B	4% (-17% - 25%)
Diffusion Tubes Mean:	19 µgm-3
Mean CV (Precision):	3
Automatic Mean:	18 µgm-3
Data Capture for periods used:	96%
Adjusted Tubes Mean:	18 (15 - 23) µgm-3



Jaume Targa, for AEA
Version 04 - February 2011

The 2021 local bias correction for Crawley was calculated as 0.96 using the LAQM Diffusion Tube Precision Accuracy Spreadsheet tool. A summary table showing the calculation of the local bias adjustment factor is given in Table C,3 below. Crawley Borough Council has applied a single local bias adjustment factor of 0.96 to adjust the

2021 diffusion tube monitoring data. A summary of bias adjustment factors used by Crawley Borough Council over the past five years is presented in Table C.1.

Choice of Factor for Bias Adjustment:

The locally derived bias adjustment figure of 0.96, indicates very good correlation in the tube data relative to the reference method (chemiluminescence analyser), over the data capture period.

The national bias adjustment value for 2021 was 0.84. This value was slightly lower than the locally derived factor, indicating the correlation wasn't as close and that the diffusion tubes had a tendency to over-estimate actual concentrations when compared to the reference method.

In deciding which bias adjustment value to use, the following factors were taken into account in accordance to the guidance in LAQM-TG22:

Box 7.13 advises that: ***"****If the co-location site is unusual in some way: for example, affected by specific large NOx sources other than road traffic, such as local industrial installations, this is a strong indication in favour of using a locally-derived factor"*

The co-location site is situated on the eastern boundary of the Gatwick Airport and therefore affected by NOx sources from the Airport. The site is 63m from the nearest residential property, and there are many other residential properties within 1000m of the airport. Determining relevant exposure within 1km of the airport boundary is one of the assessment criteria required for authorities with a major airport within their boundary. This would therefore favour using the locally derived factor.

However, in paragraph 7.227 the guidance says that*: "care should be taken to avoid applying a bias adjustment factor derived from a local co-location study carried out for concentrations that are very different to those being measured in the wider survey"*

Although the effect of the airport as an area source should be considered it may be less of an influence at roadside locations where traffic sources will be the major consideration. At these locations the nationally derived factor may be more relevant.

Consultation with the laqm helpdesk in previous years resulted in the decision to use the more conservative locally derived bias factor. The rationale for this decision was that it isn't appropriate to use two different bias factors within the report, but since both national

and local factors were relatively close in value, and the precision and accuracy of the local co-location study was good, the more cautious approach would be to use the local factor. Consequently all conclusions and recommendations made in this report were based on monitoring results adjusted with the 2021 bias adjustment figure of 0.96.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	Local	N/A	0.96
2020	Local	N/A	0.98
2019	Local	N/A	1.02
2018	Local	N/A	1.00
2017	Local	N/A	1.00

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

Fall-off-with-distance calculations were required for four diffusion tube sites in 2021(CR63, CR93, CR101, CR106). These are sites where the annual mean concentration was greater than 36µg/m^3, and the monitoring site was not located at a point of relevant exposure. A summary of the sites and the output data from the Diffusion Tube Data Processing Tool is presented in Table C.4.

QA/QC of Automatic Monitoring

Crawley's monitoring site (CA2) on the eastern boundary of Gatwick airport has two automatic analysers: a nitrogen dioxides analyser (ML9841B) and a FIDAS 200 particulate monitor, which replaced the existing TEOM (Tapered Element Oscillating Microbalance) in March 2020.

The monitoring data from this site is available on the sussex-air website. Current and historic data is accessible to the public and commercial users by searching the sites on the interactive site locations map. The specific search request allows for a range of variables such as site location, pollutant, averaging period, monitoring dates etc. Data is then returned to the request in the form of graphs and Excel spreadsheets.

The website also provides an Application Programming Interface (API) for air quality data. This uses a copy of the live database, which validates the data and calculates information like air quality indexes and objectives. Live data can be viewed here.

The monitoring site and data is maintained through a series of QA/QC processes and procedures:

Data Management and Local Site Operator (LSO)

Local Site Operator (LSO) duties and data management are carried out by Crawley Borough Council staff trained for this purpose. The purpose of site operator visits is to carry out regular calibration and site checks. Site calibration forms a fundamental part of the monitoring regime ad support ratification of the automatically logged data.

Site visits provide information on a range of issues which may affect the operation of the monitoring equipment or the air quality in the vicinity of the analyser such as:

- Local Information to confirm roadworks, building work, sources of dust/smoke
- Site information to confirm security and correct functioning of the site as a whole
- Analyser information to confirm correct operation of the analysers
- Analyser response information enabling correct scaling of air quality data

To retain a high quality of data, fortnightly calibration visits are made by the LSO. These site visits allow the following functions to be undertaken:

- Site Inspection
- Pre-calibration checks
- Calibration of analyser
- Filter change
- Post-calibration checks and site inspection

In addition, non-routine site visits may be necessary in the event of instrument malfunction or power cuts.

Each analyser is calibrated to ensure any instrumental drifts since the previous calibration can be quantified. Any adjustments/recalibrated to the instruments must first be approved

by the Management Unit (MU). The MU for Crawley's monitoring equipment is Bureau Veritas UK (Air Quality Monitoring and Management).

Verification and Ratification process,

Bureau Veritas UK carries out data verification and ratification on automatic monitoring data for the Sussex Air Quality Partnership.

