# Tunbridge Wells

# Hawkhurst

# Air Quality Action Plan

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

February 2023

| Information | Tunbridge Wells Borough Council Details |
|---|---|
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| **Report Reference Number** | Hawkhurst AQAP |
| **Date** | February 2023 |

# 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[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3]. 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

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

- 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 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 ASR.

# 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 ($NO_2$). 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 $NO_2$ 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 $NO_2$ 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 $NO_2$ 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 $NO_2$ 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 $NO_2$ levels at the automatic monitoring station over the past seven years, during which annual mean $NO_2$ levels have dropped from 48ugm$^{-3}$ in 2014 to 26ugm$^{-3}$ 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 $NO_2$ 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 $NO_2$ 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 $NO_2$ levels would be expected by the roadside, however, the road is very wide, with few obstacles to the dispersion of $NO_2$, and the residential properties are well spaced and set well back from the road. Tube TW82 recorded an annual mean $NO_2$ 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 $NO_2$. 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 $NO_2$ 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 'lock-downs' 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 40 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 $NO_2$ levels in January and February 2020 (ie 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 $NO_2$ 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 40.4$\mu gm^{-3}$. This was increased from 34.8$\mu gm^{-3}$ in 2020. In 2019, the site, which was then a single tube, recorded an annual mean $NO_2$ level of 52.7$\mu gm^{-3}$.

## Figure 1 Hawkhurst Air Quality Management Area Order 2021

**TUNBRIDGE WELLS BOROUGH COUNCIL**

**THE HAWKHURST AIR QUALITY MANAGEMENT AREA (AQMA) ORDER 2021**

**ENVIRONMENT ACT 1995 PART IV – SECTION 83(1)**

Whereas Tunbridge Wells Borough Council ("The Council") is satisfied that as a result of its air quality review and the Detailed Assessment report dated June 2020 the air quality objective for Nitrogen Dioxide ($NO_2$) (annual mean) may not be achieved by the relevant date prescribed by the Air Quality (England) (Wales) Regulations 2000 in some parts of the area described below.

The Council, in exercise of the powers conferred on it by section 83(1) of the Environment Act 1995 HEREBY ORDER THAT:-

1. Residential properties in the southern part of Cranbrook Road in the centre of Hawkhurst, as outlined in red on the attached map shall be designated as an Air Quality Management Area, to be known as the Hawkhurst Town Air Quality Management Area.

2. The Air Quality Management Area will be an air quality management area in relation to Nitrogen Dioxide ($NO_2$) only.

3. The order shall be cited as The Hawkhurst Air Quality Management Area Order (2021).

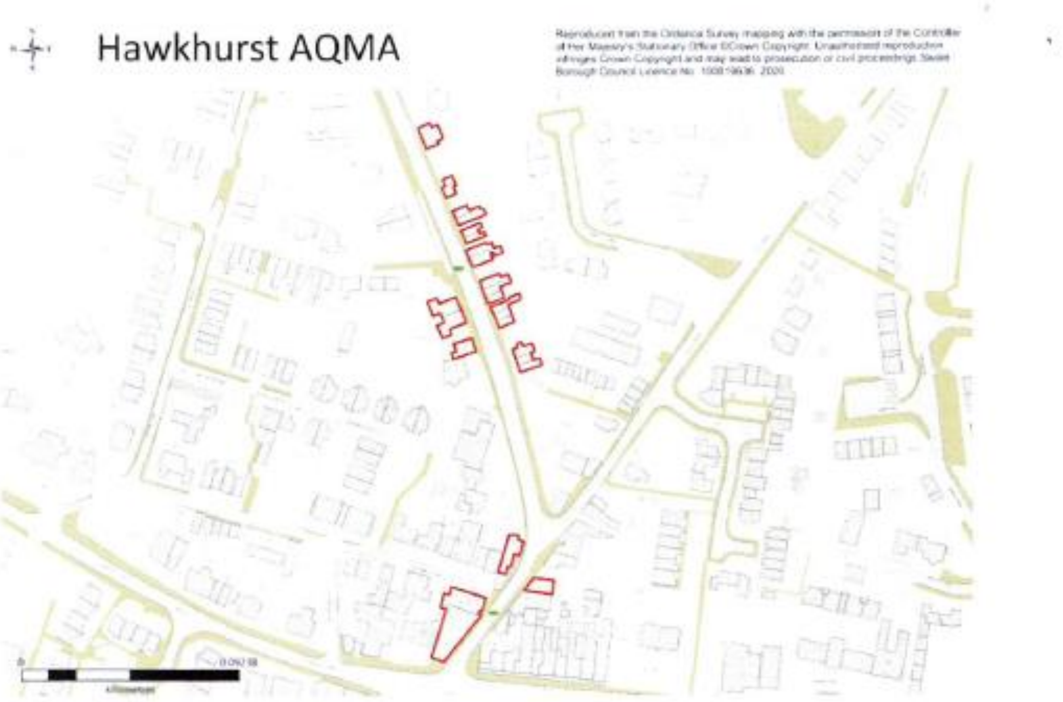
4. The order shall come into force on 1st December 2021 and shall remain in force until varied or revoked by subsequent order.

