



Tunbridge Wells

Air Quality Action Plan

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

February 2023

Tunbridge Wells Borough Council

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Executive Summary

This Air Quality Action Plan (AQAP) has been produced as part of our statutory duties required by the Local Air Quality Management framework. It outlines the action we will take to improve air quality in Tunbridge Wells Borough Council (TWBC) in respect of the Hawkhurst AQMA between 2023 and 2028.

This action plan relates to the new Air Quality Management Area (AQMA) declared in Hawkhurst on 1st December 2021.

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 and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often the less affluent areas , .

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion. Tunbridge Wells Borough Council is committed to reducing the exposure of people in Hawkhurst to poor air quality in order to improve health.

We have developed actions that can be considered under a number of broad topics:

- Alternatives to private vehicle use
- Freight and delivery management
- Policy guidance and development control
- Promoting low emission transport
- Promoting travel alternatives
- Public information
- Transport planning and infrastructure
- Traffic management
- Vehicle fleet efficiency

Our priorities are:

- improvements to traffic management in Hawkhurst,
- development management and planning policy, and
- public information and awareness.

In this AQAP we outline how we plan to effectively tackle air quality issues within our control. However, we recognise that there are a large number of air quality policy areas that are outside of our direct control and influence, but for which we may have useful evidence, and so we will continue to work with regional and central government on policies and issues beyond Tunbridge Wells Borough Council's direct influence.

Responsibilities and Commitment

This AQAP was prepared by the Environmental Health Service of Tunbridge Wells Borough Council with the support and agreement of the following officers and departments:

- Kent County Council (Various Teams)
- TWBC Economic Development Team
- TWBC Development Management Team
- TWBC Planning Policy Team
- TWBC Parking Services Team
- TWBC Sustainability Team
- Hawkhurst Parish Council
- Local Council Members for Hawkhurst

This AQAP has been approved by the TWBC Cabinet following consideration by the TWBC Management Board and

- TWBC Communities and Economic Development Cabinet Advisory Board

This AQAP will be subject to an annual review, appraisal of progress and reporting to the relevant Council Committee where necessary. Progress each year will be

Tunbridge Wells Borough Council

reported in the Annual Status Reports (ASRs) produced by Tunbridge Wells Borough Council, as part of our statutory Local Air Quality Management duties.

If you have any comments on this AQAP, please send them to Dr Stuart Maxwell at:

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1 Introduction

This report outlines the actions that Tunbridge Wells Borough Council will deliver with partners including Kent County Council between 2023-2028 in order to reduce concentrations of air pollutants and exposure to air pollution; thereby positively impacting on the health and quality of life of residents and visitors to the Hawkhurst Area of Tunbridge Wells.

It has been developed in recognition of the legal requirement on the local authority to work towards Air Quality Strategy (AQS) objectives under Part IV of the Environment Act 1995 and relevant regulations made under that part and to meet the requirements of the Local Air Quality Management (LAQM) statutory process.

This Plan will be reviewed every five years at the latest and progress on measures set out within this Plan will be reported on annually within Tunbridge Wells Borough Council's Air Quality Annual Status Report (ASR).

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2 Summary of Current Air Quality in Tunbridge Wells

Please refer to the latest ASR from Tunbridge Wells Borough Council.

Royal Tunbridge Wells suffers from congestion, particularly on the approach roads to the town centre. Other pollution sources, including commercial, industrial and domestic sources, also contribute to the background pollution concentrations.

For many years, there was only one Air Quality Management Area (AQMA) declared in the Borough, due to exceedances of the annual mean Air Quality Strategy (AQS) objective for nitrogen dioxide (NO₂). This AQMA was originally declared in 2005 and extended in 2011 due to exceedances outside of the original AQMA boundaries. At the end of 2016, Tunbridge Wells Borough Council commissioned Air Quality Consultants Ltd to review the boundaries of its AQMA again. The review concluded that the northern and southern ends of the AQMA could be extended, but that the width of the AQMA could be reduced. This process was formally completed in 2018, with the new AQMA taking effect from 1st September 2018.

The Action Plan adopted by the Council in 2010 was largely completed by 2017, therefore a new action plan was produced during 2018 to cover the period 2018 to 2023. The new plan was adopted by the council in early 2019 and actions are currently being implemented, although progress in 2020 and 2021 was hampered by the COVID pandemic.

The 2021 annual mean NO₂ level, measured at the A26 St John's Roadside automatic monitoring location decreased to 26µgm⁻³ from 31µgm⁻³ in 2020. This was somewhat unexpected as we thought the pandemic had a less significant effect on traffic volumes expected in 2021 than it did in 2020. We noted, however, that many of the diffusion tube sites did show small increases in NO₂ levels in 2021 compared to 2020. We note that of the 29 tube sites where a comparison was possible, 16 sites showed an increased level, 10 sites were unchanged, which we define as the 2021 level being within ±1µgm⁻³ of the 2020 level, and three tube sites indicated a lower level in 2021 compared to 2020.

The 1-hour objective for NO₂ was met yet again at the automatic monitoring station, with no instances of the hourly mean exceeding 200µgm⁻³. No exceedances of the hourly mean have been recorded in the last five years. We believe there has probably been a continuing trend of reductions in underlying NO₂ levels across the borough in the last 6 or 7 years, but the pandemic has rather masked this trend in the last couple of years.

Nevertheless, we have seen a steady decline in NO₂ levels at the automatic monitoring station over the past seven years, during which annual mean NO₂ levels have dropped from 48µgm⁻³ in 2014 to 26µgm⁻³ in 2021. This reflects a national downward trend in pollution levels which is occurring as a result of the introduction of Euro VI engines, increased uptake of electric and hybrid vehicles, and the natural disappearance of some of the oldest and most polluting vehicles from the roads as they reach the end of their service lives. Since 2016, there have been no exceedances of the annual mean objective at relevant receptors in the main AQMA.

In 2021, two diffusion tube locations recorded annual mean NO₂ levels above the annual mean objective in Tunbridge Wells. The two locations were TW63 and TW82.

TW63 is a triplicate site in the new Hawkhurst AQMA, and the annual mean recorded there showed a marginal exceedance of 40.4µgm⁻³. The site was not distance corrected by the diffusion tube data processing tool since it is on the façade of a building, but there is no residential property in that part of the building at ground floor level. The nearest relevant residential exposure is at first floor level, so is almost certain to be below the objective. TW63 is one of 10 diffusion tube locations currently active in Hawkhurst. None of the other locations was within 10% of the NO₂ annual mean objective in 2021.

TW82 is a new site for 2021 by Dorin Court on the Pembury Road. Pembury Road is one of the busier roads in Tunbridge Wells, and is prone to congestion at peak times, so high NO₂ levels would be expected by the roadside, however, the road is very wide, with few obstacles to the dispersion of NO₂, and the residential properties are well spaced and set well back from the road. Tube TW82 recorded an annual mean NO₂ level in 2021 of 41.7µgm⁻³. This was distance corrected to 27.2µgm⁻³ at the nearest relevant receptor.

2.1 Hawkhurst

Data from 2018 and 2019 showed some exceedances of the annual mean objective for NO₂. However, TWBC did have some concerns about the reliability of that data, since it seemed to be subject to wild monthly fluctuations of the type that we wouldn't normally expect to see. We understand that roadworks were in place at the crossroads for an extended period in 2019 which almost certainly would have had an impact on the NO₂ levels there. Since we weren't entirely confident of the reliability of the data, we had intended to wait until data from 2020 was available before making a decision about whether or not to declare an AQMA in Hawkhurst. However, in March of 2020 we started to see the first of a number of 'lockdowns' which were inevitably going to impact the results, and therefore we decided that we should base our decision about declaring the AQMA on the 2019 data. The Detailed Assessment was carried out by Air Quality Consultants (AQC) Ltd.

In 2020, site TW63 (Smugglers Rest) was upgraded to a triplicate site to improve the robustness of the data. Two additional sites were established in Hawkhurst, namely TW78 and TW79, (see Map 13) although exceedances are not thought likely at these locations.

The detailed air quality assessment of Hawkhurst undertaken by AQC in 2020 was reported in the 2020 ASR. The conclusion recommended that a small AQMA should be declared on the uphill section of Cranbrook Road, which would include about 30 properties. TWBC accepted this recommendation, and declared the AQMA at the earliest opportunity, although it remains the view of officers that the 2019 data appeared somewhat anomalous, particularly for site TW63, as it showed very large fluctuations between months which could not be explained. One of the highest levels was recorded in June 2019, which would normally be expected to be one of the lowest months of the year. The preferred approach would have been to re-evaluate the need for an AQMA based on 2020 data and it was noted that NO₂ levels in January and February 2020 (i.e., prior to the first COVID lockdown) were considerably lower than the corresponding months in 2019. However, the remainder of 2020 results were affected by lockdowns, (some more than others) so could not inform the decision about whether or not to declare the AQMA.

A targeted consultation exercise was undertaken in the summer of 2020, to inform local residents about the AQMA. Once the AQMA had been declared, this Air Quality Action Plan was developed which has involved more extensive consultation with local residents and other stakeholders.

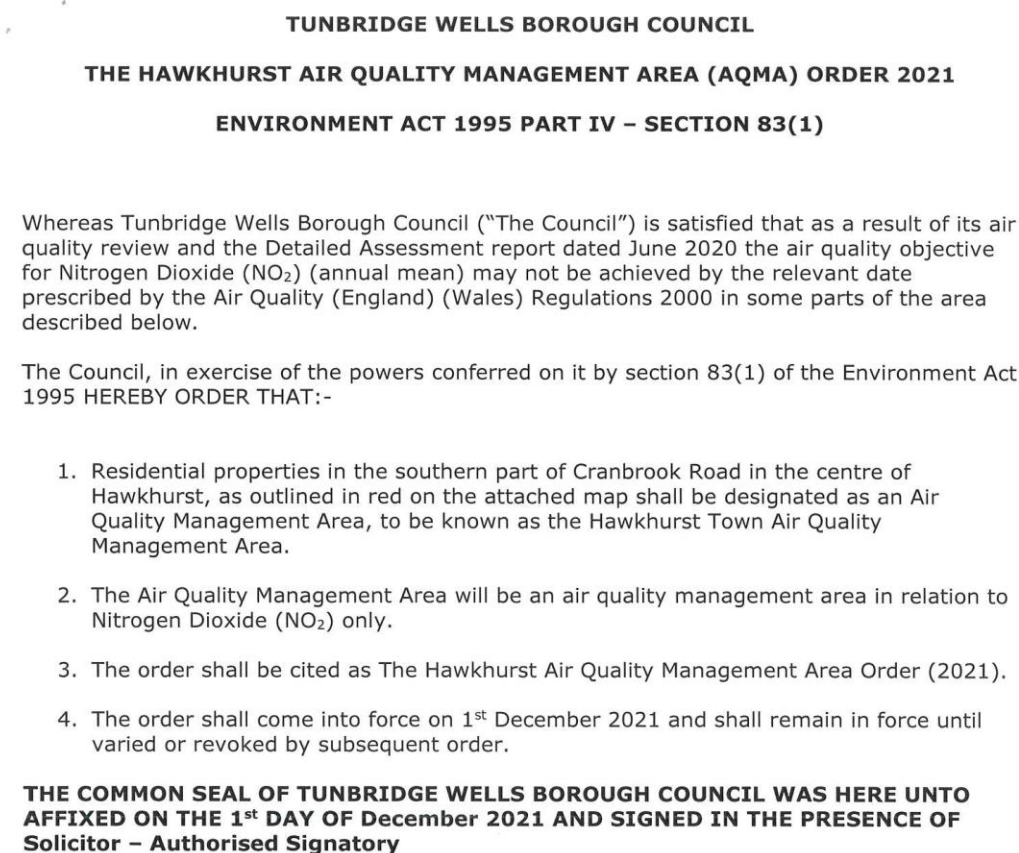
An additional piece of work undertaken in 2020 was a consideration of the cumulative impacts of development in Hawkhurst. This was carried out by AQC who did the modelling for the AQMA. The basic premise of the work was that we are seeing a downward trend in pollution levels, with year-on-year reductions, both locally and nationally, which means that a certain amount of development can go ahead each year, with no net worsening of air quality. The report is an attempt to quantify this additional planning.

Separately, as an interim measure, TWBC developed a planning position statement which describes how air quality considerations will be addressed for planning applications in the vicinity of Hawkhurst. The planning position statement can be found here: -

[Hawkhurst Planning Position Statement](#)

In 2021, the NO₂ levels at all the tube locations in Hawkhurst where a comparison was possible, were somewhat higher than those in 2020, however, they were comfortably below the levels measured in 2019. The highest reading site in 2021 was TW63, where the triplicate annual mean was 40.4µgm⁻³. This was increased from 34.8µgm⁻³ in 2020. In 2019, the site, which was then a single tube, recorded an annual mean NO₂ level of 52.7µgm⁻³.

Figure 1 Hawkhurst Air Quality Management Area Order 2021

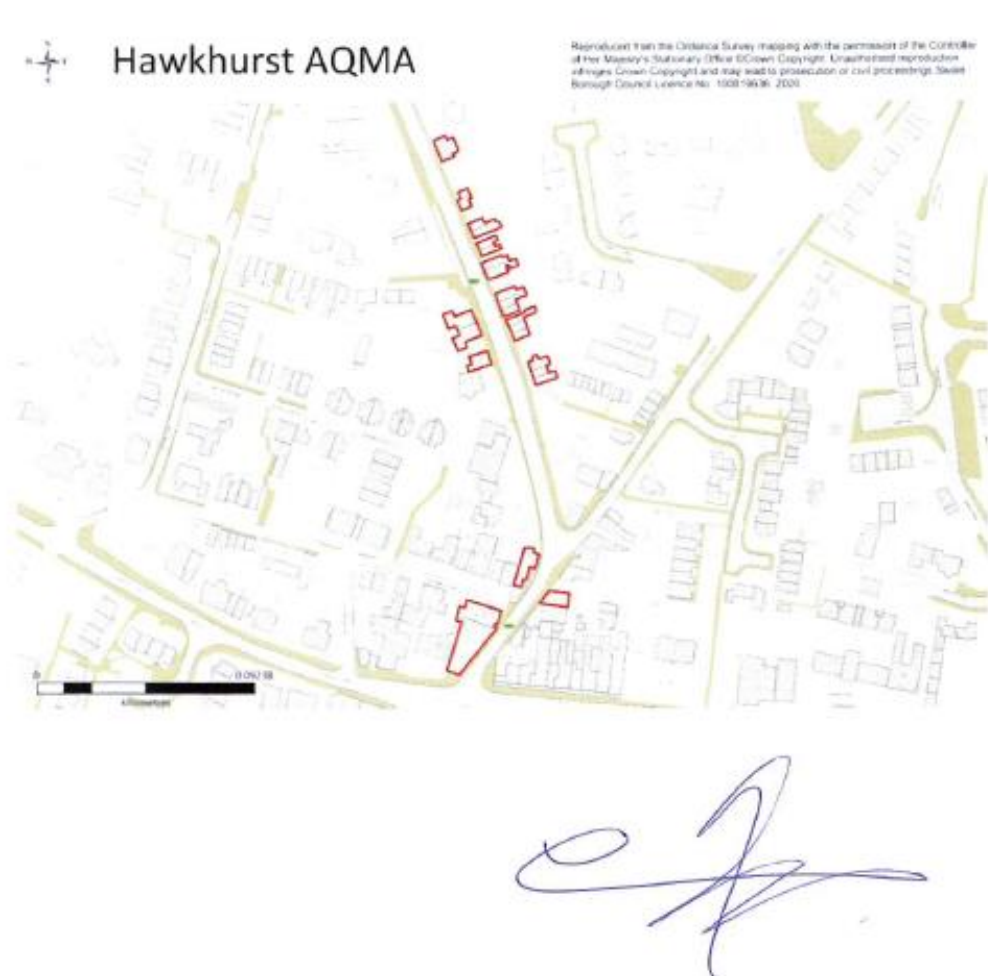


Authorised Signatory



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Figure 2 Receptor Locations in Hawkhurst Air Quality Management Area



3 Tunbridge Wells' Air Quality Priorities

3.1 Public Health Context

As detailed in [LAQM Policy Guidance PG22](#) (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of PM2.5 (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM2.5 has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

New (2020) data from the Public Outcomes Framework (indicator D01) indicates that for the fraction of deaths, attributable to PM2.5, in Tunbridge Wells is 5.7%. This is very slightly higher than the national average of 5.6%.

In May 2021, a new PM2.5 BAM analyser was installed in Tunbridge Wells AQ station on the A26, allowing us to measure PM2.5 in the borough for the first time. We anticipate that this station will measure a 'worst case scenario' in the Borough and therefore that PM2.5 levels in Hawkhurst will not exceed those measured at the AQ station. In the 2022 ASR, the PM2.5 level in the Borough was estimated to be 12.1µgm⁻³, so exceedances of the PM2.5 objective in Hawkhurst are thought to be highly unlikely.

As was noted in the Chief Medical Officer's Annual Report 2022 on Air Pollution, PM2.5 levels have been largely static for the last decade, unlike NO₂ and PM10, the levels of which have decreased quite considerably in the same period.

However, we note that transport is just one of many sources of PM2.5 pollution. Other significant source include agriculture, industry, construction, electricity generation and domestic wood burning.

3.2 Planning and Policy Context

In June 2020, TWBC developed a planning position statement which describes how air quality considerations will be addressed for planning applications in the vicinity of Hawkhurst. The planning position statement can be found here: -

[Hawkhurst Planning Position Statement](#)

In addition, TWBC commissioned AQC to prepare a report considering the potential air quality impacts of development in Hawkhurst. The report was commissioned because of a significant number of planning applications potentially coming forward in the Hawkhurst area. It considers the long-term downward trend in pollution levels which is occurring both locally and nationally. As a result of this reduction in pollution levels, it is recognised that a certain amount of development can go ahead with no net worsening of air quality. The report attempts to quantify this amount, based on when it is scheduled, taking account of this ongoing trend in future years. This document informed the [Pre-Submission Regulation 19 Local Plan](#). (PSLP) and is given at Appendix E.

Whilst the Pre-Submission Local Plan allocates sites for future development, there is always the possibility that some sites for whatever reason do not come forward for development during the plan period, or if they do, the scale of development could be different as each planning application is assessed on its own merits – hence why a number of site allocation policies give a scale within a range of number of residential units. In addition to the allocated sites, which are planned growth, each year the Council receives a number of planning applications for residential development across the borough – and these are termed ‘windfall’ applications/dwellings, i.e. non-allocated sites.

Following the PSLP the Council prepared the [Submission Local Plan](#) (SLP) for examination by the Secretary of State. The examination is ongoing. The SLP sets out at para 4.15/16 That ‘windfalls’ are a reliable source of housing supply and that these are generally, although not exclusively, small sites that come forward in line with general, rather than site-specific, planning policies. The occurrence of these, as well as likely future trends, has been carefully reviewed and there is compelling evidence that such sites will continue to provide a reliable source of supply through the Local Plan period. Further details of windfall sites are set out in the [Housing Supply and Trajectory Topic Paper](#) (HS&T) and the [Brownfield Land Topic Paper](#) (BL TP).

Overall, there is scope for a degree of flexibility in the number of houses which could be built in Hawkhurst, but the modelling which has been done can accommodate a range of scenarios, and therefore is as realistic as possible under the circumstances.

The SLP contains two policies relating to air quality, one of which relates specifically to AQMAs. The two policies are:-

Policy EN 21: Development will not be permitted when it is considered that the health, amenity, or natural environment of the surrounding area would be subject to unacceptable air quality effects (that are incapable of being overcome by a condition or planning obligation), taking into account the cumulative effects of other proposed or existing sources of air pollution in the locality. Sensitive receptors will be safeguarded at all times. Where detailed assessments are required, developments are expected to be at least air quality neutral, with air quality positive proposals strongly encouraged. In the interests of improving air quality borough-wide, all relevant development is required to install the following small-scale mitigation measures: 1. Low NO_x heating, i.e. emitting less than 40mg NO_x per kWh; 2. Electric vehicle charging infrastructure (points and cabling; or any new technology requirements); 3. Cycle storage that is sufficient and convenient (see Policy TP 3: Parking Standards). In accordance with Policy TP 1: Transport Assessments and Travel Plans, transport assessments and travel plans are required for proposals above the limits set out in Kent County Council's latest guidance. Policies STR 6: Transport and Parking, TP 1: Transport Assessments and Travel Plans, and TP 2: Transport Design and Accessibility, also set out that contributions towards mitigation measures may be considered necessary. Applicants should have regard to the Council's guidance note on Electric Vehicle Charging Points for New Development*. The use of sustainable transport measures, such as supporting sustainable public transport, shared transport initiatives, cycle/footways, improved connectivity, and green infrastructure (for example, green roofs, hedges, and street trees) to reduce pollution concentrations and exposure, are strongly encouraged (see Policies STR 5: Infrastructure and Connectivity; STR 6: Transport and Parking; EN 14: Green, Grey, and Blue Infrastructure; TP 2: Transport Design and Accessibility; TP 3: Parking Standards; OSSR 1: Retention of Open Space; and OSSR 2: The Provision of Publicly Accessible Open Space and Recreation).

Policy EN 22: Air Quality Management Areas Development within, or able to impact upon, an Air Quality Management Area must follow the approach

outlined in Policy EN 21: Air Quality and will be required to undertake an emissions mitigation assessment and cost calculation. These requirements also apply in the event that the Council designates an 'Air Quality Protection Zone' or equivalent. Subject to the results of the assessment and calculation, a Section 106 agreement will be used to secure contributions to mitigate this impact.

In terms of planning applications, any applications within Hawkhurst Parish would be assessed against the emerging new strategic policy for Hawkhurst Parish, Policy STR/HA 1 (see pages 201-202 of the SLP). This remains at examination, but it is however worth noting the requirements of this policy – the need for air quality assessments is set out in Criterion 5 as follows:

“In relation to all development proposals for major development, which would generate more than 100 light delivery vehicles (cars and vans of less than 3.5 tonnes gross weight) or 25 heavy duty vehicles (lorries, buses, etc. over 3.5 tonnes gross weight) annual average daily traffic (AADT) movements through the northern arm of the crossroads in Hawkhurst, (i.e. approximately 250m to the north of the crossroads along the Cranbrook Road) per day, to be accompanied by an air quality assessment, with the development providing appropriate mitigation measures.”

In terms of the AQMA Action Plan it seems sensible that you would wish to monitor housing as part of this, to inform, I would suggest comments on planning applications for example.