Data verification and ratification is the process whereby provisional data are combined with all other relevant information to derive the best final dataset, which is as accurate as possible and has known measurement uncertainties to allow meaningful comparison with other data using specialised data handling software.

Verification is carried out on an ongoing basis and is nominally a process to "clean-up" the initial provisional data by reviewing/excluding/including any data due to instrument malfunctions or faulty calibrations, and updates to data scaling following application of the most recent calibration factors.

Ratification is a detailed manual check of the data set carried out on a monthly/ quarterly/ yearly basis. It requires a longer-term view of the dataset incorporating the results from independent QA/QC audits of the monitoring stations, and assessment on the validity of data by experienced air quality scientists. It will consider a range of variables such as: relationships between pollutants, the impact of air pollution episodes, the context of the results in the overall climate, national and regional pollutant patterns, long-term trends etc. Once all the checks and corrections have been completed the data is given a "fully ratified" status.

Service and Maintenance of the Automatic Monitoring Equipment

The NOx analyser (ML9841B) and the FIDAS 200 particulate monitor are both maintained and twice yearly serviced on contract with specialist service engineers operating BSI audited and accredited systems for quality.

The service methodology includes; pre-service inspection, visual inspection, calibration, flow check, leak check, inspection and recording of analyser internal diagnostics and communication check from remote site.

Engineer servicing or callout reports are supplied to the council as a record of the work carried out.

PM_{10} and $PM_{2.5}$ Monitoring Adjustment

The type of PM_{10}/$PM_{2.5}$ monitor utilised within Crawley Borough Council is the Palas Fidas 200 which measures both PM_{10} and $PM_{2.5}$ at the same time.

7.174 of LAQM.TG(22) advises that although the Fidas PM_{10} data can be used without the need for correction, the $PM_{2.5}$ should be corrected for slope by applying a factor of 1.06. The 2021 $PM_{2.5}$ data has therefore been corrected by dividing by 1.06 to achieve equivalence to the reference method.

Automatic Monitoring Annualisation

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

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

Fall-off-with-distance calculations were required for four diffusion tube sites in 2021 (CR63, CR93, CR101, CR106). These are sites where the annual mean concentration was greater than 36µg/m^3, and the monitoring site was not located at a point of relevant exposure. A summary of the sites and the output data from the Diffusion Tube Data Processing Tool is presented in Table C.4.

Fall off with Distance Inputs

i) Enter background concentration for each diffusion tube listed. Once completed see Annual Results Summary tab

Enter data into the pink cells

Diffusion Tube ID	Distance (m)		NO_2 Annual Mean Concentration ($\mu g/m^3$)			Comment
	Monitoring Site to Kerb	Receptor to Kerb	Bias Adjusted	Background	Predicted at Receptor	
CR63	7.4	37.4	42.2	22.5	31.4	*Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.*
CR93	1.8	3.3	42.2	22.5	39.4	*Predicted concentration at Receptor within 10% the AQS objective.*
CR101	1.1	10.0	40.6	12.6	28.0	
CR106	3.9	9.9	36.7	20.86	32.6	

Table C.2 – Annualisation Summary (concentrations presented in µg/m^3)

Annualisation has not been required at any site in Crawley Borough Council's monitoring network during this reporting year 2021

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
Periods used to calculate bias	12				
Bias Factor A	0.96 (0.8 – 1.2)				
Bias Factor B	4% (-17% - 25%)				
Diffusion Tube Mean (µg/m^3)	19				
Mean CV (Precision)	3%				
Automatic Mean (µg/m^3)	18				
Data Capture	96%				
Adjusted Tube Mean (µg/m^3)	18 (15 – 23)				

Notes:

A single local bias adjustment factor has been used to bias adjust the 2021 diffusion tube results.

Table C.4 – NO_2 Fall off With Distance Calculations (concentrations presented in µg/m^3)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor	Comments
CR63	7.4	37.4	42.2	22.5	31.4	*Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.*
CR93	1.8	3.3	42.2	22.5	*39.4*	*Predicted concentration at Receptor within 10% the AQS objective.*
CR101	1.1	10.0	40.6	12.6	28.0	
CR106	3.9	9.9	36.7	20.86	32.6	

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – Map of Crawley AQMA Boundary