**THE COMMON SEAL OF TUNBRIDGE WELLS BOROUGH COUNCIL WAS HERE UNTO AFFIXED ON THE 1st DAY OF December 2021 AND SIGNED IN THE PRESENCE OF Solicitor – Authorised Signatory**

3981

Authorised Signatory

## Figure 2. Receptor Locations in Hawkhurst Air Quality Management Area




# 3 Tunbridge Wells Borough Council's Air Quality Priorities for Hawkhurst

## 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 $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

New (2020) data from the Public Outcomes Framework (indicator D01) indicates that for the fraction of deaths, attributable to $PM_{2.5}$, in Tunbridge Wells is 5.7%. This is very slightly higher than the national average of 5.6%.

In May 2021, a new $PM_{2.5}$ BAM analyser was installed in Tunbridge Wells AQ station on the A26, allowing us to measure $PM_{2.5}$ in the borough for the first time. We anticipate that this station will measure a 'worst case scenario' in the Borough and therefore that $PM_{2.5}$ levels in Hawkhurst will not exceed those measured at the AQ station. In the 2022 ASR, the $PM_{2.5}$ level in the Borough was estimated to be 12.1µgm$^{-3}$, so exceedances of the $PM_{2.5}$ objective in Hawkhurst are thought to be highly unlikely.

As was noted in the Chief Medical Officer's Annual Report 2022 on Air Pollution, $PM_{2.5}$ levels have been largely static for the last decade, unlike $NO_2$ and $PM_{10}$, the levels of which have decreased quite considerably in the same period.

However, we note that transport is just one of many sources of $PM_{2.5}$ 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 in it scheduled, taking account of this ongoing trend in future years. The report is given at Appendix E.

## 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 $NO_2$ within the AQMA are identified in Table 2 below.

### Table 1: Annual Contribution of $NO_2$ as a Percentage by Source

| Receptor | Annual Mean Contribution ($\mu gm^{-3}$) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 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 $NO_2$ 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 $NO_2$ concentrations. The following calculations use the 'modelled $NO_2$ 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 $NO_2$ concentration of 40µgm$^{-3}$ (road NOx-required) has been calculated using the $NO_x$ to $NO_2$ calculator by entering a total $NO_2$ concentration of 40µgm$^{-3}$, along with the local background $NO_2$ concentration. The ratio of 'road $NO_x$-required' to 'road $NO_x$-current' gives the required percentage reduction in local road NOx 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 NOx required to Meet Annual Mean NO2 Objective at Relevant Modelled Receptors (µgm$^{-3}$) in 2019