3.3 Source Apportionment

The AQAP measures presented in this report are intended to be targeted towards the predominant sources of emissions within the Hawkhurst Air Quality Management Area.

A source apportionment exercise was carried out by Tunbridge Wells Borough Council in 2020, based on data from 2019. The percentage source contributions of NO₂ within the AQMA are identified in Table 2 below.

Table 1 Annual Contribution of NO₂ as a Percentage by Source

Receptor	Annual Mean Contribution (µgm ⁻³)							
	Regional Background	Local Background	Car	Motorcycle	LGV	Rigid HGV	Artic HGV	Buses and Coaches
14	10.5	4.1	35	0.1	24.2	16.6	5.8	3.7
16	11.9	4.7	34.2	0.1	23.6	16.2	5.7	3.6
19	14.5	5.7	34.9	0.1	24	13	5	2.8
20	14.7	5.8	34.8	0.1	23.9	13	5	2.8

The receptors considered are all residential properties in Cranbrook Road. Cars were found to account for approximately 35% of the total NO₂ emissions, and LGVs were responsible for a further 25%.

3.4 Required Reduction in Emissions

The improvement in road NO_x emissions to meet the objective at modelled locations (as presented in the Detailed Assessment reference J4114A/1/F2, dated 25th June 2020), (Appendix D), where concentrations exceeded the objective in 2019, is shown in Table 3. As set out in [LAQM Technical Guidance TG22](#) paragraph 7.107, any required percentage reductions of local emissions should be expressed in terms of NO_x due to local road traffic. This is because the primary emission is NO_x and there is a non-linear relationship between NO_x concentrations and NO₂ concentrations. The following calculations use the 'modelled NO₂ concentrations' presented in the Detailed Assessment, and the methodology set out in TG16 Box 7.6. The 'Road NO_x - current' concentration has been modelled. The road NO_x concentration required to give a total NO₂ concentration of 40µgm⁻³ (road NO_x-required) has been calculated using the NO_x to NO₂ calculator by entering a total NO₂ concentration of 40µgm⁻³, along with the local background NO₂ concentration. The ratio of 'road NO_x-required' to 'road NO_x-current' gives the required percentage reduction in local road NO_x emissions to achieve the objective.

A 42% decrease in road NO_x emissions from 2019 is required to meet the objective at the worst-case modelled location.

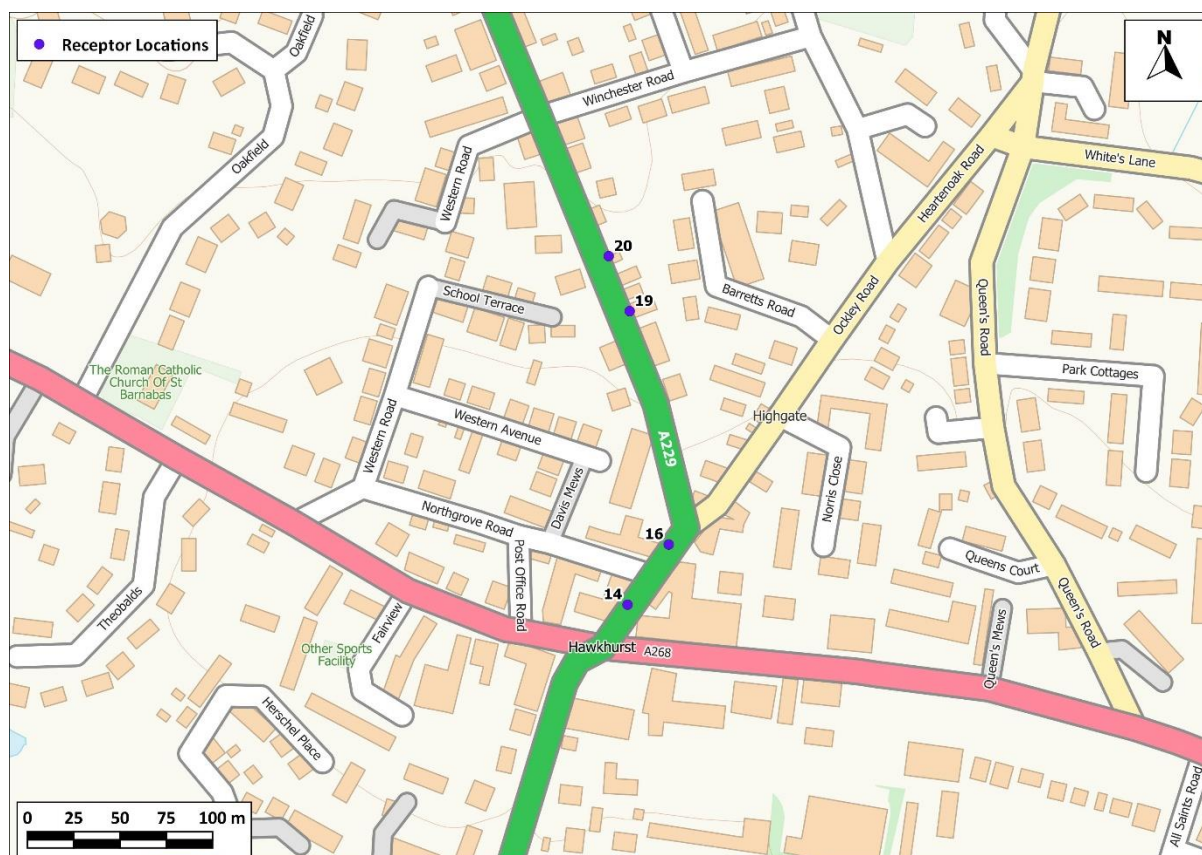
Table 2 Percentage Decrease in Road NO_x required to Meet Annual Mean NO₂ Objective at Relevant Modelled Receptors (µgm⁻³) in 2019

Receptor	Annual Mean Contribution (µg/m ³)					
	Modelled NO ₂ Concentration	Road NO _x Current (a)	Road NO _x Required (b)	Background NO ₂ (for information)	Difference between a and b (c)	% Decrease in Road NO _x to Meet Objective
14 ^a	56.6	111.1	65.0	8.2	46.2	42
14 ^b	54.6	105.5	65.0	8.2	40.5	38
16 ^b	49.5	91.5	65.0	8.2	26.6	29
19 ^b	40.6	68.7	65.0	8.2	3.8	5
20 ^b	40.1	67.5	65.0	8.2	2.5	4

a modelled at 0.1 m height

b modelled at 1.5 m height

c based on unrounded numbers

Figure 3 Receptor Locations from Table 3

3.5 Key Priorities

Priority 1 – Traffic Management

Hawkhurst AQMA is a very small AQMA, caused by very specific issues, namely traffic congestion and queuing, in a small street canyon with a significant gradient. It is not possible to address the street canyon or the gradient, which means that traffic management measures will be our first priority. Foremost of the traffic management measures is to improve traffic flow across the junction at Hawkhurst crossroads. It is hoped that this will be achieved by the introduction of an upgrade to the control of the traffic lights from the present Vehicle Actuation (VA) system to a MOVA (Microprocessor Optimised Vehicle Actuation) system. The MOVA system, originally developed by the Transport Research Laboratory (TRL) typically reduces delays by 10 to 20% compared to the VA system.

We regard this as very important action because it is hoped that this measure could, by itself, address the current exceedance of the NO₂ annual mean objective in the

Hawkhurst AQMA. We recognise that options to reduce the NO₂ levels are limited in this highly localised situation for the reasons given above.

Priority 2 – Planning and Development Management

Whereas the Action Plan measures are intended to improve air quality in the Hawkhurst AQMA, new developments in the area, if not properly managed, have the potential to worsen it.

Prior to formally declaring the AQMA, in June 2020, TWBC published a planning position statement for Hawkhurst, [Hawkhurst Planning Position Statement](#)

the primary purpose of which was to develop a consistent approach to managing the impacts of development, particularly on Cranbrook Road and in the proposed AQMA. The planning position statement broadly follows the principles set out in the EPUK/IAQM document [Land-Use Planning & Development Control: Planning For Air Quality](#) in describing the types of development which will need an Air Quality Assessment before consent can be considered.

It is recognised that there is, both locally and nationally, a trend of improving air quality. One consequence of this trend is that a certain amount of development can be carried out each year, with no net worsening of pollution levels. We commissioned Air Quality Consultants Ltd to attempt to quantify this amount. Their report is given at Appendix E.

AQC modelled the number of vehicle trips in future years which would have either a slight adverse or a moderate adverse effect on three. The results are shown in the table below. Planning and Development Management

Table 3 Annual Modelled Negligible, Slightly Adverse and Moderately Adverse effects from the Number of Vehicle Trips in Hawkhurst

Year	All Negligible	Three Slight Adverse	Three Moderate Adverse
2020	93	N/A	114
2021	97	N/A	292
2022	102	N/A	306
2023	107	N/A	322
2024	114	182 ^a	433 ^b
2025	122	367 ^c	1,277 ^b
2026	396	1,319	1,851
2027	428	1,570	2,000

a The impacts predicted from these additional cars would cause two slight adverse impacts only.

b The impacts predicted from these additional cars would cause two moderate adverse impacts and one slight adverse impact.

c The impacts predicted from these additional cars would cause one slight adverse impact only.

AQC's report states that "there are three properties located on Cranbrook Road close to the junction with the A268 which all have similar and high baseline concentrations, and as such impacts have been determined based on these properties. Applying professional judgement, and considering the EPUK/IAQM guidance, it would seem unlikely that slight or moderate adverse impacts at three properties for a limited number of years would lead to significant health effects. As such the assessment presents the number of vehicles to cause a maximum impact of slight adverse or moderate adverse at a maximum of three properties." The report therefore gives us a very good idea of the cumulative impacts of development in Hawkhurst.

As of April 2022, there is an estimated 161-170 new houses expected to be delivered within the next Local Plan period (before 2038), although it is noted that these will likely be delivered early in the Plan period, given they all have planning permission. Therefore, the numbers of vehicle trips considered in the report are considered to be of an appropriate order of magnitude. The Local Plan is also proposing to allocate 1.2 ha of employment land to expand the Hawkhurst Station Business Park at Gill's

Green. We will work with the TWBC Planning Policy and Development Management teams to mitigate the air quality impacts of this expansion.

Priority 3 – Public Information and Awareness Raising

Several actions have been developed to raise awareness of the specific AQMA in Hawkhurst, as well as air quality problems more generally.

Part of this work will include working with schools through our Clean Air For Schools (CAFS) programme and by continuing to encourage schools to sign up to use our DEFRA funded Pollution Patrol resource.

We will also be continuing with our deployment of anti-idling signage and hope to introduce new signage to make people aware that they are entering an AQMA.

4 Development and Implementation of Tunbridge Wells Borough Council's AQAP for Hawkhurst

4.1 Consultation and Stakeholder Engagement

In developing/updating this AQAP, we have worked with other local authorities, agencies, businesses, and the local community to improve local air quality. Schedule 11 of the Environment Act 1995 requires local authorities to consult the bodies listed in Table 4. In addition, we have undertaken the following stakeholder engagement:

- Web-based survey
- Individual letter encouraging participation in the survey to AQMA residents
- Press releases to local media organisations
- Emails to statutory consultees

The response to our consultation stakeholder engagement is given in Appendix A: Response to Consultation.

Table 4 Consultation Undertaken

Consultee	Consultation Undertaken
The Secretary of State	Yes
The Environment Agency	Yes
The highways authority	Yes
All neighbouring local authorities	Yes
Other public authorities as appropriate, such as Public Health officials	Yes
Bodies representing local business interests and other organisations as appropriate	Yes

4.2 Steering Group

TWBC has established a steering group in order to develop the Air Quality Action Plan for Hawkhurst.

The steering group comprised representatives from

- Kent County Council Highways Team
- TWBC Economic Development Team
- TWBC Development Management Team
- TWBC Planning Policy Team
- TWBC Parking Services Team
- Hawkhurst Parish Council
- Local Council Members for Hawkhurst

The group held four monthly meetings between April and July 2022, in order to develop the list of actions to be included in the consultation which was held between September and November 2022.

5 AQAP Measures

Table 5 shows the Tunbridge Wells Borough Council AQAP measures. It contains:

- a list of the actions that form part of the plan
- the responsible individual and departments/organisations who will deliver this action
- estimated cost of implementing each action (overall cost and cost to the local authority)
- expected benefit in terms of pollutant emission and/or concentration reduction
- the timescale for implementation
- how progress will be monitored

Quantification exercises for some of the measures are likely to be carried out in due course, where possible, however, we note that at present, insufficient information is available for most of the measures to allow meaningful modelling to be undertaken. Updates on this will be included in any future versions of the AQAP, however, we also note that compliance with all air quality objectives is anticipated in the Hawkhurst AQMA in the very short term.

NB: Please see future ASRs for regular annual updates on implementation of these measures

Table 5.1 – Air Quality Action Plan Measures

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	New improved traffic signals at crossroad	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, inc. Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	KCC	Dependent on release of s106 funding from development	Dependent on release of s106 funding from development	Upgraded signals are installed	MOVA systems typically reduce delays by 10 to 20% compared to VA systems		End of action plan	Funding is available from S106 to replace Vehicle Actuated (VA) signals with Microprocessor Optimised Vehicle Actuated (MOVA) signals. Query if will be fully effective if current parking continues to prevent flow of traffic. Potentially high impact
2	Working with schools to promote active travel and travel plans	Public Information	Via other mechanisms	KCC/TWBC	04/23-06/23	09/23 – 07/24	All primary schools in Hawkhurst signed up to Pollution Patrol; Identify Secondary used by pupils in Hawkhurst, and engage with them on travel planning			Ongoing	TWBC already has Clean Air For Schools scheme and is seeking to engage with KCC to extend. To include engaging with secondary schools used by Hawkhurst children in Paddock Wood etc. Impact likely to be low
3	Awareness Campaign including signage	Public Information	Other	TWBC/KCC	04/23-06/23	06/23- 03/24	Designing signage, identifying locations, installing signage			Mar 2024	TWBC already has anti idling signs. Potential to deploy more easily subject to KCC allowing use of street furniture. Inexpensive, but impact likely to be low
4	Increased EV points	Promoting Low	Procuring alternative Refuelling	KCC	04/23 -03/25	04/25-03/28	Number of EV charging points			Mar 2028	Work will be as part of KCC planned roll out and KCC EV strategy

		Emission Transport	infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging								
5	Work with planning development to improve mitigation of businesses in Gills Green	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	TWBC							This action relates specifically to single large development at the Gills Green Business Park
6	Ensure all developments are in accordance with current AQ policies in emerging local plan	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	TWBC	Apr-23	Jun-23	Production of specific Air Quality Guidance for Hawkhurst			Ongoing	Important to endure new development is compliant. Already ongoing
7	Have awareness of potential Impact of cross boundary development	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	TWBC Planning	Apr-23					Ongoing	Ongoing although influence is limited to consultee status. Good working relationship with neighbours
8	Explore options to limit and mitigate the effects of HGVs on the crossroads in Hawkhurst	Traffic Management	Other	KCC	Apr 23- Apr 24					Apr 2025	Reworded to reflect difficulty and time needed to identify suitable options.
9	Prioritise Hawkhurst in the rollout of	Public Information	Via other mechanisms	TWBC	Jun 24 – May 25	Jun 25 – May 26				Jun 2026	

	new DEFRA funded GPs air quality training resource										
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Appendix A: Response to Consultation

Table A.1 - Summary of Responses to Consultation and Stakeholder Engagement on the AQAP

Consultee	Category	Response
Survey Respondents	Traffic Management	New traffic signals at crossroad considered most achievable but concerns on whether this will change anything; removing or reducing parking considered least achievable; concerns of residents parking if parking spaces are removed on Cranbrook Rd
Survey Respondents	Public Information	Working with schools to promote active travel seen as achievable in 100% of respondents aged 18-34 years (42% of all respondents); note that awareness campaigns already occurring in and around schools; concerns that people will not take notice of signage
Survey Respondents	Promoting Low Emission Transport	More EV Charging points considered to have a low impact but comments of likely increased EV ownership; 100% of respondents aged 18-34 years said active travel measures are achievable compared with 28% of all respondents; concerns of terrain, narrow roads and safety of E-Bikes and alternative transportation.

Consultee	Category	Response
Survey Respondents	Policy Guidance	Many consider any development to negatively impact air quality due to increased vehicles; concerns of enforcement of developments for compliance;
Survey Respondents	Freight and Delivery Management	Rerouting of HGVs considered to be most unachievable as there are no alternative routes at present but also considered to have the greatest impact if achievable; consider HGV traffic to be the major contributor to congestion.
KCC Highways	Traffic Management	Signalised crossing points and method-of-control of traffic signals dependent on new developments; mini roundabout rather than traffic lights could lead to further queues, safety concerns, and would require further consultation;
KCC Highways	Promoting Low Emission Transport	Private EVCPs cannot be installed on highway; EV infrastructure will need to be provided on private car parks; currently updating on-street EV Charging guidance note; recommend Parish Council apply to on street residential charge point scheme but note 40% match funding requirement; consider improvements to walking and cycling infrastructure a high priority.
KCC Highways	Freight and Delivery Management	Hawkhurst crossroads are at a junction of 2 'A' roads which are suitable for most traffic; highly unlikely that this measure can be implemented

Consultee	Category	Response
KCC Highways	Public Information	Promotional signage requires planning permission; high priority for measures and programs involving schools for behavioural change.

Appendix B: Reasons for Not Pursuing Action Plan Measures

Table B.1 – Action Plan Measures Not Pursued and the Reasons for that Decision

Action category	Action description	Reason action is not being pursued (including Stakeholder views)
Traffic Management	Remove/Reduce or move parking on Cranbrook Road	Has been looked at several times, likely to be unpopular with residents. Query if needed if traffic light improvements are effective. Potentially high impact
Promoting Low Emission Transport	Clean Air Zone	Very expensive not likely to be justified for the size of the problem
Traffic Management	Alternative to pedestrian crossing such as a bridge	Cost, conservation area etc
Traffic Management	Remove one of the crossings on the high street	See amended action 1
N/A	Protect residents of affected houses by offering to install mitigation such as mechanical ventilation	Would not solve the problem, cannot make residents take up offer and cost implications

Alternatives to private vehicle use.	New or expansion of current car club to Hawkhurst	Economic Development at TWBC have met with Co Wheels (car club provider). Evidence base for uptake does not support expansion of the TWBC car club into Hawkhurst. Would need to be set up and heavily subsidised in the long term by TWBC or other contributor. No prospect of becoming self sustainable
Promoting Travel Alternatives	Active Travel Measures such as e-bike scheme	Not taken forwards as a separate measure. No funding for E bike scheme and unlikely to have much impact or be very suitable for the location. Active travel to be included in work with schools.
Traffic Management	Change traffic lights at junction to a mini roundabout	Not taken forwards. Not supported by residents or KCC. Not funded. A mutually exclusive option to the planned upgrade to the traffic lights

Appendix C: Air Quality Action Plan Public Consultation Report

Tunbridge Wells Borough Council

Air Quality Action Plan Consultation

December 2022

Consultation undertaken by Maidstone Borough Council, Corporate
Insight, Communities and Governance Team on behalf of
Tunbridge Wells Borough Council

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Background

On 1 December 2021 Tunbridge Wells Borough Council declared a small Air Quality Management Area (AQMA) in Cranbrook Road, Hawkhurst.

The Council has been measuring air quality in Hawkhurst for a number of years, and whilst they found it to be generally good, there were some 27 properties in Cranbrook Road where the air quality objective, or limit, for nitrogen dioxide was exceeded in 2019. The cause of the exceedance was identified as a combination of the traffic queues at the crossroads, the uphill gradient at the approach to the crossroads in Cranbrook Road and the narrowness of the street in that location.

When the Council measures an exceedance of an air quality objective they are legally required to declare an AQMA, as Tunbridge Wells Council have done. They are then required to produce an Air Quality Action Plan (AQAP) which includes the measures to tackle the exceedance.

There has already been a significant improvement in air quality since 2019, partly due to a long-term trend of improvement, and partly because of how many people have changed their working and driving routines in recent years. The AQAP is intended to build on the improvement which has already occurred.

Methodology

Tunbridge Wells Borough Council undertook a consultation between 29 September and 27 November 2022

The survey was carried out online. Those living in the affected area were notified directly by letter. Paper copies of the survey and alternative formats were also available on request. The survey was open to all Tunbridge Wells Borough residents aged 18 years and over as well as visitors to the borough.

The Consultation asked respondents their opinions about the proposed actions for the Air Quality Management Plan. There was an opportunity throughout to provide additional comments.

There were a total of 62 responses to the survey. In addition, a letter commenting on the proposed actions was received from KCC (attached at Appendix A).

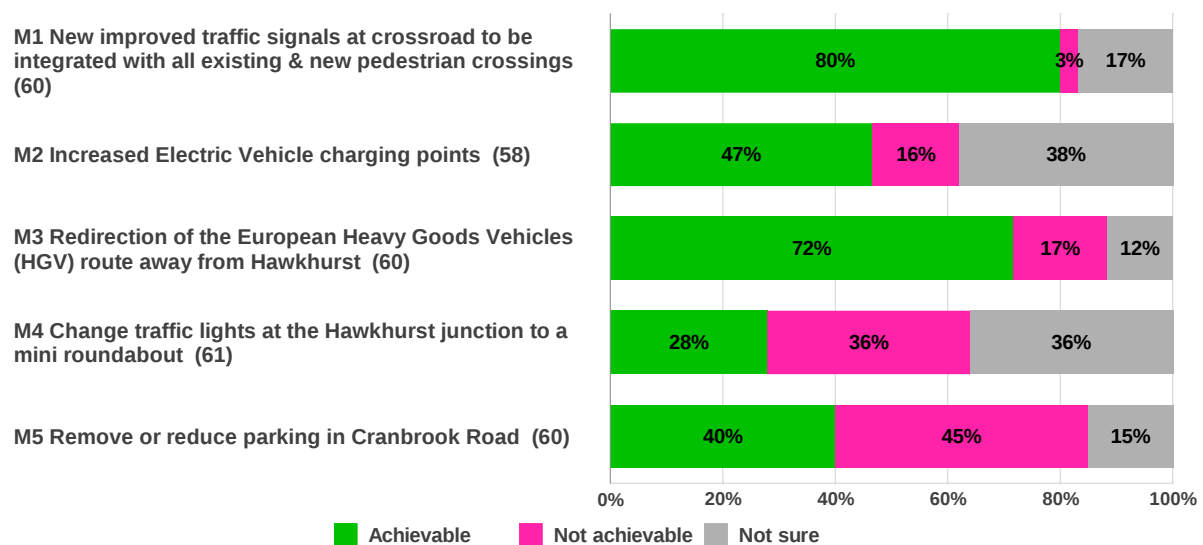
The data has not been weighted; however, the bottom two age brackets were combined to give the 18 to 34 years group. Please note not every respondent answered every question; therefore, the total number of respondents, refers to the number of respondents for that question, not to the survey overall. Comments have been categorised according to content with some covering more than one category. All suggestions identified have been passed to the Environmental Health Team for response in the committee papers.