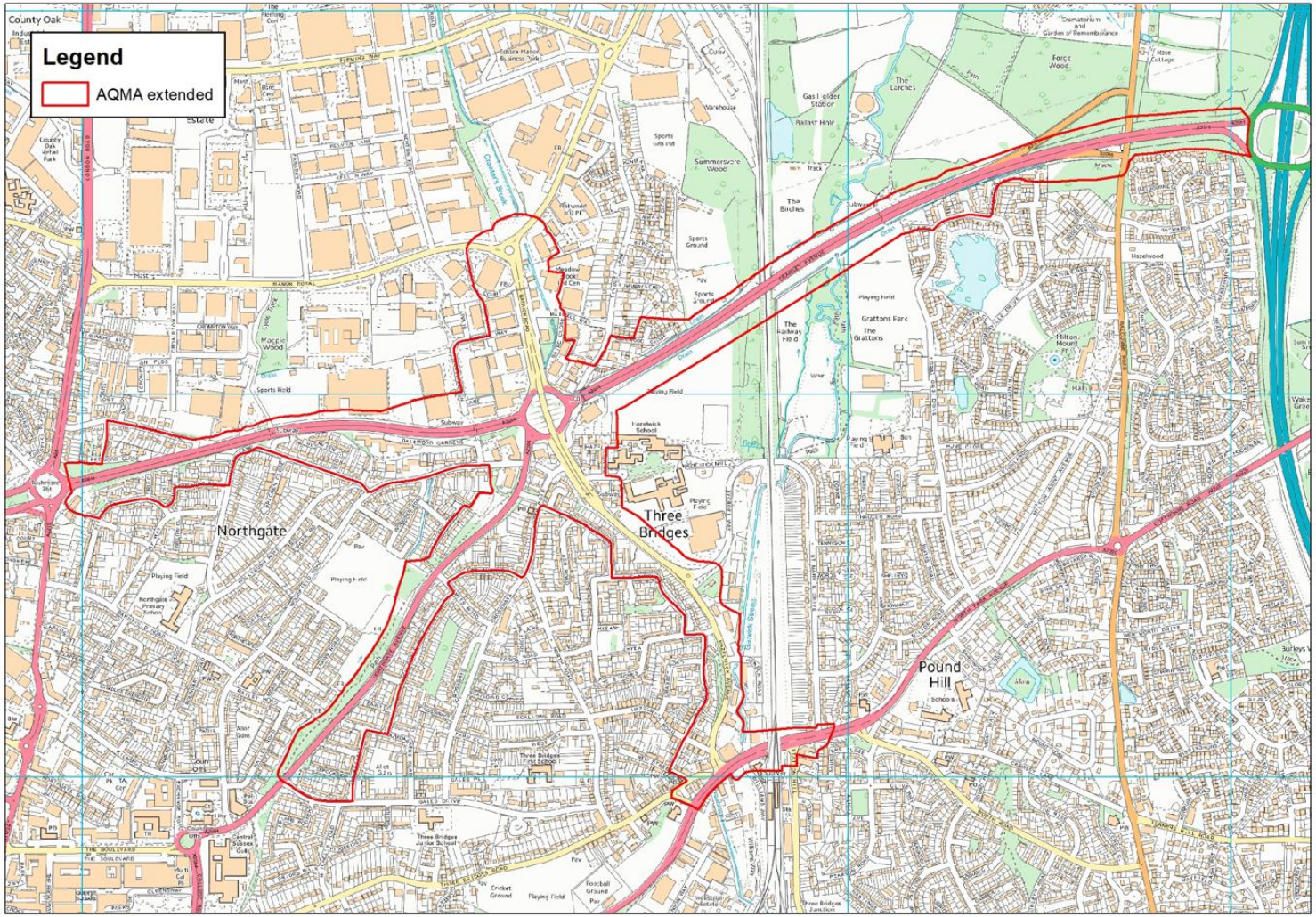


Figure D.2 – Map of Non-Automatic Monitoring Sites in Crawley in relation to the AQMA