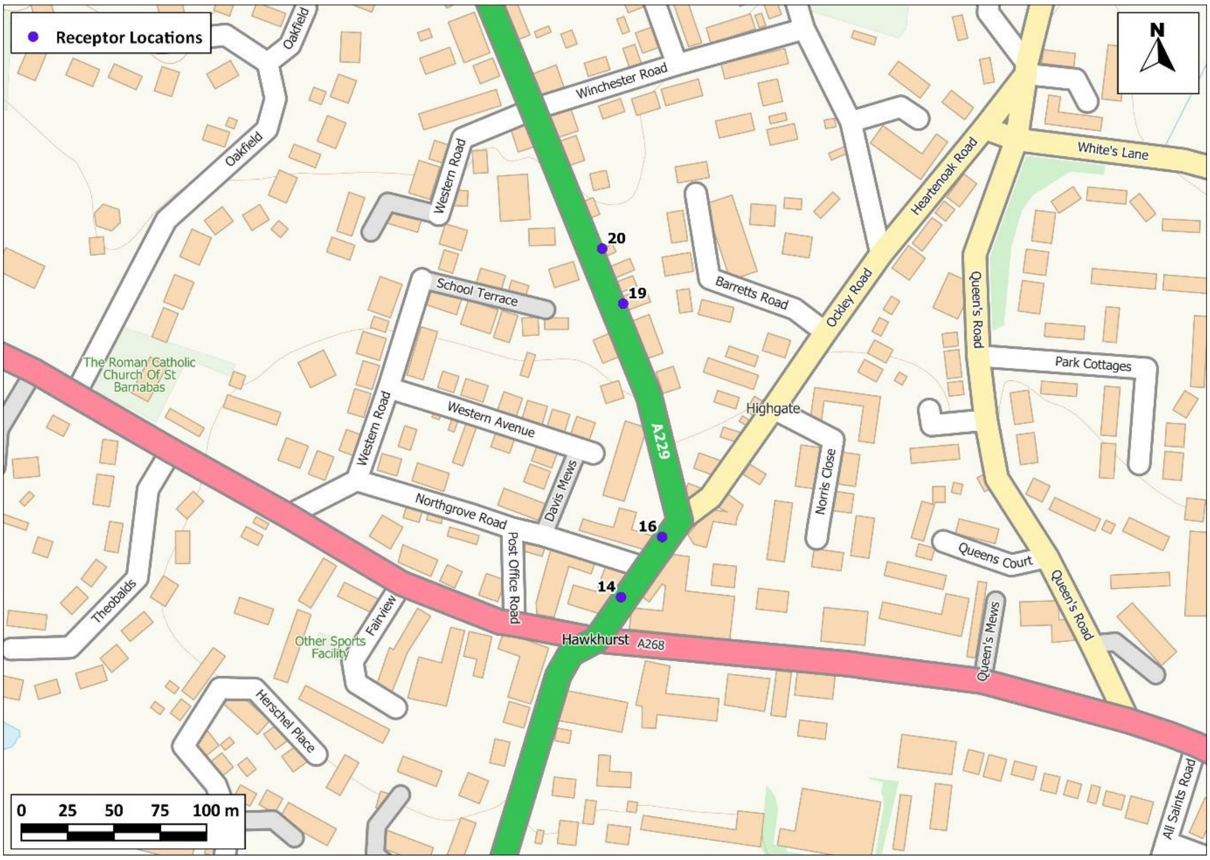
| Receptor | Annual Mean Contribution (µg/m$^3$) | | | | | |
|---|---|---|---|---|---|---|
| | Modelled $NO_2$ Concentration | Road NOx Current (a) | Road NOx Required (b) | Background $NO_2$ (for information) | Difference between a and b (c) | % Decrease in Road NOx to Meet Objective |
| 14[a] | 56.6 | 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 2: Receptor Locations from** Error! Reference source not found.




## 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 $NO_2$ annual mean objective in the Hawkhurst AQMA. We recognise that options to reduce the $NO_2$ 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' https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf 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.

## 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.Priority 3 - <insert text>

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. 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 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
- Individaul 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 |

| Consultee | Consultation Undertaken |
|---|---|
| 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

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

## Table 5 – 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-24 | 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 Emission Transport | Procuring alternative Refuelling infrastructure to | KCC | 04/23 -03/25 | 04/25-03/28 | Number of EV charging points | | | Mar-28 | Work will be as part of KCC planned roll out and KCC EV strategy |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 |

# 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 erm 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. No unded. A mutually exclusive option to the planned upgrade o 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

## Contents

- 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).