Transport Measures

Achievement

Respondents were asked to review the proposed transport measures and were asked if they were achievable or not.

A total of 61 answered this question. Overall, Measure 1, 'new improved traffic signals at crossroad to be integrated with all existing and new pedestrian crossings' was considered the most achievable with 80% responding this way. Measure 5, 'remove or reduce parking in Cranbrook Road' was considered the least achievable with the greatest proportion answering 'not achievable' across the transport measures with 45% answering this way. Measure 4, 'change traffic lights at the Hawkhurst junction to a mini roundabout' had the lowest proportion stating it was achievable at 28%, here respondents were split with 36% responding 'not sure' and 36% responding 'not achievable'.



Demographic Differences

The data show that respondents with a disability were more likely to respond that Measure 5, 'remove or reduce parking in Cranbrook Road' was achievable with 83% answering this way compared to 34% of respondents without a disability.

Respondents that said that a measure was unachievable, were prompted to explain why they felt this way.

Measure 1 – Unachievable Comments (2) – Shown in full

It's a crossroad so how can changing the signals improve it!
There are queues at every entrance to the junction and changing the sequence will not make the slightest difference

Measure 2 – Unachievable Comments (9) – shown in full

Lake of space for charging points
Hardly any houses have the proximity for electric charging points for vehicles on Cranbrook Road.

only achievable with total cooperation with supermarkets. The one charge point next to the BP fuel station is hardly used anyway. Electric cars are NOT eco and Biofuels are coming on stream which are far more eco and more than 40% of coal fired power stations are required to make all this electricity, utter madness.
Electric vehicles are not green and there is insufficient space in Hawkhurst to accommodate charging points
Complete waste of public money, nobody will use them
Depends on location, would have no discernible impact on air quality on Cranbrook Road, indeed if installed along Cranbrook Road could worsen air quality due to increased congestion.
there are no public points to install
I don't think it will impact the traffic using the junction. They come from far away and just transit through the junction between Hastings and Maidstone.
Will not make any difference to traffic flow in any way. There is nowhere to put EV charging points.

Measure 3 – Unachievable Comments (10) – shown in full

It's a major road there is no practical alternative
Main thoroughfare from Maidstone and the Medway towns to the south coast. Not another good route to Hastings.
Foreign HGV drivers will ignore any signage as they do with Goudhurst
Redirect to where? The non-existent A21 trunk road?
It's the most direct route for HGVs, they would probably just take it anyway. And it would just move the traffic elsewhere
Because they will not take any notice of any restriction, as do the excessive speeds we witness every day by drivers who do not observe the 30 or 40 speed restrictions. 50/60mph speeds are witnessed every day in 30 mph zones and continued jumping of red traffic lights.
It hasn't worked in Cranbrook or other villages...more importantly it's unenforceable.
Measure 3 will simply displace HGV traffic onto other unsuitable roads causing/exacerbating congestion and air pollution in other villages, such as Goudhurst, where I live, which is gridlocked by HGVs on a daily basis. European HGV traffic should be required to use the motorway network, using other roads for access only
This will only be achievable by providing an alternate road. This is possible but years off, it would be viable at all. The "European" aspect of this, cannot be easily policed. European bound traffic has no benefit coming through Hawkhurst and should/will still follow A20/M20.
There are many units/businesses within the area that use HGV so it would not reduce the amount of HGV that use the Hawkhurst Route also there is not any other suitable routes that HGV can use IE A 21 generally very narrow from Lamberhurst and over capacity already would only work if A21 was made into a dual carriageway all the way to Hastings but even then, HGV would still need to get to areas from Hastings around to Rye

Measure 4 – Unachievable Comments (22)

Theme	No.	Nature
No space/ room	8	Not enough room for a mini roundabout. The need to move the war memorial and demolish buildings were mentioned.
Investigated	6	This measure had already been investigated by KCC and deemed unfeasible.

Too much traffic	6	This would not have any impact due to the amount of traffic. With idling mentioned as remaining an issue due to the need for pedestrian crossings.
Other	4	1 - no impact on air quality. 1 - too expensive. 1 - the current junction works well. 1 - would cause safety issues particularly for pedestrians.

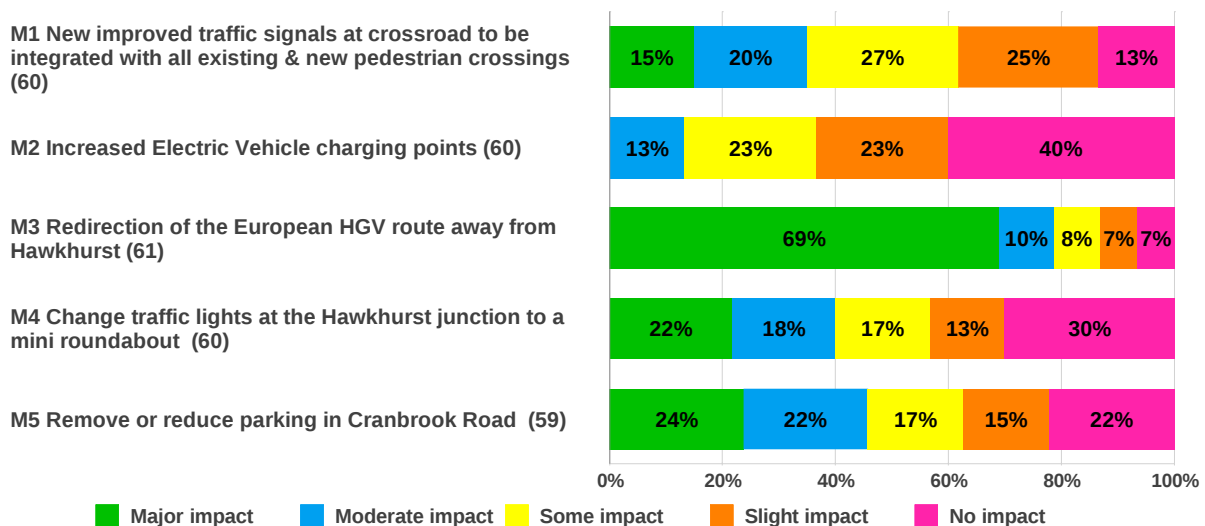
Measure 5 – Unachievable Comments (27)

Theme	No.	Nature
Resident Parking	27	All expressed concern about where residents would park if this measure enacted. Many said it was unfair on the residents living on Cranbrook Road and that there was insufficient parking locally.

Impact

Respondents were asked to indicate what impact they thought each of the measures would have on air quality locally.

A total of 60 respondents answered these questions. Overall, respondents felt that Measure 3 (redirect of the European HGV route away from Hawkhurst) would have the greatest impact with 79% responding Major or Moderate impact. Respondents felt that Measure 2 (increase electric vehicle charging points) would have the least impact with 63% responding that this measure would have a slight impact or no impact.



Demographic Differences

No demographic differences were identified.

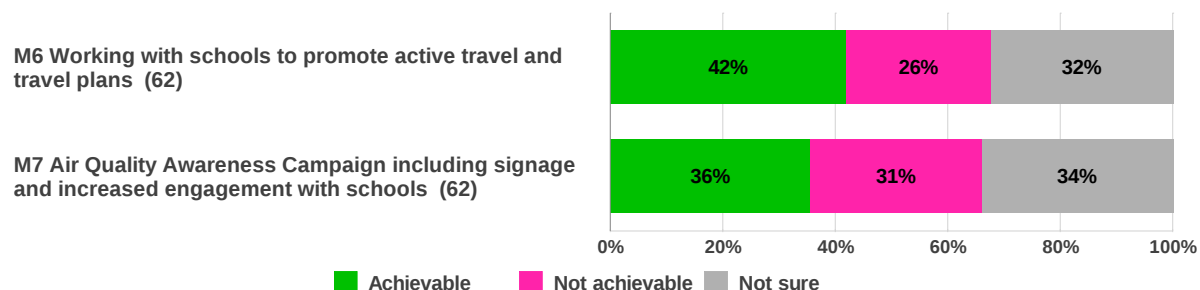
Comments on Transport Measures (35)

Theme	No.	Nature
HGVs	16	• HGVs are the cause of the congestion and pollution. • Roads are unsuitable for HGVs. • Redirection of HGV traffic would positively impact air quality locally.
Traffic Management	14	• Better junction management requested including pedestrian crossings. • Concerns that a mini roundabout would cause more issues such as HGVs getting stuck. • Suggestions for a bypass/relief road.
Parking	7	• There would be more room for free-flowing traffic if parking on Cranbrook Road was removed but a solution would need to be found for residents parking.
Congestion	7	• HGVs and idling cars considered main source of congestion
Electric Vehicles/Chargers	4	• EV charger will not impact air quality. • EV chargers would encourage more electric vehicle ownership. • EV chargers are a good idea.
Development	3	• Additional housing creates more traffic and congestion.
Other	3	• Enforcement of one-way system at Water Lane required. • Queries on feasibility and impact of proposed actions.

Information & Education Measures

Respondents were asked to review the proposed Information & Education measures and were asked if they were achievable or not. A total of 62 respondents answered this question.

Overall, Measure 6 was considered slightly more achievable with 42% responding this way.



Demographic Differences

100% of respondents aged 18 to 34 years said that measures 6 and 7 were achievable this result was significantly greater than the proportion responding the same for the other age groups.

Respondents that said that a measure was unachievable were prompted to explain why they felt this way.

Measure 6 Unachievable Comments (16)

Theme	No.	Nature
Little to no impact	6	- The majority of traffic is through traffic. - School traffic is not the issue.
Driving to School	6	- Parents make this choice rather than children and are unlikely to change habits. - Those who can walk already do so.
Active travel options	2	No dedicated school bus or appropriate public transport available that could be used by school children.
Other	3	- Measure 6 already exists. - No public transport available. - Safety issue walking due to narrow lanes and no footpaths.

Measure 7 Unachievable comments (18)

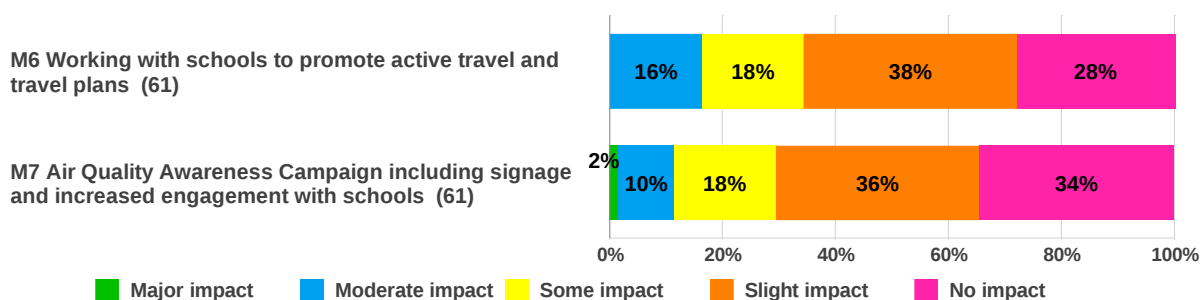
Theme	No.	Nature
Little to no impact	13	- People will not take any notice and therefore it will not impact air quality. - School traffic not a problem, the problem is the amount of HGVs and through traffic.
Other	5	- One said there is already an awareness campaign. - Two mentions a lack of viable alternative i.e., no public transport. - One said it was not the schools place to get involved with such a campaign.

		One said this would just highlight the issue and make the local residents unhappy.
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Impact

Respondents were next asked to indicate what impact they thought each of the measures would have on air quality locally.

A total of 61 respondents answered these questions. Overall, respondents felt that Measure 6 would have a greatest impact than measure 7 with 34% responding 'major or moderate impact'.



Demographic Differences

The data show that respondents with a disability were more likely to agree that that Measure 6, 'working with schools to promote active travel and travel plans would have a major or moderate impact on air quality with 43% answering this way compared to 13% of respondents without a disability.

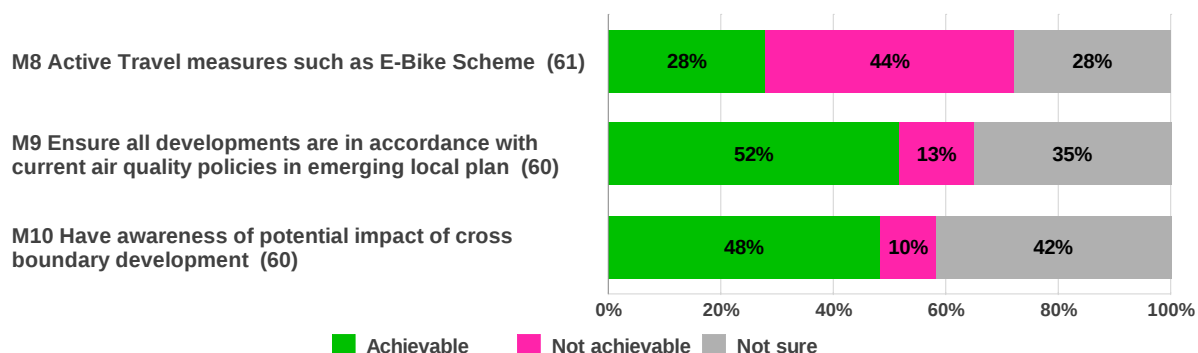
Comments on Information & Education Measures (23)

Theme	No.	Nature
No impact	12	- Measures proposed will not work. - People will not take any notice. - More radical solutions required to improve air quality.
HGV	6	- HGV through traffic main cause of the problem. - Suggestion to ban HGVs from passing through the village.
Idling engines	3	- Education required to avoid idling. - Suggestion of introducing fines for idling vehicles.
School transport	3	- Introduce school buses. - Restrictions on streets with schools for pick up and drop off. - More children could walk.
Other	2	- Road infrastructure poor with no regular public transport or cycle lanes. - People need to know how to reduce their pollution.

Miscellaneous Measures

Respondents were asked to review the proposed 'miscellaneous measures' and were asked if they were achievable or not

A total of 61 answered these questions. Overall, measure 9 was considered the most achievable with 52% responding this way. Measure 8 was considered the least achievable with the 44% responding that this measure was unachievable.



Demographic Differences

- 100% of respondents aged 18 to 34 years said that Measure 8 was achievable. This result was significantly greater than the proportion responding the same for the age groups 45 years and over.

Respondents that said a measure was unachievable were prompted to explain why they felt this way.

Measure 8 - Unachievable Comments (25)

Theme	No.	Nature
Safety	10	- Heavy traffic makes it unsafe to cycle. - Roads need to be safer for this to be viable.
Terrain/Fitness	8	- Local area is hilly. - Local population is aging and cycling therefor less attractive an option.
Won't be used/No impact	6	- Unlikely children will cycle to school. - Little to no impact in Hawkhurst.
Expensive	3	- E-bikes are expensive. - A hire scheme would be expensive in terms of maintenance.
Journey distances	3	- Schools too far away to cycle to. - Cycling unsuitable for long journeys.
Other	1	The narrow reads and lanes prohibit cycle lanes being installed.

Measure 9 – Unachievable comments (8)

Hawkhurst has suffered and still suffering major development - this will result in extra traffic and more pollution
Because developers ignore them. More development =more cars & pollution

I'm an architect and it infuriates me that developers and councils believe adding a charging point (now a building reg btw, so its compulsory) and providing 1 parking space per new house when the reality is 2 or more cars per house. You just create parking issues. The reality is, there are no local jobs that can pay for the bills and a mortgage of a house in this borough. 80% of people need to commute. So, I don't see how the council can do much about developments other than demanding more parking for houses. This will obviously mean more cars and more pollution. So it's silly to address that yet. They infrastructure and economy of the local towns need to provide better jobs; this comes with a better local infrastructure and roads first.

It's not the developments at the design or building stage. You can build a new house with an EV charger and reduce parking spaces BUT people may not buy a electric car and you may have several people in one residence all with cars they have to park somewhere

Build a bypass

House building with any measures will be minimal an have no impact of air quality

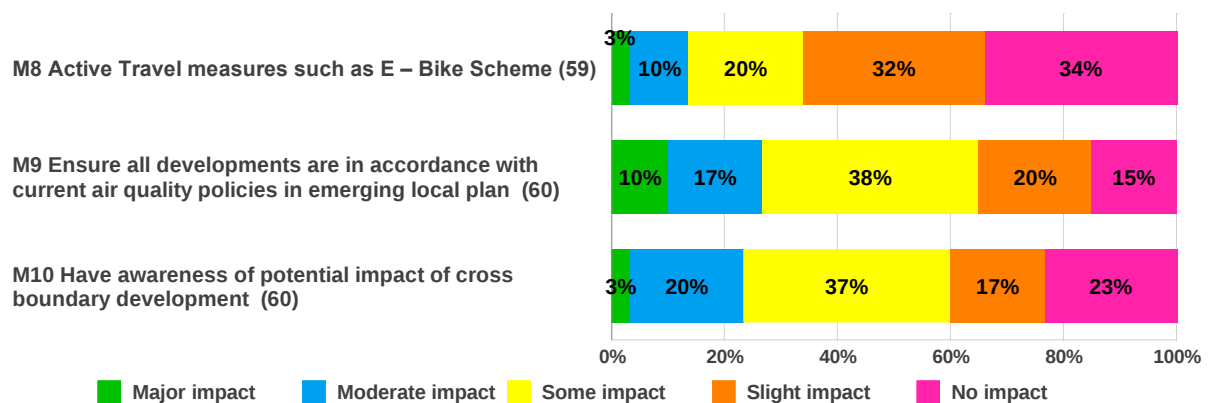
with all developments will come cars and other vehicles> We must have more development to keep Hawkhurst alive and to prosper so we will get reduced air quality but as we change over to electric Cars this will reduce any way to a time that air quality is not affected by vehicles. if anything, we should promote the use of electric vehicles and all buses and council vehicles should be Electric

The overdevelopment of Hawkhurst has led to many of the issues we are seeing now. Developers produce vague plans in line with air quality policies which are simply fiction. Any house that is built, increases the local traffic by 1-2 vehicles. Also, conditions put on developments are not enforced, evidenced by the fact that the junction with Cranbrook Road and Heartenoak Road remains unchanged despite it being a condition of the Hawkhurst House development.

Impact

Respondents were next asked to indicate what impact they thought each of the measures would have on air quality locally.

A total of 60 respondents answered these questions. Overall, it was felt that Measure 9 would have the greatest impact with 27% responding major or moderate impact. Respondents felt that Measure 8 would have the least impact with 66% responding that this measure would have a slight impact or no impact.



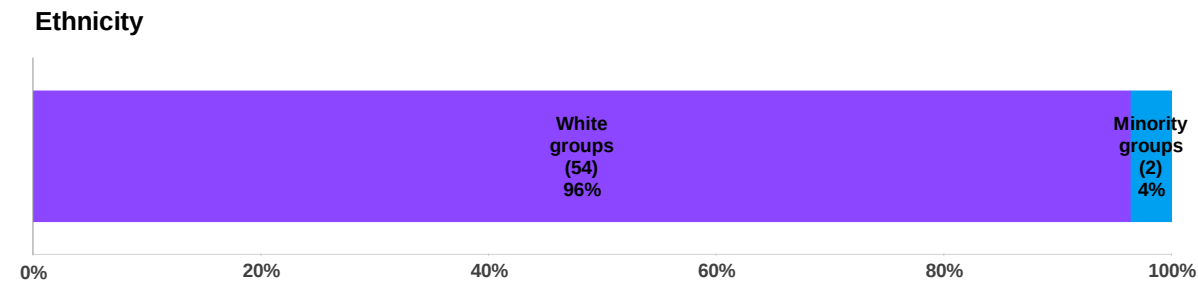
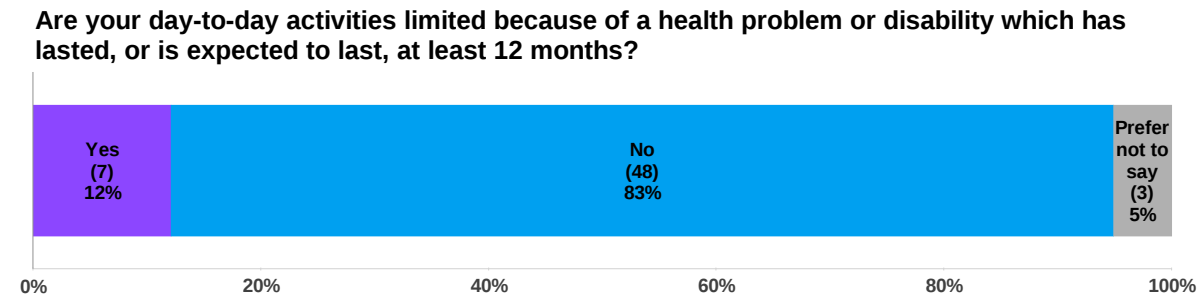
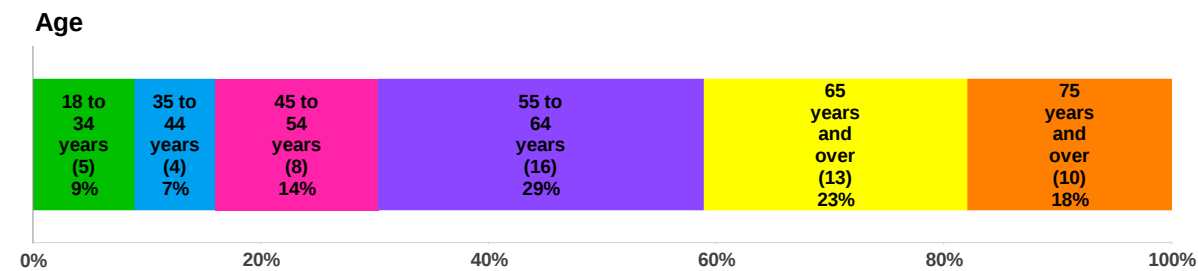
Demographic Differences

Respondents aged 75 years and over had a significantly greater proportion responding that measure 10 would have slight or no impact with 70% answering this way compared to the over result of 41%.