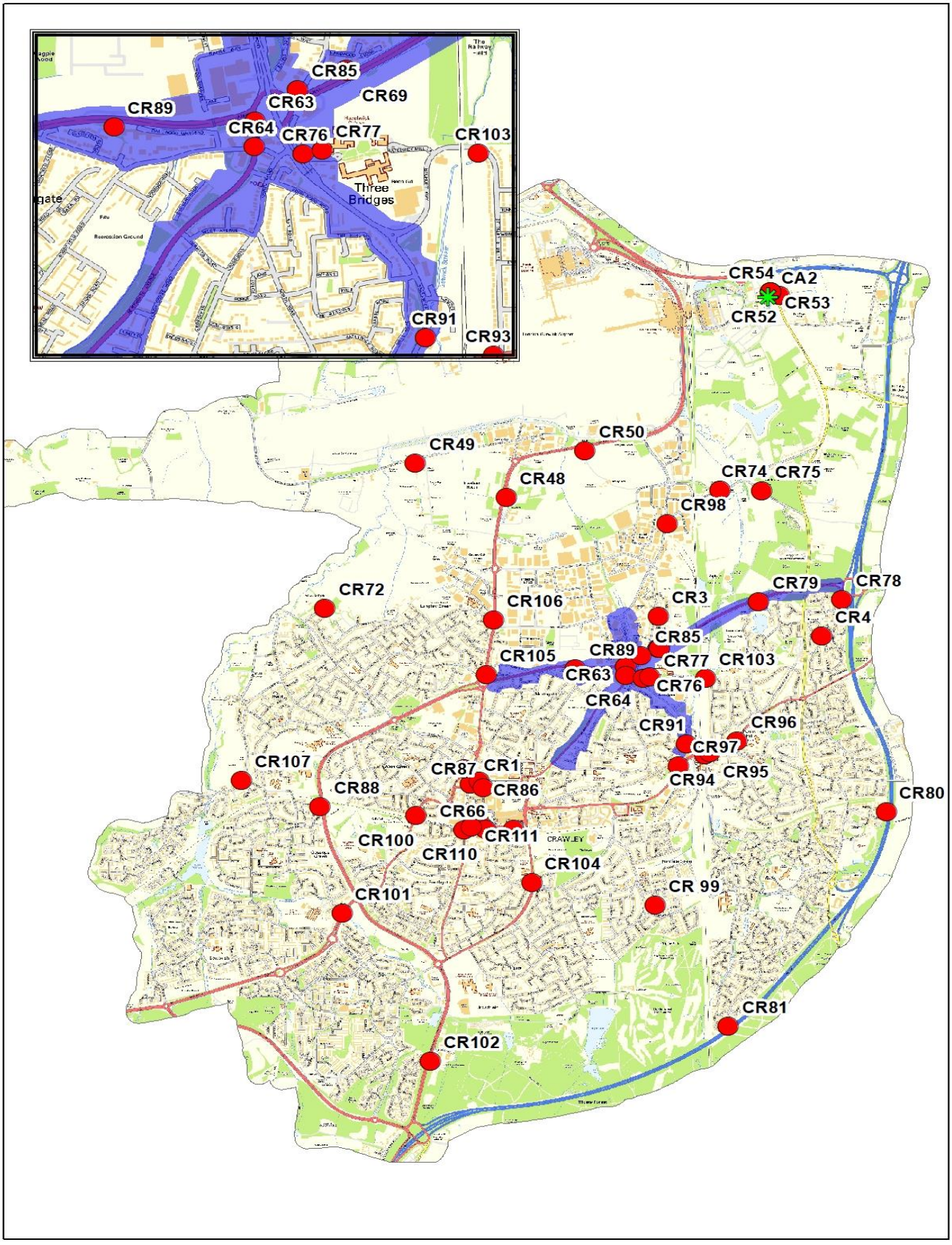


Figure D.3 Map of Diffusion sites: CR3,55,62,63,64,69,76,77,85,89,103

Figure D.4 Map of Diffusion site: CR49

Figure D.5 Map of Diffusion sites: CR91,93,94,95,96,97

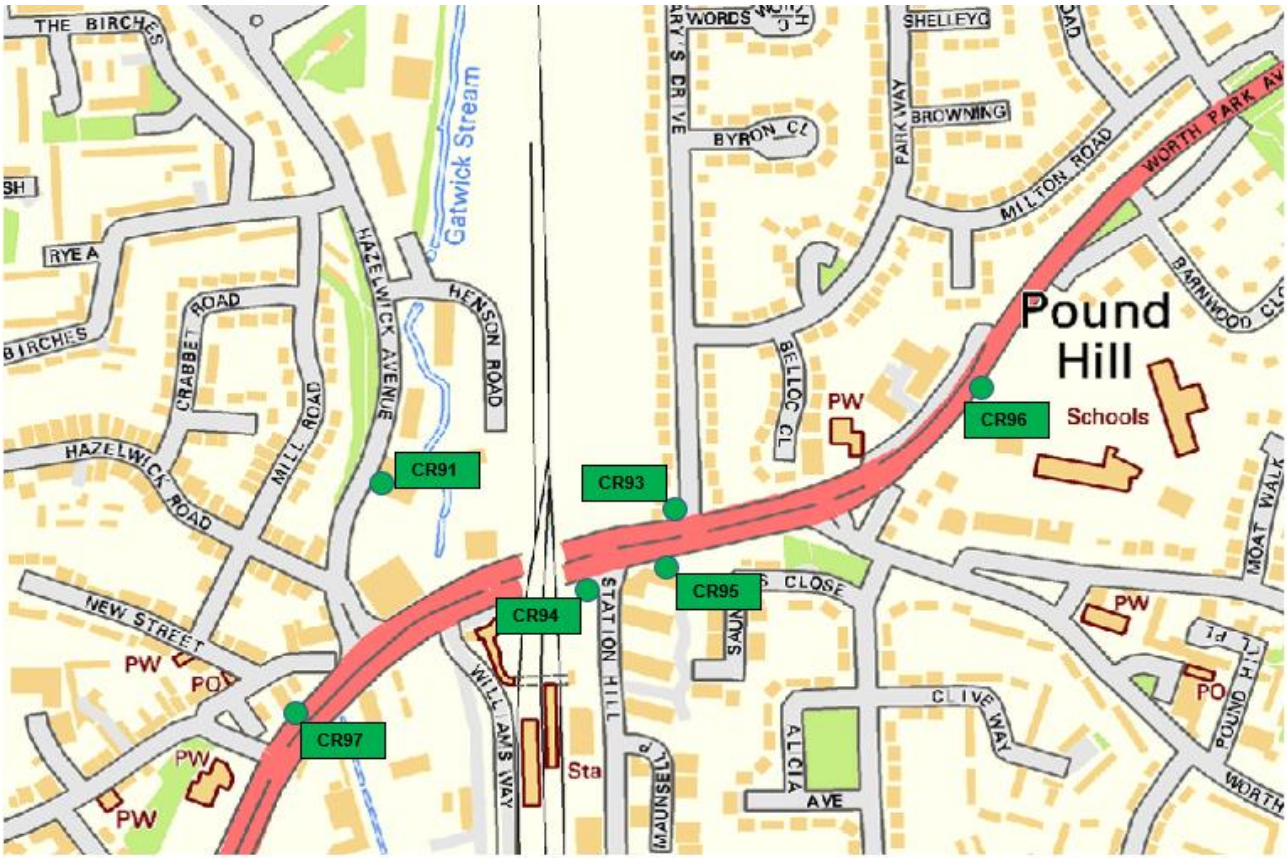