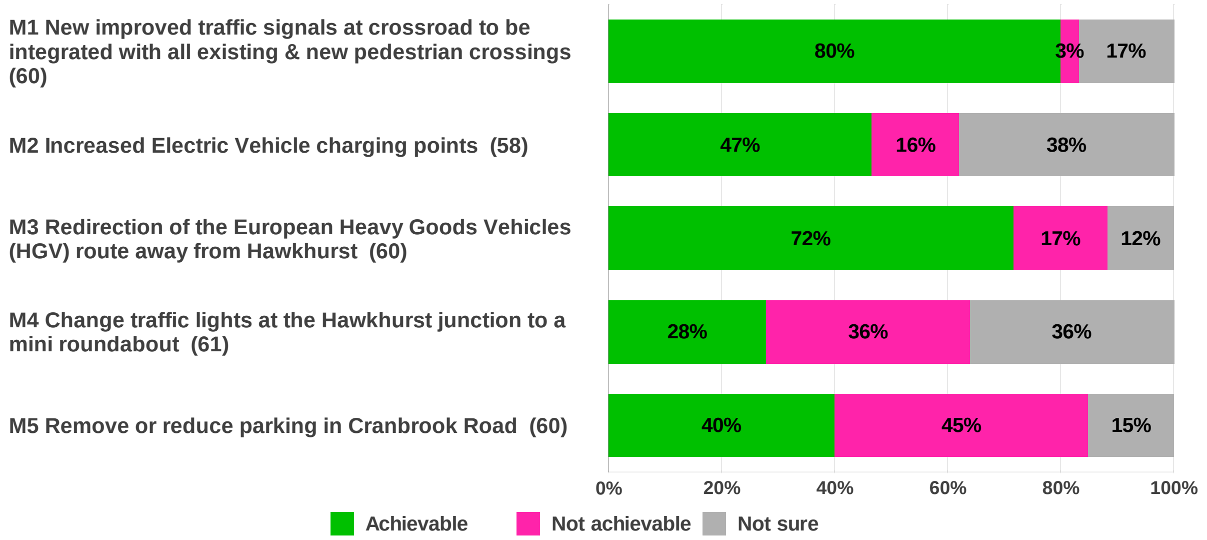
The data has not been weighted; however, the bottom two age brackets were combined to give the 18 to 34 years group. Please note not every respondent answered every question; therefore, the total number of respondents, refers to the number of respondents for that question, not to the survey overall. 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'.




<u>Demographic Differences</u>

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.

<u>Measure 1 – Unachievable Comments (2) – Shown in full</u>

| |
|---|
| 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 |

<u>Measure 2 – Unachievable Comments (9) – shown in full</u>

| |
|---|
| 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 uses 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

| |
|---|
| Its 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 its 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.<br>1 - too expensive.<br>1 -the current junction works well.<br>1 - would cause safety issues particularly for pedestrians. |

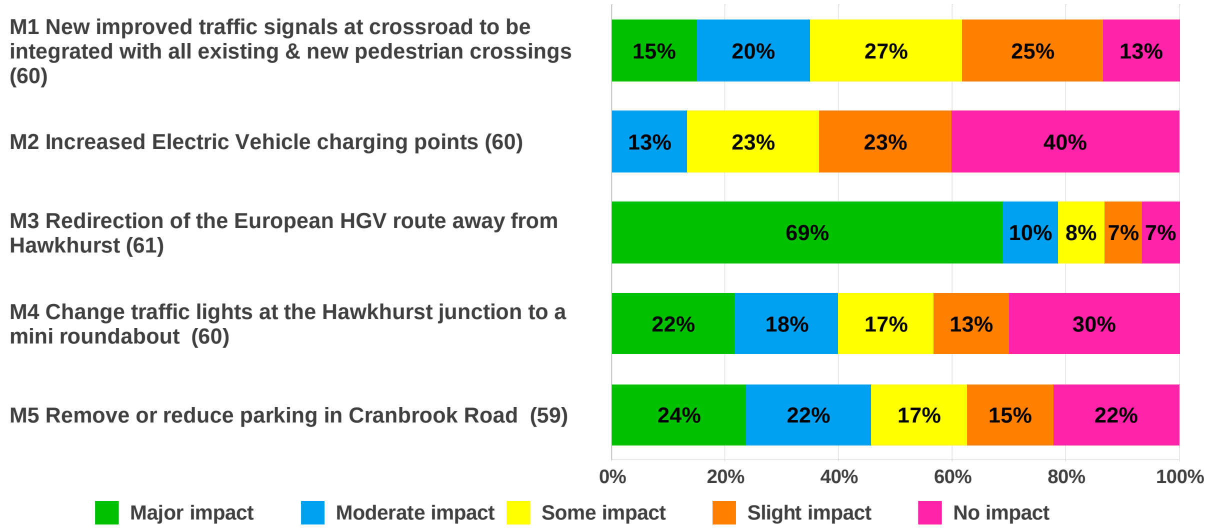
Measure 5 – Unachievable Comments (27)

| 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.