Comments on Miscellaneous Measures (22)

Theme	No.	Nature
Development	8	• New housing will increase pollution. • There is too much housing development. • Developments cross district border but on boundaries impacts on local roads.
Little to no impact	5	• Proposals will not address the problem. • Active travel schemes are a waste of time. • Proposals will not improve air quality in Tunbridge Wells.
Cycling	4	• Roads are unsuitable for cycling. • Suggestion of bike hire scheme at rural train stations.
Traffic	3	• HGVs are the main issue. • Cycling is unsafe due to traffic volume. • Most traffic is not local.
Other	4	• Idling should be discouraged • Concern expressed over time period of data used for measurement. • Query about action definition.

Demographics



Appendix A – Response from KCC Highways

By email:
Duncan.Haynes@MidKent.gov.uk

**Kent County Council
Ashford Highway Depot
Javelin Way
Henwood Industrial Estate
Ashford
Kent
TN24 8AD**

Dear Sir/Madam

RE: Hawkhurst Air Quality Action Plan Consultation

KCC recognises the UK environment and climate emergency and stated in the KCC Low Emissions Strategy that we must “*continue to tackle poor air quality hotspots, through the implementation of Air Quality Management Plans*”. KCC therefore welcomes the continued opportunity to comment on the Tunbridge Wells Borough Council Air Quality Action Plan, and by working together, ensure the proposals maximise the benefits that can be achieved.

Comments

I refer to the ‘Tunbridge Wells Actions’ document. There are five measures in the ‘Transport Related’ category, two in the ‘Information and Education’ category and three miscellaneous. Any comments are provided as follows.

Measure 1

Measure 1 addresses the highway works delivered via s278 agreement at the signalised crossroads. It will see the method of control upgraded from Vehicle Actuated to MOVA, the replacement of existing signal equipment to allow the addition of Puffin pedestrian technology with on-crossing detection, and provision of linking to the adjacent pedestrian crossing upon first occupation of any dwelling of the approved development at Highgate Hill. The proposals had been raised to reduce delays for all traffic and pedestrians. The development at Turnden in Cranbrook, which is currently at an appeal stage, has proposed for the same mitigation.

As covered by condition 12 of planning application 20/02788/FULL at Highgate Hill, full details of off-site works to the highway are to be submitted for consultation with the highway authority prior to the commencement of the development.

It is to be noted that an additional signalised crossing point On Rye Road (close to the junction with All Saints Road) and improvements to cycle parking along Rye Road are covered by condition 12 of the Highgate Hill development. Of which, the specific details must also be consulted with the highway authority.

These mitigations are therefore dependent on the development(s) coming forward.

Measure 2

Measure 2 would see the increase in EV points. Tunbridge Wells Borough Council can provide the details of any plans to provide charging points at the car park in Hawkhurst.

Kent County Council does not currently allow private EVCPs to be installed on the highway or charging cables to be brought from a private property onto the highway. Generally it will be more cost effective, with fewer design barriers, to place charging infrastructure in hub locations within car parks. This will also better accommodate future demand levels. Kent County Council are updating the on-street Electric Vehicle Charging guidance note for districts with the intention to provide guidance for district councils (including borough councils) wishing to install electric vehicle charging points (EVCP)s on highway land.

In the past, a local Electric Vehicle Charge-point scheme was opened by Kent County Council with the aim of providing funding to parish councils to install points on public land. For the purposes of the Hawkhurst AQAP, this cannot be relied upon for the scheme to be opened again in future, however if it does open again, it would be recommended for Hawkhurst Parish Council to apply to if suitable land can be identified. It can also be noted that Parish Councils can apply to on street residential charge point scheme (ORCS) but they would need 40% match funding.

For developments or new units, a minimum provision of Electric Vehicle Charging Infrastructure is now required under the Building Regulations and is reflected in Kent Design Guide: Parking Standards. For the offices (non-residential use), 10% of parking spaces should be active and 100% passive. For residential units, charge points are expected to be provided on the ratio of one per unit, with the rest as passive charging spaces for future use (involving installation of the network of cables and power supply necessary so that at a future date a socket can be added easily). The minimum specification is Mode 3, AC with a minimum output rating of 7kW.

Measure 3

This measure proposes for redirection of the European HGV route away from Hawkhurst. The crossroads are at a junction of 2 'A' roads, which are suitable for most traffic. Furthermore, we cannot distinguish between British and foreign vehicles using any routes.

In summary, it is highly unlikely that this measure will be able to be implemented at this location.

Measure 4

From a high-level perspective, this proposal would depend on the design and layout and whether it could fit within this. It further depends on safety, for example the gradient of the arms could impact on the ability of a driver approaching the junction to see the mini roundabout in advance. Slower moving vehicles may not be able to get moving in the gap they have. In addition, there may be doubt as to who is going at a mini roundabout. This could lead to conflicts and queues on some arms.

It is also important to remember that these crossroads are at the intersection of two A-roads, which are on the Strategic Road Network (SRN).

Pedestrian crossings are not used with a mini roundabout and would have to be moved back on the approach arm, possibly 20 metres from the junction.

This proposal would need to be consulted further with teams within KCC if it was to be considered any further in detail.

Measure 6

Measure 6 is in relation to working with schools to promote active travel and travel plans.

Measures and programs to encourage behavioural change and working to increase the level of active travel journeys are vital to directly improve local air quality. As such, this measure is of high priority.

Measure 7

For promotional signage on highway furniture or structures, planning permission would need to be gained.

Measure 8

Measure 8 covers active travel measures such as an E-bike scheme.

Working to increase the level of active travel journeys by residents and visitors through improvements in walking and cycling infrastructure have a direct impact on local air quality. Therefore, this measure regarding active travel should be given a high priority.

KCC is supportive in developing the Air Quality Action Plan and welcomes the positive contribution that it could have in improving the air quality in Tunbridge Wells Borough.

I trust that you will find the above information useful, and should you require any further information or clarification on any matter, please do not hesitate to contact me.

Yours sincerely,

Director of Highways and Transportation
Kent County Council Highways

Appendix D: Detailed Assessment of Air Quality in Hawkhurst



Air Quality Modelling: Hawkhurst, Tunbridge Wells

June 2020



Experts in air quality
management & assessment

Document Control

Client	Tunbridge Wells Borough Council	Principal Contact	Stuart Maxwell
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Job Number	J4114
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Report Prepared By:	David Bailey & Ricky Gellatly
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Document Status and Review Schedule

Report No.	Date	Status	Reviewed by
J4114A/1/F2	25 June 2020	Final	Dr Clare Beattie (Associate Director)

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1 Introduction

- 1.1 Diffusion tube monitoring undertaken by Tunbridge Wells Borough Council (TWBC) at new sites in Hawkhurst in 2019 highlighted potential exceedances of the annual mean nitrogen dioxide objective. A detailed assessment was commissioned by the Council to identify where the objective is exceeded at any locations of relevant exposure, and thus whether a new Air Quality Management Area (AQMA) is required to be declared.
- 1.2 This report describes the dispersion modelling carried out by Air Quality Consultants Ltd (AQC) to identify 2019 annual mean nitrogen dioxide concentration at locations of relevant exposure throughout Hawkhurst. In order to develop appropriate measures to improve air quality along Cranbrook Road and inform the action plan, source apportioned nitrogen dioxide concentrations have also been calculated taking account of the different proportions of emissions emitted by different vehicle types.

2 Background

Air Quality Strategy

- 2.1 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

Clean Air Strategy 2019

- 2.2 The Clean Air Strategy (Defra, 2019a) sets out a wide range of actions by which the UK Government will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

The Air Pollutant of Concern

- 2.3 Nitrogen dioxide is associated with adverse effects on human health. Increases in daily mortality and hospital admissions for cardiovascular diseases and hospital admissions due to asthma have been associated with short-term exposure to nitrogen dioxide. Associations have been found between long-term exposure to nitrogen dioxide and all-cause, cardiovascular, respiratory mortality, lung cancer and pneumonia. However, some debate remains as to the strength of the causal associations (COMEAP, 2018). Decrease in lung function in both children and adults and respiratory infections in early childhood due to long-term exposure to nitrogen dioxide have also been reported.

The Air Quality Objectives

- 2.4 The Government's Air Quality Strategy (Defra, 2007) provides air quality standards and objectives for key air pollutants, which are designed to protect to protect human health and the environment. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The

'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations, 2000, Statutory Instrument 928 (2000) and the Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043 (2002).

- 2.5 The objectives for nitrogen dioxide were to have been achieved by 2005, and continue to apply in all future years thereafter. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded where the annual mean concentration is below 60 $\mu\text{g}/\text{m}^3$ (Defra, 2018a). Therefore, the potential for exceedances of the 1-hour nitrogen dioxide objective have only been considered possible if and where the annual mean concentration is above this level. The relevant air quality criteria for this assessment are provided in Table 1.

Table 1: Air Quality Criteria for Nitrogen Dioxide

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year
	Annual Mean	40 $\mu\text{g}/\text{m}^3$

- 2.6 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives apply in its Local Air Quality Management Technical Guidance (Defra, 2018a). The annual mean objectives for nitrogen dioxide are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets. Both of these objectives apply at the residential properties modelled within the assessment.

3 Assessment Methodology

Modelling Methodology

- 3.1 Concentrations have been predicted using the ADMS-Roads dispersion model, with vehicle emissions derived using Defra's Emission Factor Toolkit (EFT) (v9.0) (Defra, 2020). Details of the model inputs, assumptions and the verification are provided in Appendix A2, together with the method used to derive background concentrations. Where assumptions have been made, a realistic worst-case approach has been adopted.
- 3.2 Concentrations have been predicted at thirty-two sensitive receptors throughout Hawkhurst, which are shown in Figure 1, and described in Table 2. Receptor heights have been modelled to represent ground floor exposure, unless stated otherwise in Table 2. Concentrations have also been modelled at the monitoring sites in Hawkhurst, detailed further in Section 4.

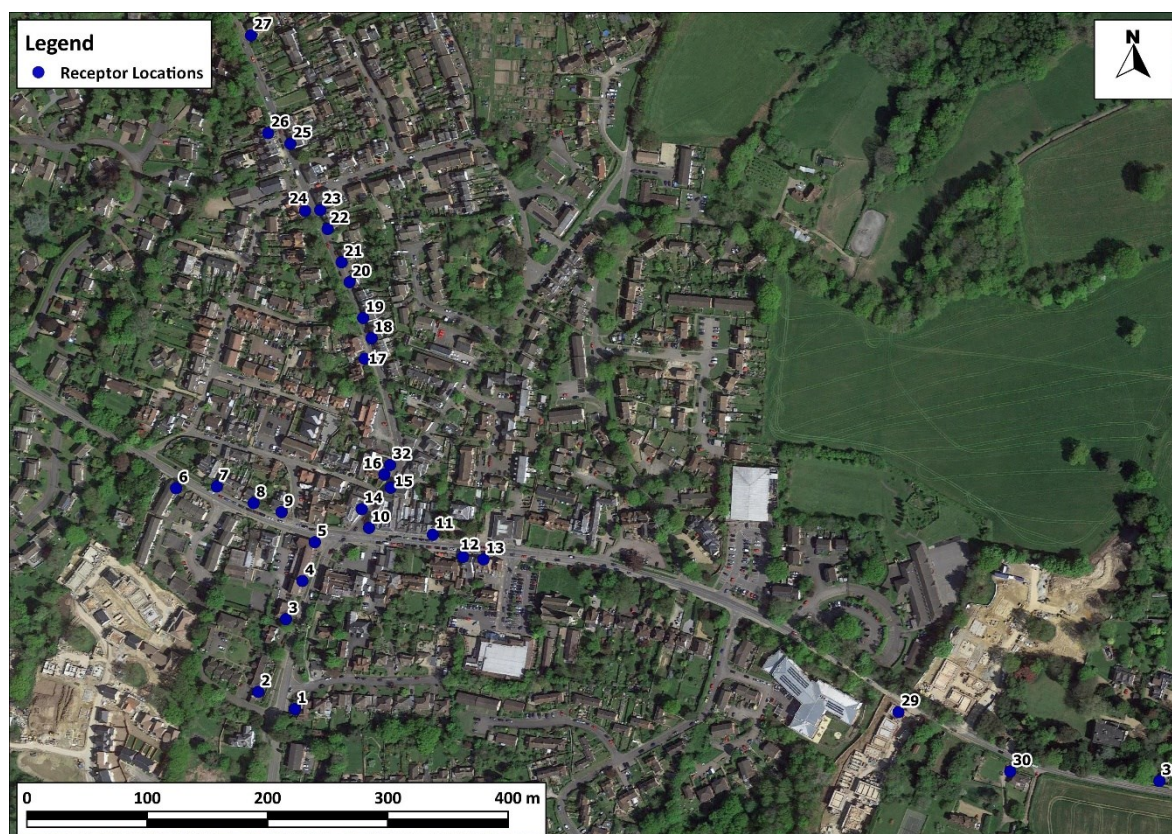


Figure 1: Receptor Locations

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Table 2: Description of Receptor Locations

Receptor	Modelled Heights	Description
Receptor 1	1.5	Residential property on Highgate Hill
Receptor 2	1.5	Residential property on Highgate Hill
Receptor 3 ^a	3.5	Residential property on Highgate Hill
Receptor 4 ^a	6	Residential property on Highgate Hill
Receptor 5 ^a	4.5	Residential property on High Street
Receptor 6	1.5	Residential property on High Street
Receptor 7	1.5	Residential property on High Street
Receptor 8	1.5	Residential property on High Street
Receptor 9	1.5	Residential property on High Street
Receptor 10 ^a	4.5	Residential property on Rye Road
Receptor 11 ^a	4.5	Residential property on Rye Road
Receptor 12 ^a	4.5	Residential property on Rye Road
Receptor 13 ^a	4.5	Residential property on Rye Road
Receptor 14 ^b	0.1, 1.5	Residential property on Cranbrook Road
Receptor 15 ^a	4.5	Residential property on Cranbrook Road
Receptor 16	1.5	Residential property on Cranbrook Road
Receptor 17	1.5	Residential property on Cranbrook Road
Receptor 18	1.5	Residential property on Cranbrook Road
Receptor 19	1.5	Residential property on Cranbrook Road
Receptor 20	1.5	Residential property on Cranbrook Road
Receptor 21	1.5	Residential property on Cranbrook Road
Receptor 22	1.5	Residential property on Cranbrook Road
Receptor 23 ^c	1	Residential property on Cranbrook Road
Receptor 24	1.5	Residential property on Cranbrook Road
Receptor 25 ^c	1	Residential property on Cranbrook Road
Receptor 26	1.5	Residential property on Cranbrook Road
Receptor 27	1.5	Residential property on Cranbrook Road
Receptor 28	1.5	Residential property on Cranbrook Road
Receptor 29	1.5	Residential property on Rye Road
Receptor 30	1.5	Residential property on Rye Road
Receptor 31	1.5	Residential property on Rye Road
Receptor 32	1.5	Residential property on Cranbrook Road

^a Receptors modelled at an elevated height representative of the lowest floor of residential exposure, either due to there being no exposure at ground level, or the ground level being raised above that of the road.

^b Receptor modelled at 0.1 m height to represent exposure at the window of a basement flat.

^c Receptor modelled at 1 m height due to ground level at the property being lower than that of the road.

Uncertainty

- 3.3 There are many components that contribute to the uncertainty of modelling predictions.
- 3.4 The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. The traffic data used in the assessment has been sourced from the Department of Transport website (DfT, 2020), and any uncertainties inherent in these data will carry into the assessment.
- 3.5 There are then additional uncertainties as models are required to simplify real-world conditions into a series of algorithms. An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix A2). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of 2019 concentrations. LAQM.TG16 (Defra, 2018a) provides guidance on the evaluation of model performance; based on the analysis shown in Table A2.2 in Appendix A2, the model performance is considered to be good.
- 3.6 All of the measured concentrations presented will also have an intrinsic margin of error which will also have been carried into the results of the modelling. These margins of error may be inflated at diffusion tubes TW66, TW67, TW68, TW69 and TW70 due to seven months or fewer of measured data being captured, requiring annualisation to be undertaken (see Section 4 and Appendix A3 for further details).

4 Results

Monitoring Results

- 4.1 Tunbridge Wells Borough Council operated six nitrogen dioxide monitoring sites in Hawkhurst during at least some of 2019 using diffusion tubes prepared and analysed by ESG Didcot (using the 50% TEA in acetone method). The monitoring sites are shown in Figure 2, with monitoring results for recent years presented in Table 3.
- 4.2 Monitoring site 63 is the only one that operated for every month of 2019; additional tubes were deployed in August 2019 due to elevated concentrations being measured at site 63. Measurements from these additional tubes for the period 9th August 2019 to 4th March 2020 have been annualised to 2019 annual mean concentrations following the approach recommended in LAQM.TG16 (Defra, 2018a).
- 4.3 Measured annual mean concentrations were above the objective in 2019 at two sites (sites 63 and 69), both located along Cranbrook Road close to the junction with Rye Road. Concentrations further north along Cranbrook Road (at site 70) are below the objective, but only marginally so. Concentrations on Rye Road (site 66) are considerably lower and well below the objective. The site on Highgate Hill (site 67) is also below the objective.



Figure 2: Monitoring Locations

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Table 3: Measured Annual Mean Nitrogen Dioxide Concentrations ($\mu\text{g}/\text{m}^3$)^a

Site Name	Site Type	Location	2018	2019
TW63	Roadside	Cranbrook Road, Hawkhurst	52.4	52.7
TW66	Roadside	Rye Road, Hawkhurst	-	26.2 ^b
TW67	Roadside	Highgate Hill, Hawkhurst	-	35.9 ^b
TW68	Roadside	Cranbrook Road, Hawkhurst	-	38.1 ^b
TW69	Roadside	Cranbrook Road, Hawkhurst	-	45.3 ^b
TW70	Roadside	Cranbrook Road, Hawkhurst	-	37.7 ^b
Objective			40	

^a Exceedances of the objectives are shown in bold.

^b Results have been annualised (see Appendix A3).

Modelling Results

- 4.4 The modelled 2019 annual mean nitrogen dioxide concentrations at the selected receptors are presented in Table 4 and Figure 3.

Table 4: Modelled Annual Mean Nitrogen Dioxide Concentrations in 2019 ($\mu\text{g}/\text{m}^3$)^a

Receptor	Height	Modelled Annual Mean Nitrogen Dioxide Concentration ($\mu\text{g}/\text{m}^3$)
Receptor 1	1.5	15.9
Receptor 2	1.5	13.4
Receptor 3	3.5	12.6
Receptor 4	6	27.5
Receptor 5	4.5	23.7
Receptor 6	1.5	13.2
Receptor 7	1.5	17.7
Receptor 8	1.5	16.9
Receptor 9	1.5	20.2
Receptor 10	4.5	19.0
Receptor 11	4.5	19.5
Receptor 12	4.5	20.1
Receptor 13	4.5	15.9
Receptor 14	0.1	56.6
Receptor 14	1.5	54.6
Receptor 15	4.5	35.8
Receptor 16	1.5	46.3
Receptor 17	1.5	34.9

Receptor	Height	Modelled Annual Mean Nitrogen Dioxide Concentration ($\mu\text{g}/\text{m}^3$)
Receptor 18	1.5	36.0
Receptor 19	1.5	40.6
Receptor 20	1.5	40.1
Receptor 21	1.5	39.8
Receptor 22	1.5	31.1
Receptor 23	1	31.1
Receptor 24	1.5	32.5
Receptor 25	1	26.2
Receptor 26	1.5	24.6
Receptor 27	1.5	16.9
Receptor 28	1.5	20.2
Receptor 29	1.5	15.9
Receptor 30	1.5	15.6
Receptor 31	1.5	18.2
Receptor 32	1.5	29.2

^a Exceedances of the annual mean objective are shown in bold.



Figure 3: Modelled Annual Mean Nitrogen Dioxide Concentrations in 2019 ($\mu\text{g}/\text{m}^3$)

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- 4.5 The results show exceedances of the annual mean nitrogen dioxide objective at receptors 14 and 16 on Cranbrook Road, close to the junction with Rye Road, as well as at receptors 19 and 20 further north along Cranbrook Road. All other receptors have modelled concentrations below $40 \mu\text{g}/\text{m}^3$; however, this does not necessarily mean that there is no risk of exceedances at those receptors with concentrations approaching the objective, as the model is a predictive tool with associated uncertainties. A pragmatic and conservative approach to AQMA declaration that takes into account some of these uncertainties is discussed in Section 5.
- 4.6 There are no modelled concentrations over $60 \mu\text{g}/\text{m}^3$ and therefore the 1-hour nitrogen dioxide objective is unlikely to be exceeded.
- 4.7 The use of an average verification factor (see Appendix A2) necessarily means that the model will predict slightly different concentrations at monitoring sites than those that were measured (although the differences will broadly average out across all sites). It is useful to identify where this effect has been especially pronounced, and thus where modelled concentrations may have been over or under-predicted by a discernible amount.
- 4.8 The modelled concentration at receptor 18 ($36.0 \mu\text{g}/\text{m}^3$) is likely to represent an under-prediction, as this receptor is adjacent to, and lower in height than, TW70, which measured a concentration of $37.7 \mu\text{g}/\text{m}^3$. This under-prediction may also suggest that concentrations at other receptors along Cranbrook Road in a similar setting to receptor 18 and TW70 (i.e. in a canyon-like section with a notable gradient) may also be under-predicted somewhat. Thus, in determining the potential area of an AQMA, consideration should be given to the fact that concentrations at receptors 17 to 27 may in reality be slightly higher than modelled.
- 4.9 Similarly, while the verified model has predicted the concentration at monitoring site TW69 reasonably accurately (to within $1 \mu\text{g}/\text{m}^3$ of that measured), it has over-predicted the concentration at TW68 by more than $7 \mu\text{g}/\text{m}^3$ and under-predicted that at TW63 by more than $5 \mu\text{g}/\text{m}^3$. As a result, it would be reasonable to conclude that the concentration at the first-floor level receptor 15 may have been under-predicted, and that at receptor 14 may have been over-predicted. Such over and under-predictions are unavoidable as a dispersion model cannot accurately reflect every element of the very complex setting of Cranbrook Road, with its multiple canyon-like sections with varying widths, heights and gaps in matters of metres.
- 4.10 Concentrations at receptor 32 are significantly lower than those at receptor 16, which is located on opposite corners of the same residential property. This is due to the property being located on the edge of a street canyon. Receptor 16 is located within a very enclosed modelled street canyon, whereas receptor 32 is located opposite a far more open section of road. A substantial difference in concentrations between these two locations might reasonably be expected in the real world, although it may not be as great as that modelled.