Figure D.6 Map of Diffusion sites: CR88 and 107

Figure D.7 Map of Diffusion sites: CR1,60,66,86,87,100,108,109,110,111

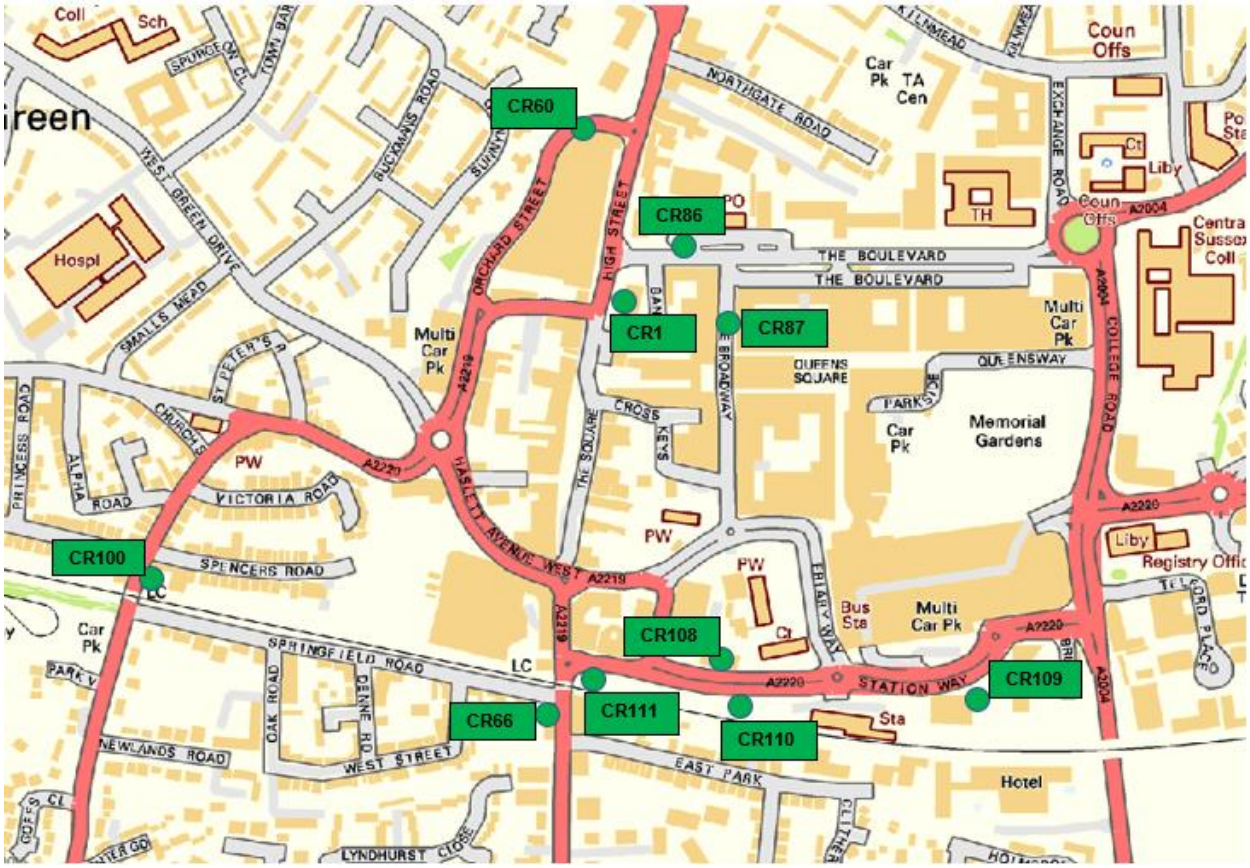


Figure D.8 Map of Diffusion site: CR104