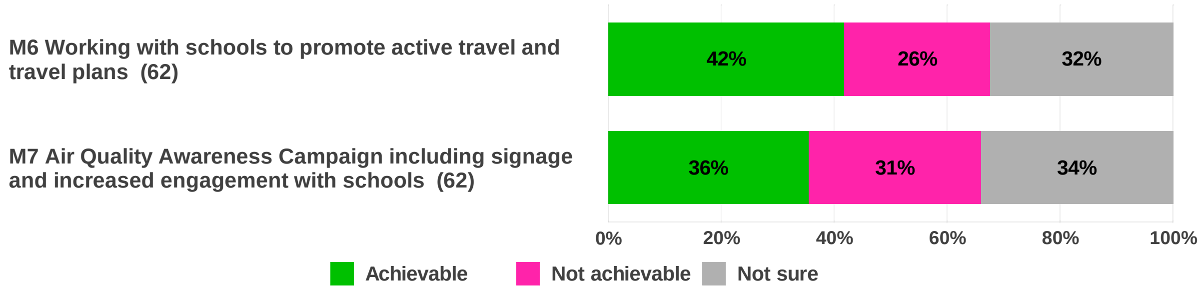
**Comments on Transport Measures (35)**

| Theme | No. | Nature |
|---|---|---|
| HGVs | 16 | • HGVs are the cause of the congestion and pollution.<br>• Roads are unsuitable for HGVs.<br>• Redirection of HGV traffic would positively impact air quality locally. |
| Traffic Management | 14 | • Better junction management requested including pedestrian crossings.<br>• Concerns that a mini roundabout would cause more issues such as HGVs getting stuck.<br>• 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.<br>• EV chargers would encourage more electric vehicle ownership.<br>• 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.<br>• 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.




<u>Demographic Differences</u>

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.

<u>Measure 6 Unachievable Comments (16)</u>

| Theme | No. | Nature |
|---|---|---|
| Little to no impact | 6 | • The majority of traffic is through traffic.<br>• School traffic is not the issue. |
| Driving to School | 6 | • Parents make this choice rather than children and are unlikely to change habits.<br>• 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.<br>• No public transport available.<br>• Safety issue walking due to narrow lanes and no footpaths. |

<u>Measure 7 Unachievable comments (18)</u>

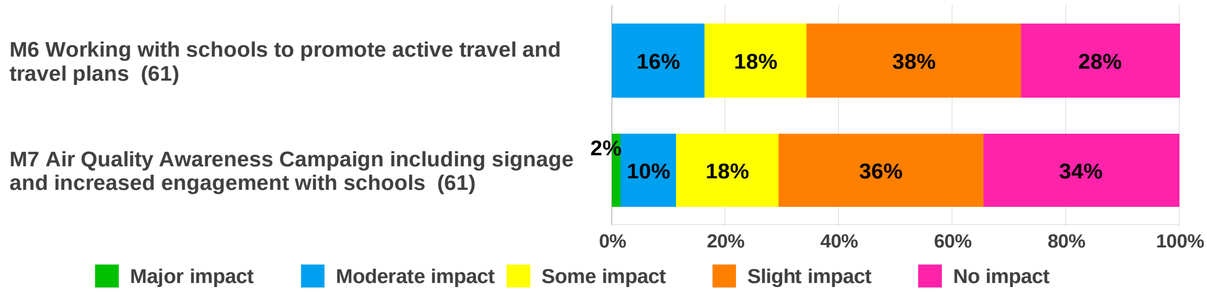
| Theme | No. | Nature |
|---|---|---|
| Little to no impact | 13 | • People will not take any notice and therefore it will not impact air quality.<br>• School traffic not a problem, the problem is the amount of HGVs and through traffic. |
| Other | 5 | • One said there is already an awareness campaign.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

**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'.




<u>Demographic Differences</u>

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.