5 Source Apportionment

- 5.1 In order to develop appropriate measures to improve air quality along Cranbrook Road and inform the action plan, it is necessary to identify the sources contributing to the objective exceedances within the study area. Source apportioned nitrogen dioxide concentrations have been calculated taking account of the different proportions of emissions emitted by different vehicle types. The percentage of emissions associated with each vehicle type is not only dependant on the emission rate from the vehicles, but also the local environment, with characteristics such as gradient also affecting emissions disproportionately from different vehicle types. The different proportions have been calculated in-line with guidance provided in Box 7.5 of LAQM.TG16 (Defra, 2020).
- 5.2 The following categories have been included in the source apportionment:
- Regional background;
 - Local background;
 - Cars;
 - Lights Good Vehicles (LGV);
 - Buses and Coaches;
 - Rigid Heavy Goods Vehicles (HGVs);
 - Artic HGVs; and
 - Motorcycles.
- 5.3 Table 5 and Figure 4 show the contribution from each of the different categories to total predicted annual mean nitrogen dioxide concentrations at receptors where exceedances were predicted; at the top of Cranbrook Road close to the A268 junction (receptors 14 and 16), and on a steeper section of Cranbrook Road further from the A268 (receptors 19 and 20).
- 5.4 Table 6 and Figure 5 show the percentage contributions of each category to total predicted annual mean nitrogen dioxide concentrations. At all receptors where exceedances are predicted, the largest proportion of the overall concentration is caused by cars (34-35%), followed by LGVs (24%), and Rigid HGVs (13-17%). Background concentrations are predominately from regional sources (72%), rather than local sources (28%), however background emissions only contribute as a relatively small proportion of the overall nitrogen dioxide concentrations (15-21%).

Table 5: Contributions of Different Sources to Total Predicted Annual Mean Nitrogen Dioxide Concentrations ($\mu\text{g}/\text{m}^3$) in 2019

Receptor	Annual Mean Contribution ($\mu\text{g}/\text{m}^3$)							
	Regional Background	Local Background	Car	Motorcycle	LGV	Rigid HGV	Artic HGV	Buses and Coaches
Receptor 14^a	5.9	2.3	19.8	0.04	13.7	9.4	3.3	2.1
Receptor 16	5.9	2.3	16.9	0.04	11.7	8.0	2.8	1.8
Receptor 19	5.9	2.3	14.2	0.03	9.7	5.3	2.0	1.1
Receptor 20	5.9	2.3	14.0	0.03	9.6	5.2	2.0	1.1
Objective	40							

^a Only data for the receptor modelled at a height of 0.1 m presented.

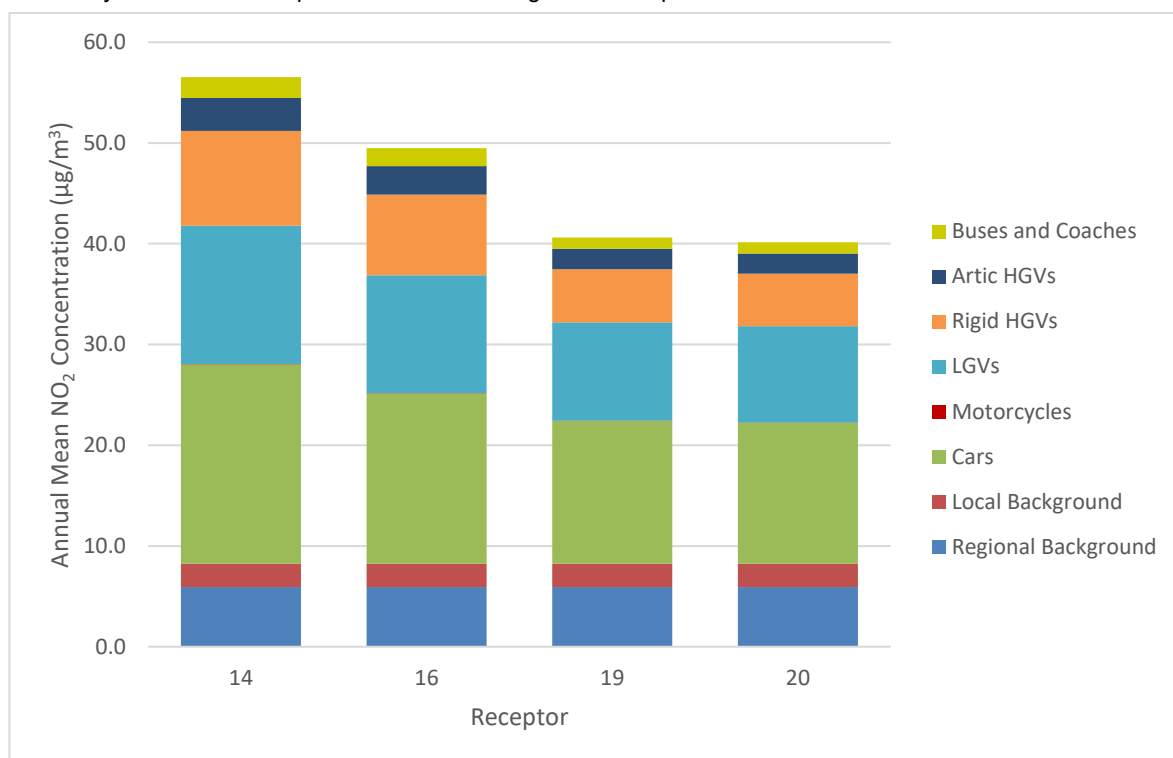


Figure 4: Contributions of Different Sources to Total Predicted Annual Mean Nitrogen Dioxide Concentration ($\mu\text{g}/\text{m}^3$) at Receptors Exceeding the Air Quality Objective in 2019

Table 6: Percentage Contributions of Different Sources to Total Predicted Annual Mean Nitrogen Dioxide Concentrations ($\mu\text{g}/\text{m}^3$) in 2019

Receptor	Annual Mean Contribution ($\mu\text{g}/\text{m}^3$)							
	Regional Background	Local Background	Car	Motorcycle	LGV	Rigid HGV	Artic HGV	Buses and Coaches
Receptor 14^a	10.5	4.1	35.0	0.1	24.2	16.6	5.8	3.7
Receptor 16	11.9	4.7	34.2	0.1	23.6	16.2	5.7	3.6
Receptor 19	14.5	5.7	34.9	0.1	24.0	13.0	5.0	2.8
Receptor 20	14.7	5.8	34.8	0.1	23.9	13.0	5.0	2.8

^a Only data for the receptor modelled at a height of 0.1 m presented.

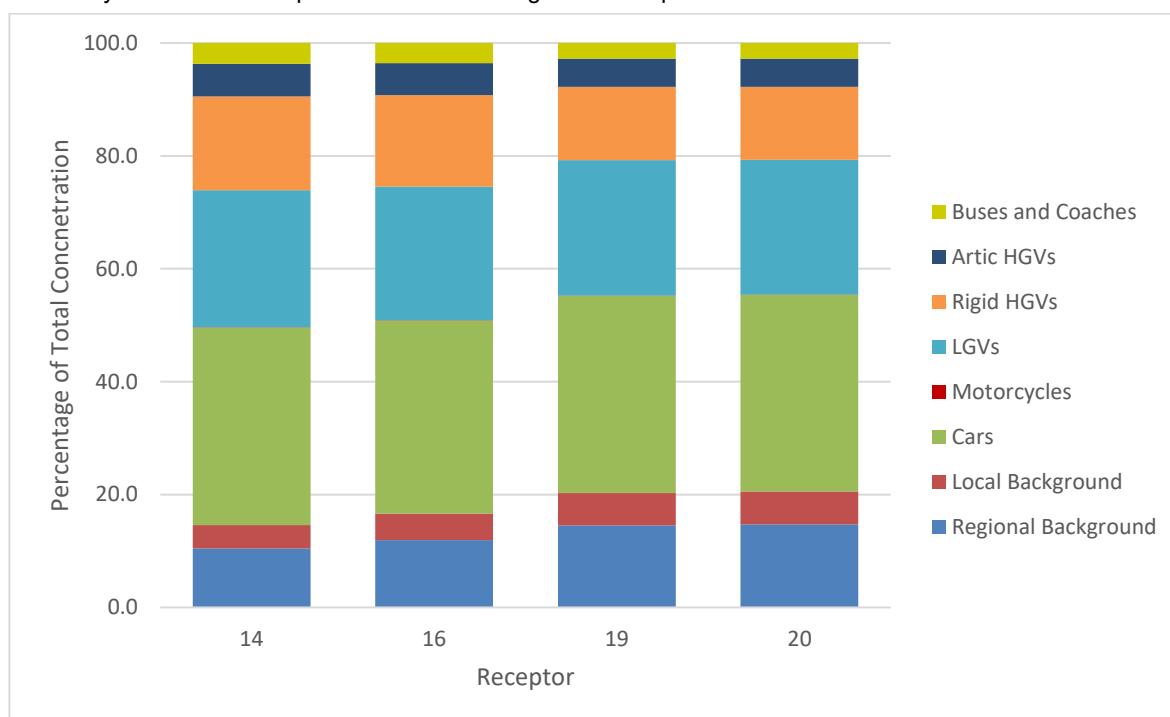


Figure 5: Percentage Contributions of Different Sources to Total Predicted Annual Mean Nitrogen Dioxide Concentrations ($\mu\text{g}/\text{m}^3$) at Receptors Exceeding the Air Quality Objective in 2019

6 Discussion and Recommendations

- 6.1 The modelling undertaken by AQC has shown there are predicted to be exceedances of the annual mean nitrogen dioxide objective in Hawkhurst, and as a result, an Air Quality Management Area should be declared. This section details the specific locations which could be covered by this declaration.
- 6.2 Figure 6 provides a recommendation for the properties that could be included within the Hawkhurst AQMA. The properties which lie within the red areas on Figure 6 are those at which receptors representative of them have modelled concentrations of over 40 $\mu\text{g}/\text{m}^3$, and therefore should be included within the AQMA. The properties within the blue areas are those which are judged to have a reasonable likelihood of an exceedance when the model uncertainties (such as those discussed in Paragraphs 4.6 to 4.9) are taken into account. These need not necessarily be included within the AQMA, but given the relative likelihood of exceedances at them, it would be pragmatic to take the conservative approach of including them.
- 6.3 It should, however, also be noted that progressive improvements in vehicle emissions, and a transition away from diesel vehicles and towards zero tailpipe emission vehicles is expected to lead to reduced nitrogen dioxide concentrations in future years (DfT, 2018). It is, therefore, reasonable to expect concentrations to reduce from those measured and modelled in 2019 in the coming years, more rapidly than they have in previous years. This should also be taken into account when deciding whether the properties within the blue areas on Figure 6 need be included in the AQMA, as they are unlikely to experience objective exceedances much beyond 2019.
- 6.4 In order to develop appropriate measures to improve air quality along Cranbrook Road and inform the action plan, source apportioned nitrogen dioxide concentrations have been calculated taking account of the different proportions of emissions emitted by different vehicle types. At all receptors where exceedances are predicted, the largest proportion of the overall concentration is caused by cars (34-35%), followed by LGVs (24%), and Rigid HGVs (13-17%).
- 6.5 The areas presented in Figure 6 will be provided to TWBC in the form of a GIS shapefile. Modelled receptor locations can also be provided in this format, or as a text file, if desired.



Figure 6: Recommendation for the Hawkhurst AQMA

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7 References

COMEAP (2018) *Associations of long-term average concentrations of nitrogen dioxide with mortality*.

Defra (2007) *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland*, Defra.

Defra (2018a) *Review & Assessment: Technical Guidance LAQM.TG16 February 2018 Version*, Defra, Available: <https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf>.

Defra (2018b) *Local Air Quality Management (LAQM) Support Website*, [Online], Available: <http://laqm.defra.gov.uk/>.

Defra (2018c) *Review & Assessment: Technical Guidance LAQM.TG16 February 2018 Version*, Defra, Available: <https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf>.

Defra (2019a) *Clean Air Strategy 2019*, Available: <https://www.gov.uk/government/publications/clean-air-strategy-2019>.

Defra (2020) *Local Air Quality Management (LAQM) Support Website*, Available: <http://laqm.defra.gov.uk/>.

DfT (2018) *The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy*.

DfT (2019) *DfT Road traffic statistics (TRA03)*, Available: <https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra>.

DfT (2020) *Annual Average Daily Flows*, [Online], Available: <http://www.dft.gov.uk/matrix/>.

The Air Quality (England) (Amendment) Regulations, 2002, Statutory Instrument 3043 (2002), HMSO.

The Air Quality (England) Regulations, 2000, Statutory Instrument 928 (2000), HMSO.

8 Glossary

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System model for Roads
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EFT	Emission Factor Toolkit
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HMSO	Her Majesty's Stationery Office
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
kph	Kilometres Per hour
LAQM	Local Air Quality Management
LGV	Light Goods Vehicle
µg/m³	Microgrammes per cubic metre
NO	Nitric oxide
NO₂	Nitrogen dioxide
NO_x	Nitrogen oxides (taken to be NO ₂ + NO)
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TEA	Triethanolamine – used to absorb nitrogen dioxide
TWBC	Tunbridge Wells Borough Council

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A1 Professional Experience

Dr Clare Beattie, BSc (Hons) MSc PhD CSci MEnvSc MIAQM

Dr Beattie is an Associate Director with AQC, with more than 20 years' relevant experience. She has been involved in air quality management and assessment, and policy formulation in both an academic and consultancy environment. She has prepared air quality review and assessment reports, strategies and action plans for local authorities and has developed guidance documents on air quality management on behalf of central government, local government and NGOs. She has led on the air quality inputs into Clean Air Zone feasibility studies and has provided support to local authorities on the integration of air quality considerations into Local Transport Plans and planning policy processes. Dr Beattie has appraised local authority air quality assessments on behalf of the UK governments, and provided support to the Review and Assessment helpdesk. She has carried out numerous assessments for new residential and commercial developments, including the negotiation of mitigation measures where relevant. She has also acted as an expert witness for both residential and commercial developments. She has carried out BREEAM assessments covering air quality for new developments. Dr Beattie has also managed contracts on behalf of Defra in relation to allocating funding for the implementation of air quality improvement measures. She is a Member of the IAQM and IES and is a Chartered Scientist.

Ricky Gellatly, BSc (Hons) CSci MEnvSc MIAQM

Mr Gellatly is a Principal Consultant with AQC with over eight years' relevant experience. He has undertaken air quality assessments for a wide range of projects, assessing many different pollution sources using both qualitative and quantitative methodologies, with most assessments having included dispersion modelling (using a variety of models). He has assessed road schemes, airports, energy from waste facilities, anaerobic digesters, poultry farms, urban extensions, rail freight interchanges, energy centres, waste handling sites, sewage works and shopping and sports centres, amongst others. He also has experience in ambient air quality monitoring, the analysis and interpretation of air quality monitoring data, the monitoring and assessment of nuisance odours and the monitoring and assessment of construction dust. He is a Member of the IAQM and is a Chartered Scientist.

David Bailey, BSc (Hons)

Mr Bailey is a Consultant with AQC, having joined the Company in 2018. Prior to joining AQC he gained a degree in Environmental Science from the University of Brighton, where his studies included modules focused on Air Quality Management. He is now gaining experience in air quality and greenhouse gas assessments, with the use of the ADMS-Roads and ADMS-5 dispersion modelling software. The use of modelling has been used in a wide variety of schemes ranging from large residential EIA developments, and detailed assessments for Local Authorities, to assessing the

impacts of gas power generation and agricultural facilities. In addition, he has also gained experience in diffusion tube and automatic monitoring, including data ratification.

A2 Modelling Methodology

Model Inputs

- A2.1 Predictions have been carried out using the ADMS-Roads dispersion model (v4.1). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width, street canyon width, street canyon height and porosity, where applicable). Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 9.0) published by Defra (2020). Road gradients have also been included within the emissions calculations.
- A2.2 Hourly sequential meteorological data from Herstmonceux for 2019 have been used in the model, which is considered suitable for this area.
- A2.3 AADT flows and fleet composition data have been determined from the interactive web-based map provided by DfT (2020). DfT flows for the most recent year available, 2018, were used; it was not considered necessary to adjust the flows to 2019 as there would be very little difference between flows in the two years, and any adjustment would be consistent along all links and thus unlikely to affect the model outcomes. The traffic data used in this assessment are summarised in Table A2.1.

Table A2.1: Summary of Traffic Data used in the Assessment (AADT Flows)

Road Link	AADT	%Car	%LGV	%Rigid HGV	%Artic HGV	%Bus and Coach	%Motor cycle
Cranbrook Road	8,680	74.7	19.6	3.5	1.3	0.4	0.5
Highgate Hill	8,732	72.1	22.5	2.9	1.1	0.6	0.8
A268 (Rye Road/ High Street)	6,638	77.1	17.4	2.4	1.5	1.3	0.3

- A2.4 Traffic speeds have been estimated based on professional judgement, taking account of the road layout, speed limits and the proximity to a junction. Diurnal and monthly flow profiles for the traffic have been derived from the national profiles published by DfT (2019).
- A2.5 Figure A2.1 shows the road network included within the model, including the speed that each link was modelled, and defines the study area. The modelled street canyons are shown in Figure A2.2.

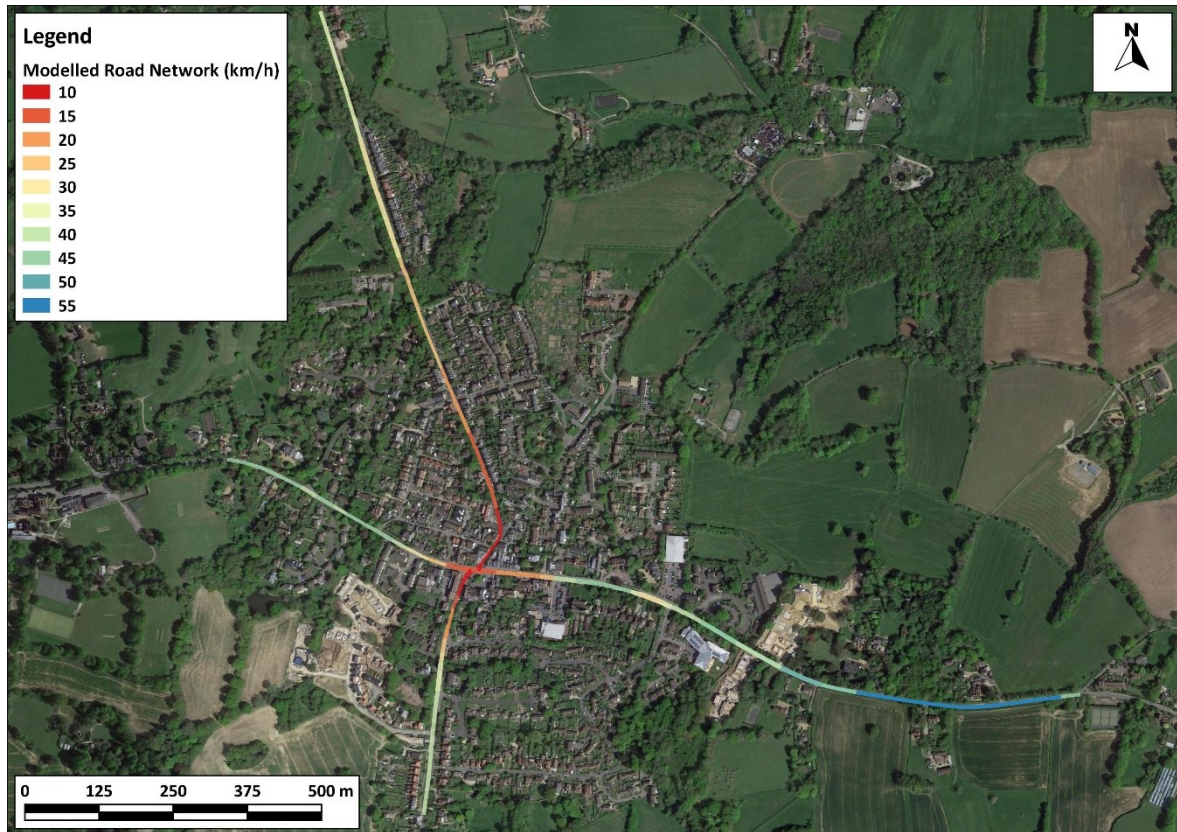


Figure A2.1: Modelled Road Network & Speed

Imagery © Google.



Figure A2.2: Modelled Street Canyons

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Background Concentrations

- A2.6 Background pollutant concentrations have been defined using the 2017-based national pollution maps published by Defra (2020). These cover the whole of the UK on a 1x1 km grid and are published for each year from 2017 until 2030. While the model domain extended across more than one of the background map grid squares, annual mean background nitrogen dioxide concentrations in these squares were all very similar, and it was decided to use a consistent value at all receptors; the value selected was that of the square covering central Hawkhurst, which was also the highest of all of the squares within which receptors were located. The 2019 annual mean background nitrogen dioxide concentration used was 8.24 $\mu\text{g}/\text{m}^3$.

Model Verification

- A2.7 Most nitrogen dioxide (NO_2) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides ($\text{NO}_x = \text{NO} + \text{NO}_2$). The model has been run to predict the annual mean NO_x concentrations during 2019 at the TW63, TW66, TW67, TW68, TW69, TW70 diffusion tube

monitoring sites. Concentrations have been modelled at 1.8 m at TW63 and 2 m at the other sites, as advised by TWBC.

- A2.8 The model output of road-NO_x (i.e. the component of total NO_x coming from road traffic) has been compared with the 'measured' road-NO_x. Measured road-NO_x has been calculated from the measured NO₂ concentrations and the predicted background NO₂ concentration using the NO_x from NO₂ calculator (Version 7.1) available on the Defra LAQM Support website (Defra, 2020).
- A2.9 The unadjusted model has under predicted the road-NO_x contribution; this is a common experience with this and most other road traffic emissions dispersion models. An adjustment factor has been determined as the slope of the best-fit line between the 'measured' road contribution and the model derived road contribution, forced through zero (Figure A2.3). The calculated adjustment factor of 1.402 has been applied to the modelled road-NO_x concentration for each receptor to provide adjusted modelled road-NO_x concentrations.
- A2.10 The total nitrogen dioxide concentrations have then been determined by combining the adjusted modelled road-NO_x concentrations with the predicted background NO₂ concentration within the NO_x to NO₂ calculator. Figure A2.4 compares final adjusted modelled total NO₂ at each of the monitoring sites to measured total NO₂, and shows a close agreement.