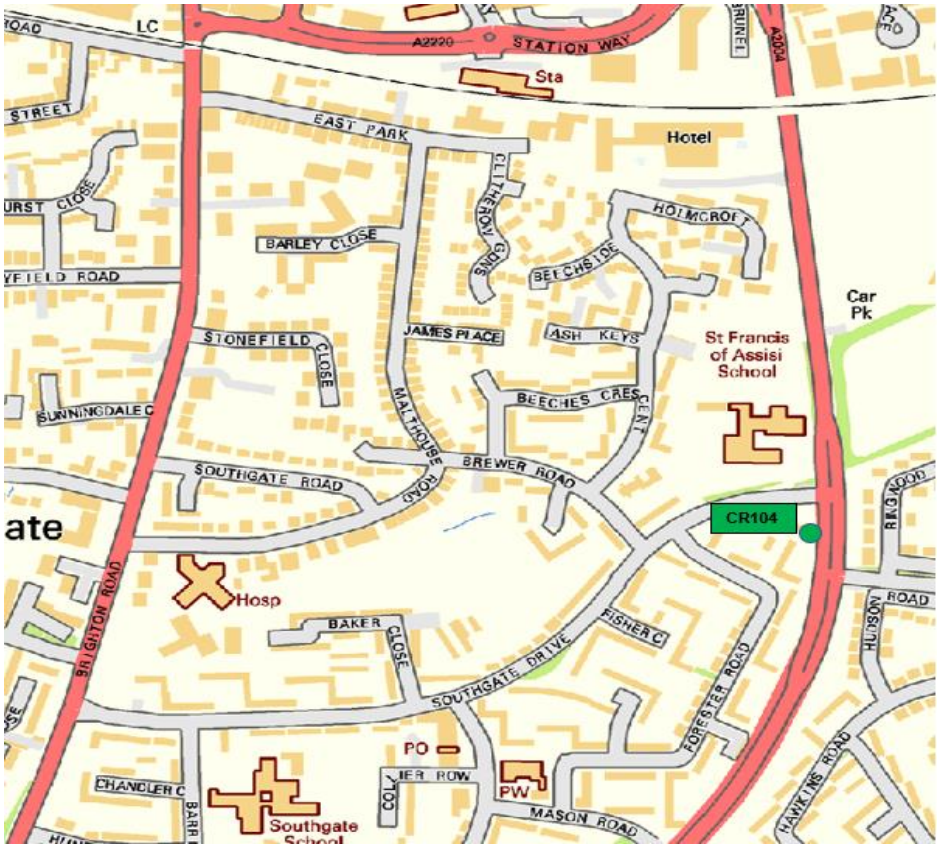


Figure D.9 Map of Diffusion sites: CR4,78,79

Figure D.10 Map of Diffusion sites: CR74 and 75

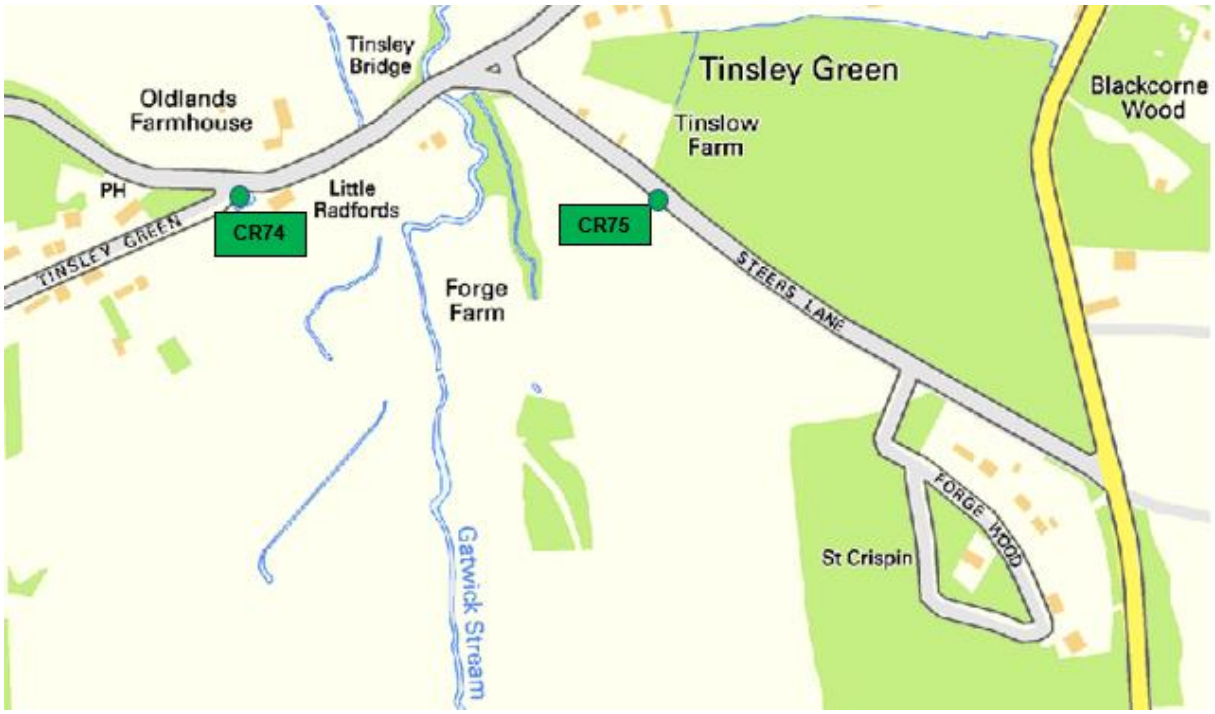


Figure D.11 Map of Diffusion sites: CR48,50,98

Figure D.12 Map of Diffusion site: CR72