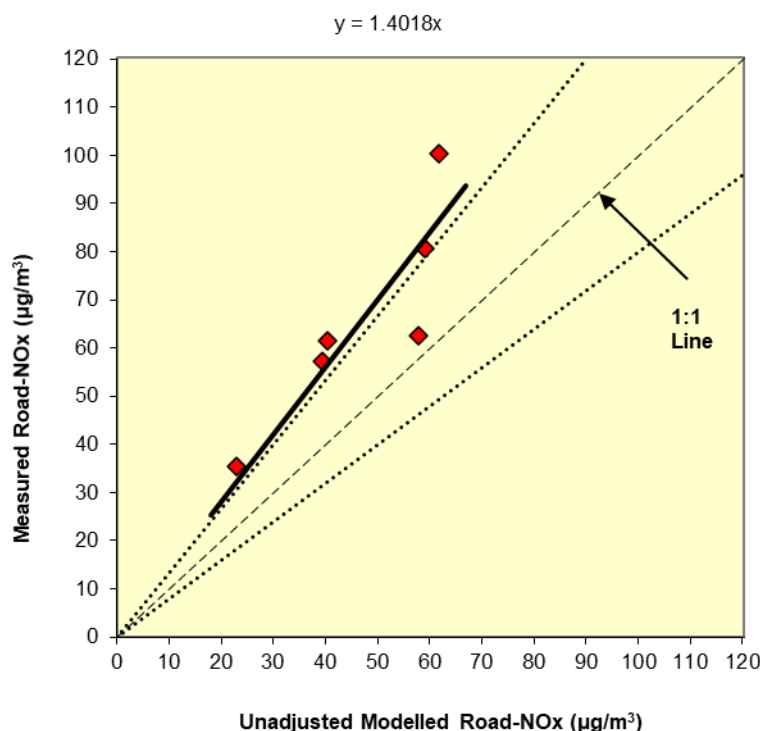


Figure A2.3: Comparison of Measured Road NO_x to Unadjusted Modelled Road NO_x Concentrations. The dashed lines show $\pm 25\%$.

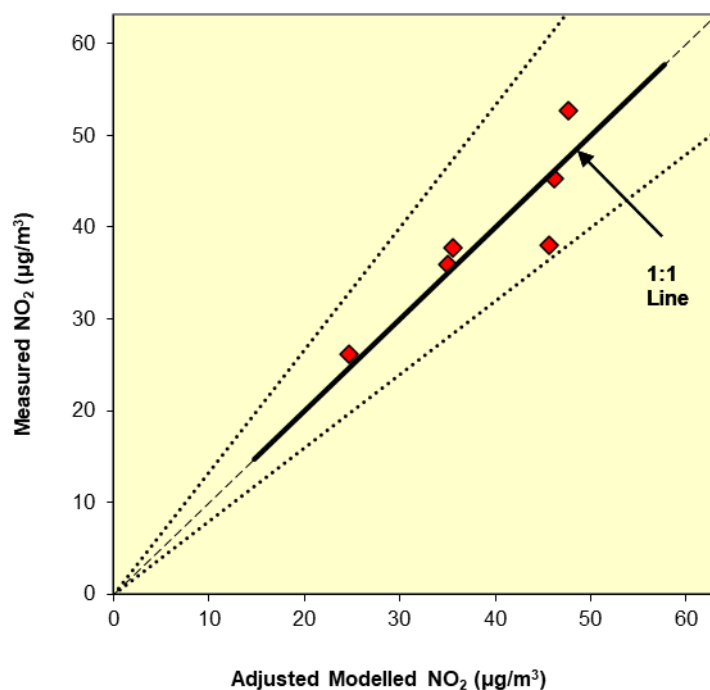


Figure A2.4: Comparison of Measured Total NO₂ to Final Adjusted Modelled Total NO₂ Concentrations. The dashed lines show $\pm 25\%$.

2.10.1 Table A2.2 presents the statistical parameters relating to the performance of the model, as well as the 'ideal' values (Defra, 2018c). The values calculated for the model demonstrate that it is performing well.

Table A2.2: Statistical Model Performance

Statistical Parameter	Model-Specific Value	'Ideal' Value
Correlation Coefficient ^a	0.89	1
Root Mean Square Error (RMSE) ^b	3.86	0
Fractional Bias ^c	0.00	0

^a Used to measure the linear relationship between predicted and observed data. A value of zero means no relationship and a value of 1 means absolute relationship.

^b Used to define the average error or uncertainty of the model. The units of RMSE are the same as the quantities compared (i.e. $\mu\text{g}/\text{m}^3$). TG16 (Defra, 2018a) outlines that, ideally, a RMSE value within 10% of the air quality objective ($4\mu\text{g}/\text{m}^3$) would be derived. If RMSE values are higher than 25% of the objective ($10\mu\text{g}/\text{m}^3$) it is recommended that the model is revisited.

^c Used to identify if the model shows a systematic tendency to over or under predict. Negative values suggest a model over-prediction and positive values suggest a model under-prediction.

Model Post-processing

- A2.11 The model predicts road-NO_x concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background NO₂ concentration, has been processed through the NO_x to NO₂ calculator available on the Defra LAQM Support website (Defra, 2018b). The traffic mix within the calculator has been set to “All other urban UK traffic”, which is considered suitable for the study area. The calculator predicts the component of NO₂ based on the adjusted road-NO_x and the background NO₂.

A3 Adjustment of Monitoring Data to Annual Mean

Calculating Annualisation Factors

- A3.1 Diffusion tube monitoring sites have been annualised as per Technical Guidance LAQM.TG16 (Defra, 2018a) in instances where valid data capture was less than 75% (and at least 25%).
- A3.2 Sites TW66, TW67, TW68, TW69, and TW70 have been annualised against automatic monitoring sites operated by TWBC at 'Swale Newington', 'Swale Ospringe', 'Swale St Pauls Street', and 'Tunbridge Wells A26'. These sites are considered to have the most appropriate annual profile with which to annualise the data, and also have over 85% data capture in 2019.
- A3.3 Four adjustment factors (one for each of the automatic sites used) have been calculated for each diffusion tube site based on the ratio of the mean concentration measured by the automatic sites during the monitoring period for which data for the diffusion tube site was available and annual mean concentrations measured by the automatic sites (see Table A3.1, Table A3.2, and Table A3.3). An average of the four adjustment factors was then calculated (see Table A3.4) and applied to the diffusion tube bias adjusted annual means.

Table A3.1: TW66 Annualisation Factor Calculation

Period	Exposure Days	Raw Diffusion Tube Mean NO ₂ Conc. (µg/m ³)	Automatic Mean NO ₂ Conc. (µg/m ³) when Diffusion Tube Data is Available			
		TW66	Swale Newington	Swale Ospringe	Swale St Pauls Street	Tunbridge Wells A26
02/09/19 to 30/09/19	28.0	32.4	22.1	28.0	31.7	30.5
30/09/19 to 07/11/19	37.9	32.8	24.2	29.7	36.7	29.6
07/11/19 to 02/12/19	25.1	36.8	34.8	34.8	45.8	38.6
PERIOD MEAN		33.8	26.5	30.6	37.7	32.3
ANNUAL MEAN:			26.9	31.4	39.0	34.4
ANNUALISATION FACTOR:			1.015	1.025	1.036	1.064

Table A3.2: TW67, TW69, TW70 Annualisation Factor Calculations

Period	Exposure Days	Raw Diffusion Tube Mean NO ₂ Conc. (µg/m ³)			Automatic Mean NO ₂ Conc. (µg/m ³) when Diffusion Tube Data is Available			
		TW67	TW69	TW70	Swale Newington	Swale Ospringe	Swale St Pauls Street	Tunbridge Wells A26
09/08/19 to 02/09/19	23.9	43.5	56.5	56.8	21.1	26.8	35.0	28.4
02/09/19 to 30/09/19	28.0	41.4	49.8	45	22.1	28.0	31.7	30.5
30/09/19 to 07/11/19	37.9	50	52.1	49.4	24.2	29.7	36.7	29.6
07/11/19 to 02/12/19	25.1	47.3	58	51.7	34.8	34.8	45.8	38.6
02/12/19 to 07/01/20	35.9	47.1	59.4	43.9	23.9	27.7	37.6	31.0
07/01/20 to 05/02/20	29.0	33.4	56.7	43.7	24.3	29.1	37.7	32.9
05/02/20 to 04/03/2020	27.8	39.1	51.9	30.7	17.8	22.9	32.1	26.1
PERIOD MEAN		43.5	54.9	45.7	23.9	28.4	36.6	30.9
ANNUAL MEAN:					26.9	31.4	39.0	34.4
ANNUALISATION FACTOR:					1.122	1.104	1.065	1.113

Table A3.3: TW68 Annualisation Factor Calculation

Period	Exposure Days	Raw Diffusion Tube Mean NO ₂ Conc. (µg/m ³)	Automatic Mean NO ₂ Conc. (µg/m ³) when Diffusion Tube Data is Available			
		TW68	Swale Newington	Swale Ospringe	Swale St Pauls Street	Tunbridge Wells A26
09/08/19 to 02/09/19	23.9	49.6	21.1	26.8	35.0	28.4
02/09/19 to 30/09/19	28.0	44.1	22.1	28.0	31.7	30.5
30/09/19 to 07/11/19	37.9	45.5	24.2	29.7	36.7	29.6
07/11/19 to 02/12/19	25.1	50.0	34.8	34.8	45.8	38.6
02/12/19 to 07/01/20	35.9	49.4	23.9	27.7	37.6	31.0
07/01/20 to 05/02/20	29.0	46.7	24.3	29.1	37.7	32.9
PERIOD MEAN		47.4	24.9	29.3	37.3	31.7
ANNUAL MEAN:			26.9	31.4	39.0	34.4
ANNUALISATION FACTOR:			1.079	1.072	1.045	1.087

Table A3.4: Average Annualisation Factors

TW66	TW67	TW68	TW69	TW70
1.035	1.101	1.071	1.101	1.101

Bias Adjustment

- A3.4 Diffusion tubes are known to exhibit bias when compared to results from automatic analysers. Therefore diffusion tube results need to be adjusted to account for this bias. One of the main factors influencing diffusion tube performance is the laboratory that supplies and analyses the tubes. The diffusion tubes exposed at Hawkhurst are supplied and analysed by SOCOTEC Didcot. (50% TEA in acetone). Defra releases national bias adjustment factors from co-location studies undertaken by local authorities around the UK. The bias adjustment factor used to obtain the final 2019 concentrations at all diffusion tubes in Hawkhurst was 0.75 (based on 24 studies), available from the spreadsheet released in April 2020 by Defra (Defra, 2020b). This bias adjustment factor was applied to all the 2019 annual means, whether annualised or not.

Appendix E: Modelling of Future Air Quality in Hawkhurst

This section provides a copy of a report produced for Tunbridge Wells Borough Council by Air Quality Consultants (AQC) Ltd. This report follows on from the detailed assessment undertaken by AQC Ltd in 2020. The conclusion of the DA was that a small AQMA should be declared in Hawkhurst. TWBC has agreed to declare an AQMA, however, this has been delayed due to extraordinary demands on officers' time as a result of the COVID pandemic. Officers do have strong reservations about the quality of the data used for the modelling, but it was the only data available at the time, and it was recognised that data in 2020 would be affected by COVID. On balance it was felt better to undertake modelling on potentially unreliable data than to wait for more reliable data, unaffected by COVID, which was unlikely to be available before the end of 2022.

The report below was commissioned because of a significant number of planning applications potentially coming forward in the Hawkhurst area. It considers the long term downward trend in pollution levels which is occurring both locally and nationally. As a result of this reduction in pollution levels, it is recognised that a certain amount of development can go ahead with no net worsening of air quality. The report attempts to quantify this amount, based on when in it scheduled, taking account of this ongoing trend in future years.



Air Quality Modelling: Future Air Quality in Hawkhurst

June 2020



Experts in air quality
management & assessment

Document Control

Client	Tunbridge Wells Borough Council	Principal Contact	Dr Stuart Maxwell
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Job Number	J4114
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Report Prepared By:	David Bailey & Ricky Gellatly
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Document Status and Review Schedule

Report No.	Date	Status	Reviewed by
J4114B/1/F1	25 June 2020	Final	Dr Clare Beattie (Associate Director)

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Executive Summary

The air quality impacts associated with potential additional traffic on Cranbrook Road in Hawkhurst as a result of developments in the local area over the course of the years 2020 to 2027 have been assessed. The assessment has been produced to assist Tunbridge Wells Borough Council's planning department in determining the likely impacts of developments on air quality within Hawkhurst, so that they can determine what level of development is sustainable without significant air quality impacts.

It is understood that most of the developments proposed in the area are residential, thus the assessment has focussed on the impacts of car trips, rather than heavier vehicles, which will have a larger impact on air quality; its results and recommendations should not be used to consider the impacts of schemes that will generate potentially significant heavy vehicle traffic. The assessment shows predictions of when the objective will be complied with at all properties within the village, and the impacts of additional traffic from individual, or multiple, developments on existing properties.

In order to inform determination of either individual or multiple planning applications, the results of these sets of results have been combined to derive the number of car trips on Cranbrook Road below which impacts would be limited to a specific descriptor level, and at a limited number of properties. These thresholds are presented in the table below.

Year	All Negligible	Three Slight Adverse	Three Moderate Adverse
2020	93	N/A	114
2021	97	N/A	292
2022	102	N/A	306
2023	107	N/A	322
2024	114	182 ^a	433 ^b
2025	122	367 ^c	1,277 ^b
2026	396	1,319	1,851
2027	428	1,570	2,000

^a The impacts predicted from these additional cars would cause two slight adverse impacts only.

^b The impacts predicted from these additional cars would cause two moderate adverse impacts and one slight adverse impact.

^c The impacts predicted from these additional cars would cause one slight adverse impact only.

There are three properties located on Cranbrook Road close to the junction with the A268 which all have similar and high baseline concentrations, and as such impacts have been determined based on these properties. Applying professional judgement, and considering the EPUK/IAQM guidance, it would seem unlikely that slight or moderate adverse impacts at three properties for a limited number of years would lead to significant health effects. As such the assessment presents the number of

vehicles to cause a maximum impact of slight adverse or moderate adverse at a maximum of three properties.

There are inherent uncertainties within the modelling, and as such the suggested screening thresholds should not be considered exact, but represent the best possible estimates, using the best available data available at the time this report was undertaken.

It is recommended that the values for the moderate adverse impacts are used to screen the trip generation of future developments on Cranbrook Road to determine whether they risk having a significant overall air quality effect. The values can be used for individual or multiple schemes, where traffic data are available for multiple schemes. Where trip generation on Cranbrook Road is below the thresholds it can be assumed there will not be a significant overall effect on air quality. Using the values for the assessment of multiple schemes would represent a conservative approach, due to the inclusion of cumulative traffic within the baseline data for each year, which will effectively have already allowed for some cumulative development.

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1 Introduction

- 1.1 Diffusion tube monitoring undertaken by Tunbridge Wells Borough Council (TWBC) at new sites in Hawkhurst in 2019 highlighted potential exceedances of the annual mean nitrogen dioxide objective in the village. A detailed dispersion modelling assessment was carried out by Air Quality Consultants Ltd (AQC) (AQC Report No. J4114A/1/F1), hereafter referred to as the “Previous Assessment” to identify where the objective was exceeded at locations of relevant exposure, and thus provide recommendations for the extents of the new Air Quality Management Area (AQMA) required.
- 1.2 This report presents further analysis utilising dispersion modelling of future traffic emissions in the village. It identifies when the annual mean nitrogen dioxide objective can be expected to be achieved in Hawkhurst, and goes on to determine the impacts that additional traffic from developments in the local area might have on air quality in Hawkhurst in the years 2020 to 2027.
- 1.3 It is understood that a relatively high level of development is anticipated in the local area in the coming years, and this report seeks to provide information to assist TWBC’s planning department in determining the likely impacts of developments on air quality within Hawkhurst, so that judgements can be made without the need for a detailed air quality assessment to accompany every application. The outcomes could also be used to provide an indication of the impacts of multiple developments in future years, assuming that traffic data are available for each of the developments.

2 Background

Air Quality Strategy

- 2.1 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

Clean Air Strategy 2019

- 2.2 The Clean Air Strategy (Defra, 2019) sets out a wide range of actions by which the UK Government will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

The Air Pollutant of Concern

- 2.3 Nitrogen dioxide is associated with adverse effects on human health. Increases in daily mortality and hospital admissions for cardiovascular diseases and hospital admissions due to asthma have been associated with short-term exposure to nitrogen dioxide. Associations have been found between long-term exposure to nitrogen dioxide and all-cause, cardiovascular, respiratory mortality, lung cancer and pneumonia. However, some debate remains as to the strength of the causal associations (COMEAP, 2018). Decrease in lung function in both children and adults and respiratory infections in early childhood due to long-term exposure to nitrogen dioxide have also been reported.

The Air Quality Objectives

- 2.4 The Government's Air Quality Strategy (Defra, 2007) provides air quality standards and objectives for key air pollutants, which are designed to protect to protect human health and the environment. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The

'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations, 2000, Statutory Instrument 928 (2000) and the Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043 (2002).

Table 1: Air Quality Criteria for Nitrogen Dioxide

Pollutant	Time Period	Objective
Nitrogen Dioxide	Annual Mean	40 µg/m ³

- 2.5 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives apply in its Local Air Quality Management Technical Guidance (Defra, 2018). The annual mean objectives for nitrogen dioxide are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels.

Impact Descriptors and Assessment of Significance

- 2.6 There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. Most air quality practitioners follow the approach recommended within guidance published by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) (Moorcroft and Barrowcliffe et al, 2017). This approach involves a two-stage process:
- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
 - a judgement on the overall significance of the effects of any impacts.

Impact Descriptors

- 2.7 Impact description involves expressing the magnitude of incremental change as a proportion of a relevant assessment level and then examining this change in the context of the new total concentration and its relationship with the assessment criterion. Table 2 sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document. The assessment criterion adopted will be the air quality objective value, which in this case will be the annual mean nitrogen dioxide objective (40 µg/m³). Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table 2: Air Quality Impact Descriptors for Individual Receptors for All Pollutants ^a

Long-Term Average Concentration At Receptor In Assessment Year ^b	Change in concentration relative to AQO				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQO	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQO	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQO	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQO	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQO	Negligible	Moderate	Substantial	Substantial	Substantial

^a Values are rounded to the nearest whole number.

^b This is the "Without Scheme" concentration where there is a decrease in pollutant concentration and the "With Scheme" concentration where there is an increase.

2.8 Table 2 can usefully be adapted to apply specifically to annual mean nitrogen dioxide concentrations, as shown in Table 3.

Table 3: Air Quality Impact Descriptors for Individual Receptors for Annual Mean Nitrogen Dioxide Concentrations

Annual Mean Concentration At Receptor In Assessment Year ($\mu\text{g}/\text{m}^3$)	Change in Concentration ($\mu\text{g}/\text{m}^3$)				
	<0.2	0.2 - 0.6	0.6 - 2.2	2.2 - 4.2	>4.2
<30.2	Negligible	Negligible	Negligible	Slight	Moderate
30.2 - 37.8	Negligible	Negligible	Slight	Moderate	Moderate
37.8 - 41.0	Negligible	Slight	Moderate	Moderate	Substantial
41.0 - 43.8	Negligible	Moderate	Moderate	Substantial	Substantial
>43.8	Negligible	Moderate	Substantial	Substantial	Substantial

Assessment of Significance

2.9 The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either 'significant' or 'not significant'. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as '*slight*' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a '*moderate*' or '*substantial*'

impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and

- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

2.10 The guidance is clear that other factors may be relevant in individual cases.

2.11 The judgement of significance should be made by a competent professional who is suitably qualified.

3 Assessment Methodology

- 3.1 Concentrations have been predicted using the ADMS-Roads dispersion model, with vehicle emissions derived using Defra's Emission Factor Toolkit (EFT) (v9.0) (Defra, 2020). Details of the model inputs and assumptions are provided in Appendix A2, together with the method used to derive future year background concentrations. Where assumptions have been made, a realistic worst-case approach has been adopted. Details of the model verification are provided in AQC's Previous Assessment.
- 3.2 The assessment has focussed on a subset of the receptors modelled in AQC's Previous Assessment; receptor heights and locations are detailed in that report. Only those receptors where an objective exceedance is relatively likely¹ have been considered in this assessment, as adverse impacts elsewhere are unlikely other than for a very large development.
- 3.3 Nitrogen dioxide concentrations have been predicted for all future years from 2020 to 2027. Baseline predictions for 2020 to 2027 have allowed for traffic growth using growth factors derived using the TEMPro System v7.2 (DfT, 2017).
- 3.4 Further predictions of future concentrations have then been made assuming that there are an additional 10 cars, 100 cars, 500 cars, and 1000 cars on Cranbrook Road, to see what impacts residential-type development that will typically generate mostly car trips might have on nitrogen dioxide concentrations. An equation for a linear relationship fitted to the values for each receptor in each year has then been determined to enable the calculation of the increase in annual mean NO₂ per additional car. While the conversion of NO_x emitted by these additional cars to NO₂ is not truly linear, over the small magnitudes of change that are being considered (typically <2 µg/m³) the relationship is so close to linear (see Figure 2) that using a more complex relationship is judged to be unnecessary.
- 3.5 These equations have then been used to identify the number of additional cars that might use Cranbrook Road in each year while having only '*negligible*', '*slight adverse*' and '*moderate adverse*' impacts at each individual receptor. This has enabled a more complex consideration of what level of additional car traffic might be acceptable while having an overall 'not significant' effect on air quality, applying professional judgement.

Uncertainty

- 3.6 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. The traffic data used

¹ I.e receptors above 37.8 µg/m³ for consistency with Table 3.

in the assessment has been sourced from the Department of Transport website (DfT, 2020), and any uncertainties inherent in these data will carry into the assessment.