Figure D.13 Map of Diffusion sites: CR105 and 106

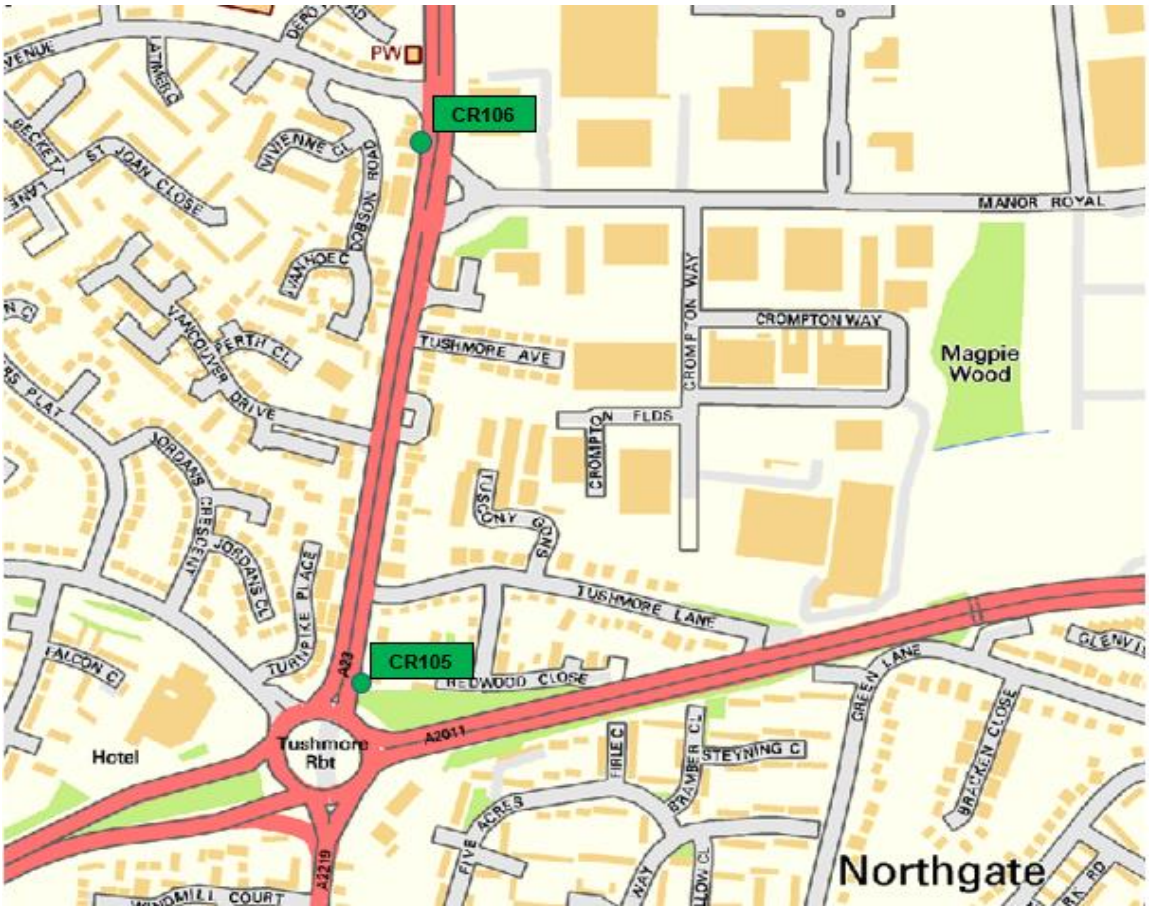


Figure D.14 Map of Diffusion site: CR99

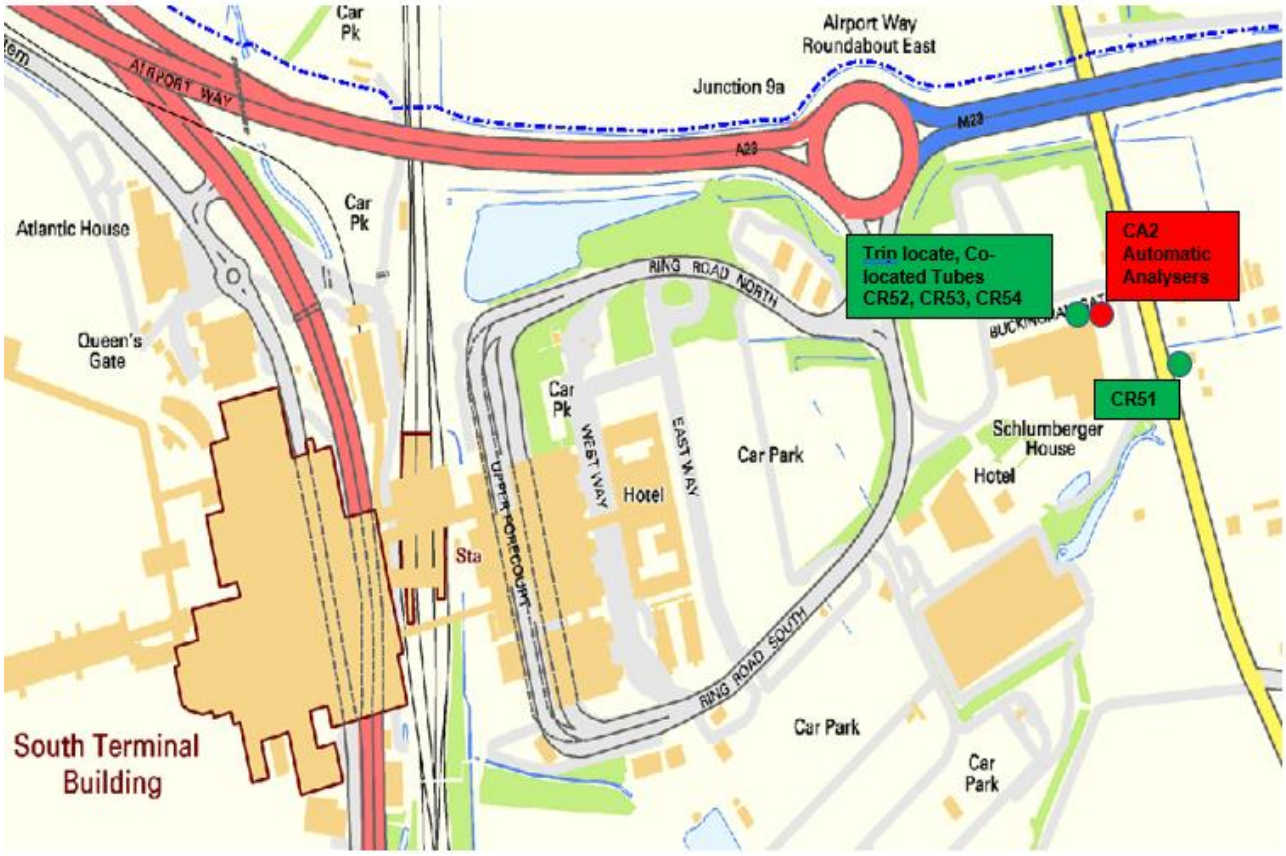
Figure D.15 Map of Diffusion site: CR101