- 3.7 There are then additional uncertainties as models are required to simplify real-world conditions into a series of algorithms. An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix A2). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of 2019 concentrations. LAQM.TG16 (Defra, 2018) provides guidance on the evaluation of model performance; based on the analysis shown in AQC's Previous Assessment, the model performance is considered to be good.
- 3.8 All of the measured concentrations will also have an intrinsic margin of error, which will also have carried into the results of the modelling. These margins of error may be inflated at diffusion tubes TW66, TW67, TW68, TW69 and TW70 due to seven months or fewer of measured data being captured, requiring annualisation to have been undertaken (see AQC's Previous Assessment for further details).
- 3.9 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, age of vehicle fleet, background pollutant concentrations and vehicle emissions.
- 3.10 European type approval ('Euro') standards for vehicle emissions apply to all new vehicles manufactured for sale in Europe. These standards have, over many years, become progressively more stringent and this is one of the factors that has driven reductions in both predicted and measured pollutant concentrations over time.
- 3.11 Historically, the emissions tests used for type approval were carried out within laboratories and were quite simplistic. They were thus insufficiently representative of emissions when driving in the real world. For a time, this resulted in a discrepancy, whereby nitrogen oxides emissions from new diesel vehicles reduced over time when measured within the laboratory, but did not fall in the real world. This, in turn, led to a discrepancy between models (which predicted improvements in nitrogen dioxide concentrations over time) and measurements (which very often showed no improvements year-on-year).
- 3.12 Recognition of these discrepancies has led to changes to the type approval process. Vehicles are now tested using a more complex laboratory drive cycle and also through 'Real Driving Emissions' (RDE) testing, which involves driving on real roads while measuring exhaust emissions. For Heavy Duty Vehicles (HDVs), the new testing regime has worked very well and NO_x emissions from the

latest vehicles (Euro VI²) are now very low when compared with those from older models (ICCT, 2017).

- 3.13 For Light Duty Vehicles (LDVs), while the latest (Euro 6) emission standard has been in place since 2015, the new type-approval testing regime only came into force in 2017. Despite this delay, earlier work by AQC (2016) showed that Euro 6 diesel cars manufactured prior to 2017 tend to emit significantly less NO_x than previous (Euro 5 and earlier) models.
- 3.14 AQC has analysed trends in measured NO_x concentrations against trends in Defra's EFT model predictions for the period 2013 to 2019 (AQC, 2020). This has demonstrated that, while the EFT typically over-stated the improvements over the period 2013 to 2016, it has tended to under-state the improvements since 2016. Wider consideration of the assumptions built into the EFT suggests that, on balance, the EFT is unlikely to over-state the rate at which NO_x emissions decline in the future at an 'average' site in the UK. In practice, the balance of evidence thus suggests that NO_x concentrations are most likely to decline more quickly in the future, on average, than predicted by the EFT, especially against a base year of 2016 or later. Using EFT v9.0 for future-year forecasts in this report thus provides a robust assessment, given that the model has been verified against measurements made in 2019.
- 3.15 The baseline traffic flows for future years (see Table A2.1 in Appendix A2) have allowed for annual traffic growth using the DfT's TEMPro System. This growth already allows for development in the local area, and thus adding the impacts of individual developments in the local area may result in some double-counting, ensuring that the assessment of potential development impacts and effects is worst-case.

² Euro VI refers to HDVs while Euro 6 refers to LDVs.

4 Baseline Concentrations

Monitoring Results

- 4.1 Monitoring results for Hawkhurst in 2019 are presented in AQC's Previous Assessment.

Background Concentrations

- 4.2 Estimated background concentrations in the study area have been determined for 2019 and for all future years from 2020 to 2027 using Defra's 2017-based background maps (Defra, 2020). The background concentrations are set out in Table 4 and have been derived as described in Appendix A2. The background concentrations are all well below the objectives.

Table 4: Estimated Annual Mean Background NO₂ Concentrations (µg/m³)

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027
NO ₂	8.2	7.9	7.7	7.4	7.2	6.9	6.7	6.6	6.5
Objective	40								

Baseline Dispersion Modelling Results

- 4.3 Modelled baseline annual mean nitrogen dioxide concentrations are presented in Table 5 and Figure 1 for all years 2019 to 2027. The future year concentrations have allowed for traffic growth, as discussed in Paragraphs 3.3 and 3.15.

Table 5: Modelled Baseline Annual Mean NO₂ Concentrations (µg/m³)^a

Receptor	2019	2020	2021	2022	2023	2024	2025	2026	2027
Receptor 14a	56.6	53.7	49.9	46.4	43.4	40.7	38.2	35.8	33.6
Receptor 14b	54.6	51.8	48.2	44.8	41.9	39.2	36.8	34.5	32.5
Receptor 16	49.5	47.0	43.7	40.6	38.0	35.6	33.4	31.4	29.6
Receptor 19	40.6	38.8	36.3	34.0	32.0	30.2	28.5	27.0	25.5
Receptor 20	40.1	38.3	35.8	33.6	31.6	29.9	28.2	26.6	25.2
Receptor 21	39.8	38.0	35.5	33.3	31.4	29.6	28.0	26.4	25.0
Objective	40								

^a Exceedances of the annual mean objective are shown in bold.

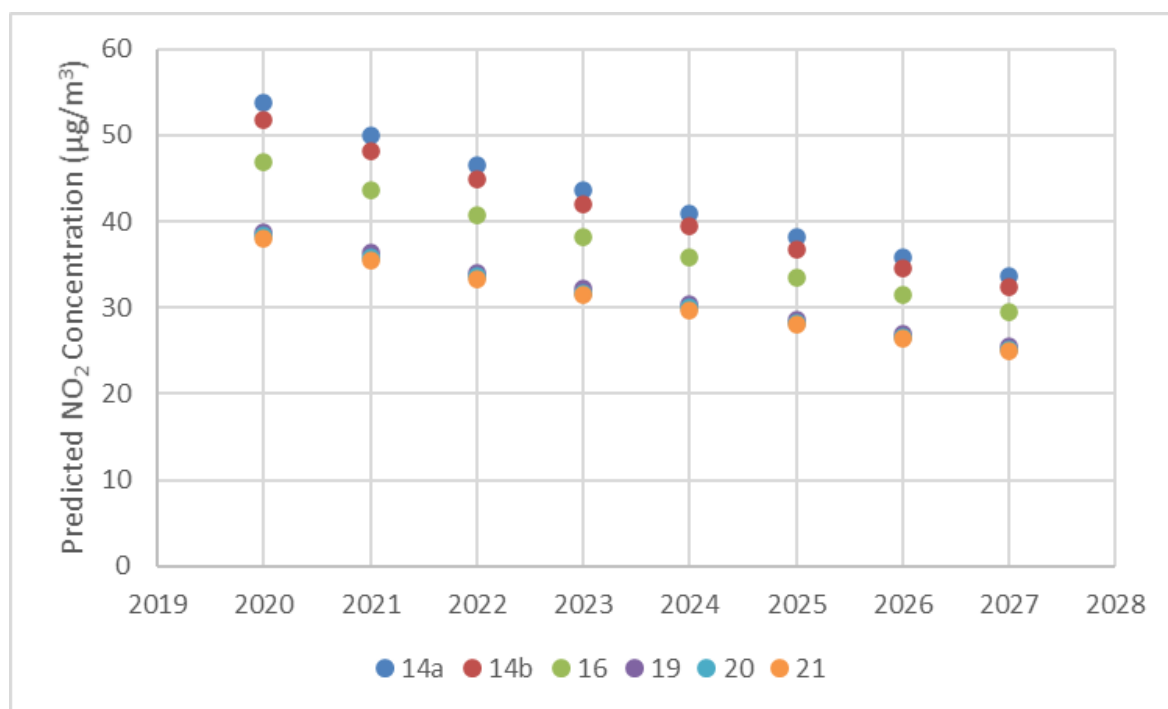


Figure 1: Predicted Baseline NO₂ Concentrations (µg/m³)

- 4.4 There are predicted exceedances of the annual mean nitrogen dioxide objective at Receptor 14 until 2024, and at Receptor 16 until 2022. All other receptors are predicted to have nitrogen dioxide concentrations below 40 µg/m³ in all years from 2020 to 2027.
- 4.5 Receptor 14 is representative of two flats, one at basement level (14a) and one at ground-floor level (14b), while receptor 16 is representative of a single house. In 2020 the objective is only exceeded at these three residential properties. In 2023 this reduces to just the two flats, then in 2024 an exceedance is only predicted at the basement flat. There are predicted to be no exceedances in Hawkhurst by 2025, and thus in that scenario there would be no requirement for an AQMA³.
- 4.6 The annual mean nitrogen dioxide concentrations are all below 60 µg/m³ at every receptor; it is, therefore, unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded.

³ Currently Defra require 2 years of monitored data below the objective before revocation unless results are well below objectives.

5 Future Development Impacts

Modelled Changes in Concentrations

- 5.1 The first step in determining the potential impacts of future development-generated traffic Hawkhurst has been to calculate the equation for the concentration increase per additional car on Cranbrook Road at each receptor in each year from 2020 to 2027. The increase in the annual mean nitrogen dioxide concentration predicted at each receptor with an additional 10, 100, 500, and 1000 cars on Cranbrook Road, and the subsequent equation for a line fitted to these data, are presented in Table 6. A sample graph from which the equation for Receptor 14a was calculated for 2020 is presented in Figure 2.

Table 6: Modelled Nitrogen Dioxide Contributions from Increased Car Flows ($\mu\text{g}/\text{m}^3$)

Receptor	Annual Mean NO ₂ Process Contribution from Additional Cars (µg/m³)				Equation for NO ₂ Increase per Car (x)
	10	100	500	1000	
2020					
Receptor 14a	0.02	0.21	1.07	2.13	0.00213x
Receptor 14b	0.02	0.21	1.03	2.06	0.00206x
Receptor 16	0.02	0.20	0.99	1.96	0.00196x
Receptor 19	0.02	0.18	0.88	1.74	0.00174x
Receptor 20	0.02	0.17	0.86	1.72	0.00172x
Receptor 21	0.02	0.17	0.86	1.71	0.00171x
2021					
Receptor 14a	0.02	0.21	1.03	2.05	0.00205x
Receptor 14b	0.02	0.20	0.99	1.98	0.00198x
Receptor 16	0.02	0.19	0.94	1.88	0.00188x
Receptor 19	0.02	0.17	0.83	1.66	0.00166x
Receptor 20	0.02	0.17	0.83	1.65	0.00165x
Receptor 21	0.01	0.16	0.82	1.63	0.00163x
2022					
Receptor 14a	0.02	0.20	0.98	1.96	0.00196x
Receptor 14b	0.02	0.19	0.95	1.89	0.00189x
Receptor 16	0.01	0.18	0.90	1.79	0.00179x
Receptor 19	0.01	0.15	0.79	1.57	0.00157x
Receptor 20	0.01	0.15	0.78	1.56	0.00156x
Receptor 21	0.02	0.16	0.78	1.55	0.00155x
2023					
Receptor 14a	0.02	0.19	0.93	1.86	0.00186x
Receptor 14b	0.02	0.18	0.90	1.80	0.0018x

Receptor	Annual Mean NO ₂ Process Contribution from Additional Cars (µg/m ³)				Equation for NO ₂ Increase per Car (x)
	10	100	500	1000	
Receptor 16	0.01	0.17	0.85	1.70	0.0017x
Receptor 19	0.01	0.15	0.74	1.48	0.00148x
Receptor 20	0.02	0.15	0.74	1.47	0.00147x
Receptor 21	0.02	0.15	0.73	1.46	0.00146x
2024					
Receptor 14a	0.02	0.17	0.85	1.68	0.00174x
Receptor 14b	0.02	0.16	0.80	1.59	0.00168x
Receptor 16	0.02	0.14	0.70	1.38	0.00159x
Receptor 19	0.02	0.14	0.69	1.37	0.00138x
Receptor 20	0.01	0.14	0.68	1.35	0.00137x
Receptor 21	0.02	0.17	0.85	1.68	0.00135x
2025					
Receptor 14a	0.02	0.17	0.82	1.63	0.00163x
Receptor 14b	0.01	0.15	0.78	1.56	0.00156x
Receptor 16	0.01	0.15	0.74	1.48	0.00148x
Receptor 19	0.02	0.13	0.65	1.29	0.00129x
Receptor 20	0.01	0.12	0.63	1.27	0.00127x
Receptor 21	0.01	0.12	0.63	1.26	0.00126x
2026					
Receptor 14a	0.02	0.15	0.76	1.51	0.00151x
Receptor 14b	0.02	0.15	0.74	1.46	0.00146x
Receptor 16	0.02	0.14	0.69	1.38	0.00138x
Receptor 19	0.01	0.12	0.59	1.19	0.00119x
Receptor 20	0.01	0.12	0.59	1.18	0.00118x
Receptor 21	0.01	0.12	0.58	1.17	0.00117x
2027					
Receptor 14a	0.02	0.15	0.70	1.40	0.0014x
Receptor 14b	0.01	0.14	0.68	1.35	0.00135x
Receptor 16	0.01	0.12	0.63	1.27	0.00127x
Receptor 19	0.01	0.11	0.55	1.10	0.0011x
Receptor 20	0.01	0.11	0.54	1.08	0.00108x
Receptor 21	0.01	0.11	0.54	1.07	0.00107x

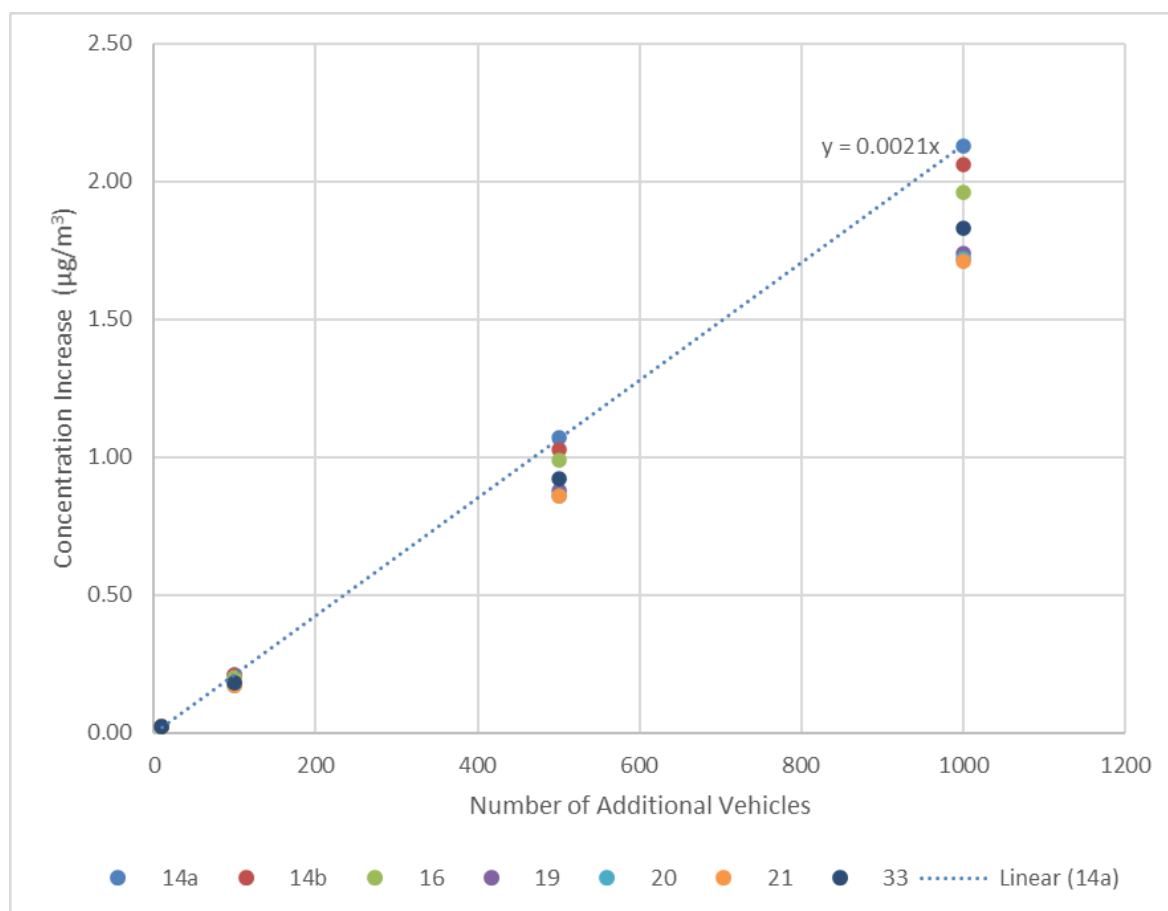


Figure 2: Modelled Nitrogen Dioxide Contributions from Increased Car Flows in 2020

^a Only the equation for Receptor 14a is shown, as this provides the worst-case results.

Resultant Impacts

- 5.2 With the equations for each receptor having been determined, the number of additional cars required to cause an increase of no more than $0.2 \mu\text{g}/\text{m}^3$, $0.6 \mu\text{g}/\text{m}^3$, $2.2 \mu\text{g}/\text{m}^3$ and $4.2 \mu\text{g}/\text{m}^3$ can be calculated for each receptor in each year (these magnitudes of change being the column headers from Table 2/Table 3). These are presented in Table A4.1 in Appendix A3.
- 5.3 The number of additional cars that would result in the total concentration moving into the next concentration band presented in Table 2/Table 3 can also be calculated; these are presented in Table A4.3 in Appendix A3.
- 5.4 These two sets of values have then been considered alongside the baseline concentrations to determine the maximum number of additional cars that could be accommodated on Cranbrook Road in each year while limiting impacts to a specific descriptor level (e.g. negligible, slight adverse etc.) at each receptor in each year, as presented in Table A4.4 in Appendix A3.

- 5.5 These three sets of highly technical data are included in Appendix A3 for completeness, but it was not considered necessary to present them in the body of the report, as the outcomes of their analysis are summarised below.

Significance of Effects

Suggested Thresholds

- 5.6 In order to inform determination of either individual or multiple planning applications, the results of these sets of results have been combined to derive car trip thresholds on Cranbrook Road below which impacts would be limited to a specific descriptor level, and at a limited number of properties. These thresholds are presented in Table 7. The “All Negligible” column presents the maximum number of car trips with which all impacts would be negligible at all receptors. The “Three Slight Adverse” column presents the maximum number of car trips on Cranbrook Road with which impacts would be no worse than slight adverse at any receptor, with these slight adverse impacts affecting no more than three receptors. The “Three Moderate Adverse” column presents the maximum number of car trips on Cranbrook Road with which impacts would be no worse than moderate adverse at any receptor, with these moderate adverse impacts affecting no more than three receptors.

Table 7: Car Trip Thresholds on Cranbrook Road

Year	All Negligible	Three Slight Adverse	Three Moderate Adverse
2020	93	N/A	114
2021	97	N/A	292
2022	102	N/A	306
2023	107	N/A	322
2024	114	182 ^a	433 ^b
2025	122	367 ^c	1,277 ^b
2026	396	1,319	1,851
2027	428	1,570	2,000

^a The impacts predicted from these additional cars would cause two slight adverse impacts only.

^b The impacts predicted from these additional cars would cause two moderate adverse impacts and one slight adverse impact.

^c The impacts predicted from these additional cars would cause one slight adverse impact only.

6 Discussion and Conclusions

- 6.1 The three threshold categories presented in Table 7 have been identified through the application of professional judgement. It is easy to judge that any development, or groups of developments, whose car trip generation is below the threshold for “All Negligible” impacts would have an overall ‘not significant’ effect on air quality, but the judgement becomes more complex once adverse impacts begin to occur. The final two categories in Table 7, in the sense that they relate to three receptors, have been identified on the basis that changes in concentrations as a result of traffic increases, and baseline concentrations, at receptors 14a, 14b, and 16 are broadly similar and high (see Table 5 and Table 6), while at the other receptors they are considerably lower. Receptors 14a, 14b, and 16 also only represent three properties, while the other selected receptors typically represent several properties. Thus, limiting impacts to receptors 14a, 14b, and 16 ensures that no more than three properties are adversely affected. Applying professional judgement, and considering the EPUK/IAQM guidance described in Paragraph 2.9, it would seem unlikely than slight or moderate adverse impacts at three properties for a limited number of years would lead to significant health effects. The same may be true for a limited number of substantial adverse impacts, but it is not recommended that these are routinely accepted in the determination of planning applications in the way that Table 7 is intended to be used, thus it has been assumed that any substantial adverse impacts are unacceptable.
- 6.2 Receptors 19, 20, and 21 have the potential for slight adverse and moderate adverse impacts with larger increases in car trips, however in all years more additional vehicles would be required for a slight adverse impact at these receptors than would cause a moderate adverse impact at receptors 14a, 14b, and 16. The number of cars to cause these impacts are therefore not presented, as focussing on receptors 14a, 14b, and 16 provides the worst-case assessment.
- 6.3 The bottom two rows of Table 3 show that, where total concentrations are above $41.0 \mu\text{g}/\text{m}^3$, there cannot be slight adverse impacts, with impacts jumping from negligible to moderate adverse as the change in concentrations rises from below $0.2 \mu\text{g}/\text{m}^3$ to above it. This is why there is no level of increase in car trips below which impacts are limited to slight adverse only in 2020, 2021, 2022, and 2023, as concentrations at least one of receptor 14a, 14b and 16 will be above $41.0 \mu\text{g}/\text{m}^3$.
- 6.4 By 2024, baseline concentrations are expected to have reduced sufficiently as to allow a significantly greater increase in car trips on Cranbrook Road whilst limiting moderate adverse impacts to no more than three properties.
- 6.5 It should also be noted that when the results from Table 7 are used for assessing the cumulative impacts of multiple schemes there will be some double counting, due cumulative traffic also being included within the baseline as described in Paragraph 3.15. As such the results in Table 7 represent the worst-case impacts if used to assess against multiple developments traffic.

Summary

- 6.6 It is the professional judgement of the consultants who have prepared this report that moderate adverse impacts limited to three properties on Cranbrook Road where annual mean nitrogen dioxide concentrations can be expected to exceed the objective for no more than the next five years would not constitute an overall significant effect, as the likelihood of them leading to significant health effects for residents of those properties is very low. **It is, therefore, recommended that the final column of Table 7 is used to screen the trip generation of future developments on Cranbrook Road to determine whether they risk having a significant overall air quality effect; schemes whose trip generation on Cranbrook Road is below the thresholds can be assumed not to have a significant overall effect on air quality.**
- 6.7 Alternatively, a more cautious approach could be to use the higher threshold value from either the “All Negligible” and “Three Slight Adverse” columns (taking the “All Negligible” value where none is presented for “Three Slight Adverse”) to identify developments that warrant no further consideration in terms of air quality, while requiring enhanced mitigation from those whose trip generation exceeds these thresholds, but is below the relevant “Three Slight Adverse” threshold. What mitigation it would be appropriate to require will, however, require further consideration
- 6.8 The inherent uncertainty within the modelling, as described in Section 3, must be acknowledged. The suggested screening thresholds should not be considered exact, but represent the best possible estimates, using the best available data available at the time this report was undertaken.
- 6.9 It must also be noted that the approach taken has focussed on developments that will generate almost entirely car trips, such as residential schemes. Schemes that will generate potentially significant volumes of other vehicle types, such as buses or light or heavy goods vehicles, will require separate assessment and this report is not intended to address such schemes.

7 References

- AQC (2016) *Emissions of Nitrogen Oxides from Modern Diesel Vehicles*, Available: <https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=a13b63aa-02ff-4bf1-8bbb-aa0e86aad4dc>.
- AQC (2020) *Performance of Defra's Emission Factor Toolkit 2013-2019*, Available: <https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=7fba769d-f1df-49c4-a2e7-f3dd6f316ec1>.
- COMEAP (2018) *Associations of long-term average concentrations of nitrogen dioxide with mortality*.
- Defra (2007) *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland*, Defra.
- Defra (2018) *Review & Assessment: Technical Guidance LAQM.TG16 February 2018 Version*, Defra, Available: <https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf>.
- Defra (2019) *Clean Air Strategy 2019*, Available: <https://www.gov.uk/government/publications/clean-air-strategy-2019>.
- Defra (2020) *Local Air Quality Management (LAQM) Support Website*, Available: <http://laqm.defra.gov.uk/>.
- DfT (2017) *TEMPro (Version 7.2) Software*, Available: <https://www.gov.uk/government/collections/tempro>.
- DfT (2020) *Annual Average Daily Flows*, [Online], Available: <http://www.dft.gov.uk/matrix/>.
- ICCT (2017) *NOx emissions from heavy-duty and light-duty diesel vehicles in the EU: Comparison of real-world performance and current type-approval requirements*, Available: <http://www.theicct.org/nox-europe-hdv-ldv-comparison-jan2017>.
- Moorcroft and Barrowcliffe et al (2017) *Land-Use Planning & Development Control: Planning For Air Quality v1.2*, IAQM, London, Available: <http://iaqm.co.uk/guidance/>.
- The Air Quality (England) (Amendment) Regulations, 2002, Statutory Instrument 3043* (2002), HMSO.
- The Air Quality (England) Regulations, 2000, Statutory Instrument 928* (2000), HMSO.

8 Glossary

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System model for Roads
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AQO	Air Quality Objective
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HMSO	Her Majesty's Stationery Office
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
kph	Kilometres Per hour
LAQM	Local Air Quality Management
LGV	Light Goods Vehicle
µg/m³	Microgrammes per cubic metre
NO	Nitric oxide
NO₂	Nitrogen dioxide
NO_x	Nitrogen oxides (taken to be NO ₂ + NO)
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal

TWBC Tunbridge Wells Borough Council

9 Appendices

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A1 Professional Experience

Dr Clare Beattie, BSc (Hons) MSc PhD CSci MEnvSc MIAQM

Dr Beattie is an Associate Director with AQC, with more than 20 years' relevant experience. She has been involved in air quality management and assessment, and policy formulation in both an academic and consultancy environment. She has prepared air quality review and assessment reports, strategies and action plans for local authorities and has developed guidance documents on air quality management on behalf of central government, local government and NGOs. She has led on the air quality inputs into Clean Air Zone feasibility studies and has provided support to local authorities on the integration of air quality considerations into Local Transport Plans and planning policy processes. Dr Beattie has appraised local authority air quality assessments on behalf of the UK governments, and provided support to the Review and Assessment helpdesk. She has carried out numerous assessments for new residential and commercial developments, including the negotiation of mitigation measures where relevant. She has also acted as an expert witness for both residential and commercial developments. She has carried out BREEAM assessments covering air quality for new developments. Dr Beattie has also managed contracts on behalf of Defra in relation to allocating funding for the implementation of air quality improvement measures. She is a Member of the IAQM and IES and is a Chartered Scientist.

Ricky Gellatly, BSc (Hons) CSci MEnvSc MIAQM

Mr Gellatly is a Principal Consultant with AQC with over eight years' relevant experience. He has undertaken air quality assessments for a wide range of projects, assessing many different pollution sources using both qualitative and quantitative methodologies, with most assessments having included dispersion modelling (using a variety of models). He has assessed road schemes, airports, energy from waste facilities, anaerobic digesters, poultry farms, urban extensions, rail freight interchanges, energy centres, waste handling sites, sewage works and shopping and sports centres, amongst others. He also has experience in ambient air quality monitoring, the analysis and interpretation of air quality monitoring data, the monitoring and assessment of nuisance odours and the monitoring and assessment of construction dust. He is a Member of the IAQM and is a Chartered Scientist.

David Bailey, BSc (Hons)

Mr Bailey is a Consultant with AQC, having joined the Company in 2018. Prior to joining AQC he gained a degree in Environmental Science from the University of Brighton, where his studies included modules focused on Air Quality Management. He has experience in air quality and greenhouse gas assessments, with the use of the ADMS-Roads and ADMS-5 dispersion modelling software. The use of modelling has been used in a wide variety of schemes ranging from large residential EIA developments, and detailed assessments for Local Authorities, to assessing the impacts of gas

power generation and agricultural facilities. In addition, he has also gained experience in diffusion tube and automatic monitoring, including data ratification.

A2 Modelling Methodology

Model Inputs

- A2.1 Predictions have been carried out using the ADMS-Roads dispersion model (v4.1). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width, street canyon width, street canyon height and porosity, where applicable). Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 9.0) published by Defra (2020). Road gradients have also been included within the emissions calculations.
- A2.2 Hourly sequential meteorological data from Herstmonceux for 2019 have been used in the model, which is considered suitable for this area.
- A2.3 AADT flows and fleet composition data have been determined from the interactive web-based map provided by DfT (DfT, 2020), as described in AQC's Previous Assessment. The baseline AADT flows have been factored forwards to the assessment years using growth factors derived using the TEMPro System v7.2 (DfT, 2017), with factors of 1.0259, 1.0411, 1.0564, 1.0718, 1.0871, 1.1024, 1.1101, and 1.1181 used for the years 2020, 2021, 2022, 2023, 2024, 2025, 2026, and 2027 respectively. The baseline traffic data used in this assessment are summarised in Table A2.1. The additional car flows for each year (10, 100, 500, and 1000 cars) assessed in this report have then been added to these growthed baseline flows⁴.

⁴ The fleet composition for each future 'With Scheme' scenario has been recalculated from those presented in Table A2.1 to reflect the increased proportion of 'cars'.

Table A2.1: Summary of Baseline Traffic Data used in the Assessment (AADT Flows)

Road Link	AADT								
	2019	2020	2021	2022	2023	2024	2025	2026	2027
Cranbrook Road	8,680	8,905	9,037	9,170	9,303	9,436	9,569	9,636	9,705
Highgate Hill	8,732	8,958	9,091	9,224	9,359	9,493	9,626	9,693	9,763
A268 (Rye Road/ High Street)	6,638	6,810	6,911	7,012	7,115	7,216	7,318	7,369	7,422
Road Link	Fleet Composition								
	%Car	%LGV	%Rigid HGV	%Artic HGV	%Bus and Coach	%Motor cycle			
Cranbrook Road	74.7	19.6	3.5	1.3	0.4	0.5			
Highgate Hill	72.1	22.5	2.9	1.1	0.6	0.8			
A268 (Rye Road/ High Street)	77.1	17.4	2.4	1.5	1.3	0.3			

A2.4 Modelled network extents, canyons, traffic speeds and diurnal and monthly flow profiles are unchanged from those presented in AQC's Previous Assessment, as is the model verification. The model verification factor calculated for 2019 was applied to all future year modelled road-NO_x outputs.

Model Post-processing

A2.5 The model predicts road-NO_x concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background NO₂ concentration, has been processed through the NO_x to NO₂ calculator available on the Defra LAQM Support website (Defra, 2020). The traffic mix within the calculator has been set to "All other urban UK traffic", which is considered suitable for the study area. The calculator predicts the component of NO₂ based on the adjusted road-NO_x and the background NO₂.

A3 Calculation of Concentration Increases and Impacts from Additional Cars

A3.1 Using the equations shown in Table 6, the maximum number of additional cars that could be accommodated without triggering a change of more than $0.2 \mu\text{g}/\text{m}^3$, $0.6 \mu\text{g}/\text{m}^3$, $2.2 \mu\text{g}/\text{m}^3$, and $4.2 \mu\text{g}/\text{m}^3$ has been calculated, as presented in Table A4.1. These concentration values represent the column change thresholds for impact descriptors in Table 3. In every case, adding one more car than the number shown would trigger a change in concentration greater than the threshold stated at the top of the column.

Table A3.1: Maximum Additional Cars Without Exceeding Concentration Threshold

Receptor	Concentration Threshold			
	<0.2 $\mu\text{g}/\text{m}^3$	<0.6 $\mu\text{g}/\text{m}^3$	<2.2 $\mu\text{g}/\text{m}^3$	<4.2 $\mu\text{g}/\text{m}^3$
2020				
Receptor 14a	93	281	1,032	1,970
Receptor 14b	97	291	1,067	2,038
Receptor 16	101	305	1,119	2,138
Receptor 19	114	343	1,261	2,407
Receptor 20	116	348	1,279	2,442
Receptor 21	116	350	1,285	2,453
2021				
Receptor 14a	97	292	1,071	2,046
Receptor 14b	101	303	1,111	2,121
Receptor 16	106	319	1,170	2,233
Receptor 19	120	361	1,325	2,529
Receptor 20	121	363	1,331	2,541
Receptor 21	122	367	1,348	2,573
2022				
Receptor 14a	102	306	1,122	2,142
Receptor 14b	105	317	1,162	2,219
Receptor 16	111	334	1,227	2,343
Receptor 19	127	381	1,399	2,672
Receptor 20	128	384	1,410	2,693
Receptor 21	128	386	1,417	2,705
2023				
Receptor 14a	107	322	1,182	2,257
Receptor 14b	111	333	1,222	2,333
Receptor 16	117	352	1,294	2,470
Receptor 19	135	405	1,486	2,837

Receptor	Concentration Threshold			
	<0.2 µg/m ³	<0.6 µg/m ³	<2.2 µg/m ³	<4.2 µg/m ³
Receptor 20	135	407	1,494	2,852
Receptor 21	136	410	1,506	2,875
2024				
Receptor 14a	114	344	1,263	2,413
Receptor 14b	118	356	1,306	2,493
Receptor 16	125	376	1,381	2,638
Receptor 19	144	433	1,589	3,034
Receptor 20	145	437	1,603	3,060
Receptor 21	147	443	1,626	3,105
2025				
Receptor 14a	122	367	1,347	2,572
Receptor 14b	128	384	1,410	2,693
Receptor 16	135	405	1,486	2,837
Receptor 19	154	464	1,702	3,250
Receptor 20	157	473	1,735	3,313
Receptor 21	158	476	1,746	3,334
2026				
Receptor 14a	132	396	1,455	2,777
Receptor 14b	136	409	1,502	2,868
Receptor 16	144	434	1,593	3,042
Receptor 19	168	505	1,851	3,535
Receptor 20	169	508	1,864	3,558
Receptor 21	171	513	1,883	3,595
2027				
Receptor 14a	142	428	1,570	2,998
Receptor 14b	147	443	1,626	3,105
Receptor 16	157	473	1,735	3,313
Receptor 19	181	545	2,000	3,818
Receptor 20	185	555	2,036	3,888
Receptor 21	186	559	2,051	3,917

A3.2 Table A4.2 identifies the impact descriptors that would be derived with a change in concentration below a given threshold (the column headers) at each receptor, in each year. It combines the baseline concentrations in Table 6 with the impact descriptor matrix in Table 2.

Table A3.2: Impact descriptors by Receptor by Concentration Change

Receptor	Impact at Receptor with Concentration Increase			
	<0.2 µg/m ³	<0.6 µg/m ³	<2.2 µg/m ³	<4.2 µg/m ³
2020				
Receptor 14a	Negligible	Moderate	Substantial	Substantial
Receptor 14b	Negligible	Moderate	Substantial	Substantial
Receptor 16	Negligible	Moderate	Substantial	Substantial
Receptor 19	Negligible	Slight	Moderate	Substantial
Receptor 20	Negligible	Slight	Moderate	Substantial
Receptor 21	Negligible	Slight	Moderate	Substantial
2021				
Receptor 14a	Negligible	Moderate	Substantial	Substantial
Receptor 14b	Negligible	Moderate	Substantial	Substantial
Receptor 16	Negligible	Moderate	Substantial	Substantial
Receptor 19	Negligible	Negligible	Moderate	Moderate
Receptor 20	Negligible	Negligible	Moderate	Moderate
Receptor 21	Negligible	Negligible	Slight	Moderate
2022				
Receptor 14a	Negligible	Moderate	Substantial	Substantial
Receptor 14b	Negligible	Moderate	Substantial	Substantial
Receptor 16	Negligible	Moderate	Moderate	Substantial
Receptor 19	Negligible	Negligible	Slight	Moderate
Receptor 20	Negligible	Negligible	Slight	Moderate
Receptor 21	Negligible	Negligible	Slight	Moderate
2023				
Receptor 14a	Negligible	Moderate	Substantial	Substantial
Receptor 14b	Negligible	Moderate	Substantial	Substantial
Receptor 16	Negligible	Slight	Moderate	Substantial
Receptor 19	Negligible	Negligible	Slight	Moderate
Receptor 20	Negligible	Negligible	Slight	Moderate
Receptor 21	Negligible	Negligible	Slight	Moderate
2024				
Receptor 14a	Negligible	Moderate	Moderate	Substantial
Receptor 14b	Negligible	Slight	Moderate	Substantial
Receptor 16	Negligible	Negligible	Moderate	Moderate
Receptor 19	Negligible	Negligible	Slight	Moderate
Receptor 20	Negligible	Negligible	Slight	Moderate
Receptor 21	Negligible	Negligible	Slight	Moderate

Receptor	Impact at Receptor with Concentration Increase			
	<0.2 µg/m ³	<0.6 µg/m ³	<2.2 µg/m ³	<4.2 µg/m ³
2025				
Receptor 14a	Negligible	Slight	Moderate	Substantial
Receptor 14b	Negligible	Negligible	Moderate	Substantial
Receptor 16	Negligible	Negligible	Slight	Moderate
Receptor 19	Negligible	Negligible	Slight	Moderate
Receptor 20	Negligible	Negligible	Slight	Moderate
Receptor 21	Negligible	Negligible	Negligible	Moderate
2026				
Receptor 14a	Negligible	Negligible	Moderate	Moderate
Receptor 14b	Negligible	Negligible	Slight	Moderate
Receptor 16	Negligible	Negligible	Slight	Moderate
Receptor 19	Negligible	Negligible	Negligible	Moderate
Receptor 20	Negligible	Negligible	Negligible	Moderate
Receptor 21	Negligible	Negligible	Negligible	Moderate
2027				
Receptor 14a	Negligible	Negligible	Slight	Moderate
Receptor 14b	Negligible	Negligible	Slight	Moderate
Receptor 16	Negligible	Negligible	Slight	Moderate
Receptor 19	Negligible	Negligible	Negligible	Slight
Receptor 20	Negligible	Negligible	Negligible	Slight
Receptor 21	Negligible	Negligible	Negligible	Slight

A3.3 In some cases an increase in concentration that is between two of the threshold values used in Table A3.1 and Table A3.2 will cause the total concentration to move into a higher concentration band (See Table 2), i.e from 76-94% of the AQO to 95-102% of the AQO. As a result, the determination of the number of additional cars that can be accommodated while limiting impacts to a certain descriptor level cannot focus solely on the increase in cars that will cause a change in concentrations of just below 0.2 µg/m³, 0.6 µg/m³, 2.2 µg/m³ or 4.2 µg/m³, and needs to also consider the increase in cars that will cause a change in the categorisation of the total concentration into concentration bands. Table A4.3 calculates, using the equations in Table 6, the number of additional cars that would cause the total concentration to move up beyond a given concentration band at each receptor in each year. It should be noted that all calculated values are presented for completeness, but it is generally only the values at the lower end of the range of values presented that have actually been used in the assessment. Where a value of zero is stated, the total concentration already exceeds this range.

Table A3.3: Number of Cars to Cause Total Concentration to Exceed Concentration Band

Receptor	Number of Cars to Cause Concentration to Exceed Concentration Band			
	103-109% of AQO	95-102% of AQO	76-94% of AQO	75% or less of AQO
2020				
Receptor 14a	0	0	0	0
Receptor 14b	0	0	0	0
Receptor 16	0	0	0	0
Receptor 19	2,883	1,278	0	0
Receptor 20	3,203	1,575	0	0
Receptor 21	3,411	1,775	0	0
2021				
Receptor 14a	0	0	0	0
Receptor 14b	0	0	0	0
Receptor 16	68	0	0	0
Receptor 19	4,516	2,829	902	0
Receptor 20	4,816	3,121	1,185	0
Receptor 21	5,061	3,345	1,384	0
2022				
Receptor 14a	0	0	0	0
Receptor 14b	0	0	0	0
Receptor 16	1,757	195	0	0
Receptor 19	6,216	4,435	2,398	0
Receptor 20	6,540	4,744	2,692	0
Receptor 21	6,756	4,953	2,891	0
2023				
Receptor 14a	111	0	0	0
Receptor 14b	975	0	0	0
Receptor 16	3,327	1,680	0	0
Receptor 19	7,882	5,990	3,828	0
Receptor 20	8,202	6,300	4,127	0
Receptor 21	8,454	6,537	4,345	0
2024				
Receptor 14a	1,790	182	0	0
Receptor 14b	2,705	1,043	0	0
Receptor 16	5,129	3,371	1,361	0
Receptor 19	9,801	7,778	5,466	0
Receptor 20	10,163	8,122	5,791	252
Receptor 21	10,497	8,427	6,061	441

Receptor	Number of Cars to Cause Concentration to Exceed Concentration Band			
	103-109% of AQO	95-102% of AQO	76-94% of AQO	75% or less of AQO
2025				
Receptor 14a	3,454	1,739	0	0
Receptor 14b	4,475	2,680	628	0
Receptor 16	6,992	5,101	2,939	0
Receptor 19	11,802	9,635	7,158	1,277
Receptor 20	12,308	10,098	7,574	1,578
Receptor 21	12,576	10,353	7,812	1,778
2026				
Receptor 14a	5,287	3,435	1,319	0
Receptor 14b	6,320	4,408	2,222	0
Receptor 16	8,973	6,944	4,626	0
Receptor 19	14,161	11,804	9,111	2,714
Receptor 20	14,544	12,172	9,460	3,020
Receptor 21	14,881	12,484	9,745	3,239
2027				
Receptor 14a	7,248	5,250	2,966	0
Receptor 14b	8,374	6,303	3,937	0
Receptor 16	11,231	9,021	6,497	501
Receptor 19	16,632	14,086	11,177	4,268
Receptor 20	17,224	14,632	11,669	4,633
Receptor 21	17,547	14,936	11,951	4,863

A3.4 Utilising the information from Table A4.1, Table A3.2 and Table A4.3, Table A4.4 presents these maximum number of additional cars on Cranbrook Road that could be accommodated while keeping impacts to a certain descriptor level, at each receptor in each year. N/A's reflect occasions where any change above 0.2 $\mu\text{g}/\text{m}^3$ causes the impact to increase from 'negligible' directly to 'moderate adverse', as occurs in the bottom two rows of Table 2 and Table 3. In these cases, any additional cars above the number stated in the 'negligible' column impacts would lead to 'moderate adverse' impacts.

Table A3.4: Maximum Number of Car to Limit Impacts to Each Descriptor

Receptor	Negligible	Slight Adverse	Moderate Adverse
2020			
Receptor 14a	93	N/A	281
Receptor 14b	97	N/A	291
Receptor 16	101	N/A	305
Receptor 19	114	343	1,278

Receptor	Negligible	Slight Adverse	Moderate Adverse
Receptor 20	116	348	1,575
Receptor 21	116	350	1,775
2021			
Receptor 14a	97	N/A	292
Receptor 14b	101	N/A	303
Receptor 16	106	N/A	319
Receptor 19	361	902	2,529
Receptor 20	363	1,185	2,541
Receptor 21	367	1,348	2,573
2022			
Receptor 14a	102	N/A	306
Receptor 14b	105	N/A	317
Receptor 16	111	195	1,227
Receptor 19	381	1,399	2,672
Receptor 20	384	1,410	2,693
Receptor 21	386	1,417	2,891
2023			
Receptor 14a	107	N/A	322
Receptor 14b	111	N/A	975
Receptor 16	117	352	1,680
Receptor 19	405	1,486	3,828
Receptor 20	407	1,494	4,127
Receptor 21	410	1,506	4,345
2024			
Receptor 14a	114	182	1,263
Receptor 14b	118	356	1,306
Receptor 16	376	1,361	2,638
Receptor 19	433	1,589	5,466
Receptor 20	437	1,603	5,791
Receptor 21	443	1,626	6,061
2025			
Receptor 14a	122	367	1,739
Receptor 14b	384	628	2,680
Receptor 16	405	1,486	2,939
Receptor 19	1,277	1,702	7,158
Receptor 20	1,578	1,735	7,574
Receptor 21	1,746	1,778	7,812

Receptor	Negligible	Slight Adverse	Moderate Adverse
2026			
Receptor 14a	396	1,319	2,777
Receptor 14b	409	1,502	2,868
Receptor 16	434	1,593	4,626
Receptor 19	1,851	2,714	9,111
Receptor 20	1,864	3,020	9,460
Receptor 21	1,883	3,239	9,745
2027			
Receptor 14a	428	1,570	2,998
Receptor 14b	443	1,626	3,937
Receptor 16	501	1,735	6,497
Receptor 19	2,000	3,818	11,177
Receptor 20	2,036	3,888	11,669
Receptor 21	2,051	3,917	11,951

Glossary of Terms

Abbreviation	Description
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
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
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
SO ₂	Sulphur Dioxide

References

- Department for Environment, Food and Rural Affairs (Defra) (2016) *Local Air Quality Management Technical Guidance LAQM.TG 16*.
- Department for Environment, Food and Rural Affairs (Defra) (2016) *Local Air Quality Management Policy Guidance LAQM.PG 16*
- Kent and Medway Air Quality Partnership (2011) *Air Quality and Planning Technical Guidance (updated 2016)*
- Tunbridge Wells Borough Council (2015) *Updating and Screening Assessment*.
- National Diffusion Tube Bias Adjustment Spreadsheet, version 03/19 published in March 2019.
- Tunbridge Wells Borough Council Air Quality Action Plan – November 2009
- TWBC Draft Local Plan <https://beta.tunbridgewells.gov.uk/planning/planning-policy/local-plan/draft-local-plan>.
- Tunbridge Wells Borough Transport Strategy – July 2015
http://www.tunbridgewells.gov.uk/data/assets/pdf_file/0019/132256/Transport