Figure D.16 Map of Diffusion site: CR102

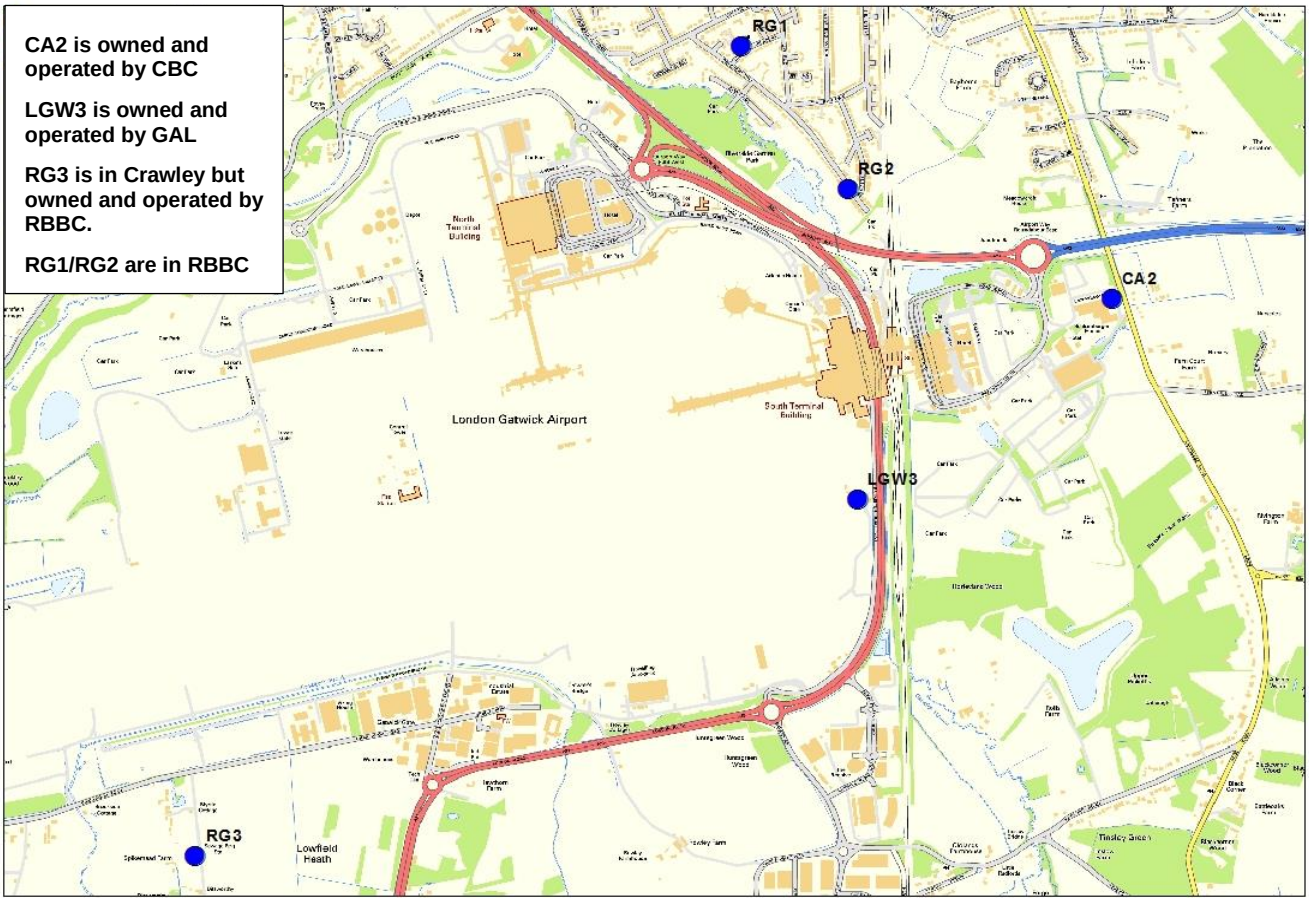
Figure D.17 Map of Diffusion site: CR80

Figure D.18 Map of Diffusion site: CR81

Figure D.18 Map of Diffusion sites: CR51,52,53,54



Figures D.19 – Map of Automatic Monitoring Sites in Crawley



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO_2)	40µg/m^3	Annual mean
Particulate Matter (PM_{10})	50µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM_{10})	40µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO_2)	125µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO_2)	266µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[7] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

Abbreviation	Description
AADT	Annual Average Daily Traffic
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
AQS	Air Quality Strategy
ASR	Air quality Annual Status Report
CBC	Crawley Borough Council
CGP	Crawley Growth Programme
CAZ	Clean Air Zones
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
DFT	Department for Transport
EA	Environment Agency
EFT	Emissions Factor Toolkit
EPAQS	Expert Panel on Air Quality Standards
EU	European Union
FDMS	Filter Dynamics Measurement System
FIDAS	Fine Dust Aerosol Spectrometer
GAL	Gatwick Airport Ltd
LAQM	Local Air Quality Management
LEP	Local Enterprise Partnership
LEZ	Low Emission Zone

LPTS	Local Plan Transport Strategy
NAQS	National Air Quality Strategy
NPPF	National Planning Policy Framework
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
OLEV	Office for Low Emission Vehicles
PHE	Public Health England
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SAQP	Sussex Air Quality Partnership
WHO	World Health Organisation
WSCC	West Sussex County Council
ZEC	Zero Emission Capable

References

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- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Sussex Air Quality Emissions Mitigation Guidance 2021
- Draft Crawley Borough Council Local Plan 2020-2035
- Crawley Growth Programme
- Crawley Town Centre Regeneration Programme 2016
- National bias adjustment factor spreadsheet: http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html
- Tube precision spreadsheet: www.airquality.co.uk/archive/laqm/tools/AEA_DifTPAB_v03.xls
- Bureau Vitas LAQM Diffusion Tube Data Processing Tool
- Public Health Outcomes Framework