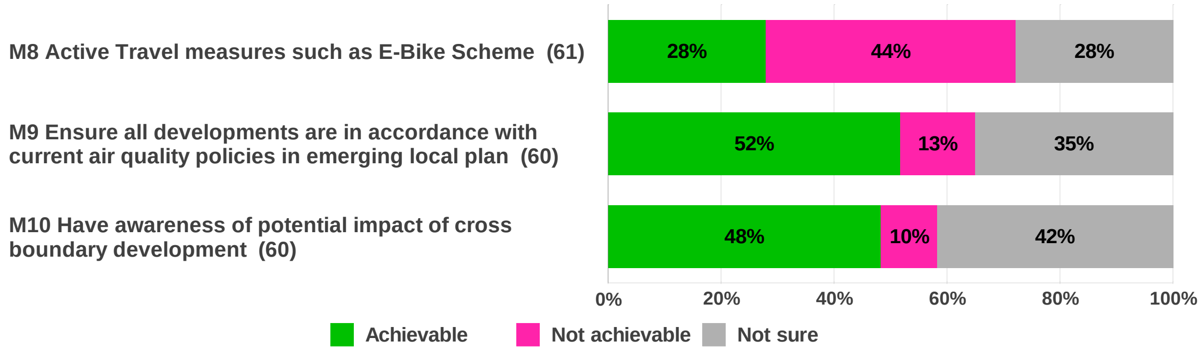
**Comments on Information & Education Measures (23)**

| Theme | No. | Nature |
|---|---|---|
| No impact | 12 | • Measures proposed will not work.<br>• People will not take any notice.<br>• More radical solutions required to improve air quality. |
| HGV | 6 | • HGV through traffic main cause of the problem.<br>• Suggestion to ban HGVs from passing through the village. |
| Idling engines | 3 | • Education required to avoid idling.<br>• Suggestion of introducing fines for idling vehicles. |
| School transport | 3 | • Introduce school buses.<br>• Restrictions on streets with schools for pick up and drop off.<br>• More children could walk. |
| Other | 2 | • Road infrastructure poor with no regular public transport or cycle lanes.<br>• 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.<br>• Roads need to be safer for this to be viable. |
| Terrain/Fitness | 8 | • Local area is hilly.<br>• Local population is aging and cycling therefor less attractive an option. |
| Won’t be used/No impact | 6 | • Unlikely children will cycle to school.<br>• Little to no impact in Hawkhurst. |
| Expensive | 3 | • E-bikes are expensive.<br>• A hire scheme would be expensive in terms of maintenance. |
| Journey distances | 3 | • Schools too far away to cycle to.<br>• Cycling unsuitable for long journeys. |
| Other | 1 | • The narrow reads and lanes prohibit cycle lanes being installed. |

Measure 9 – Unachievable comments (8)

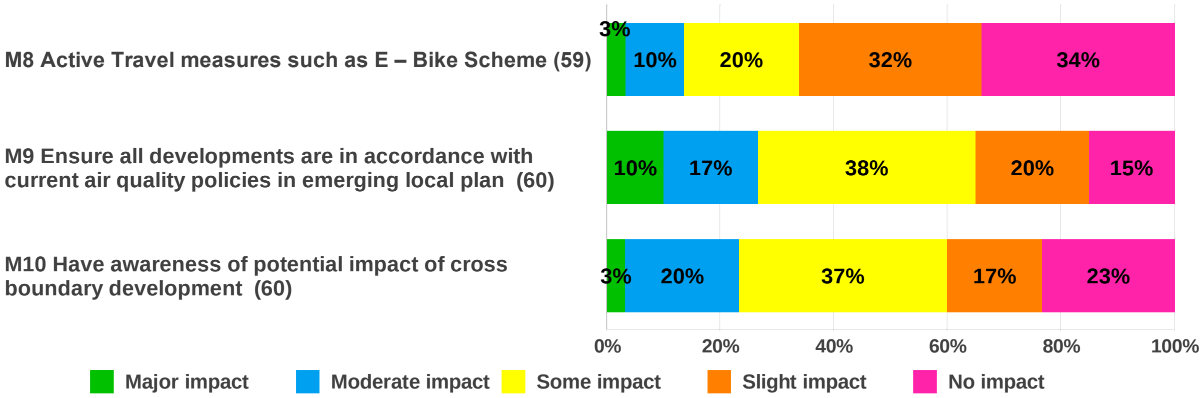
| |
|---|
| Hawkhurst has suffered and still suffering major development - this will result in extra traffic and more pollution |
| Because developers ignore them. More development =more cars & pollution |

| |
|---|
| 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.



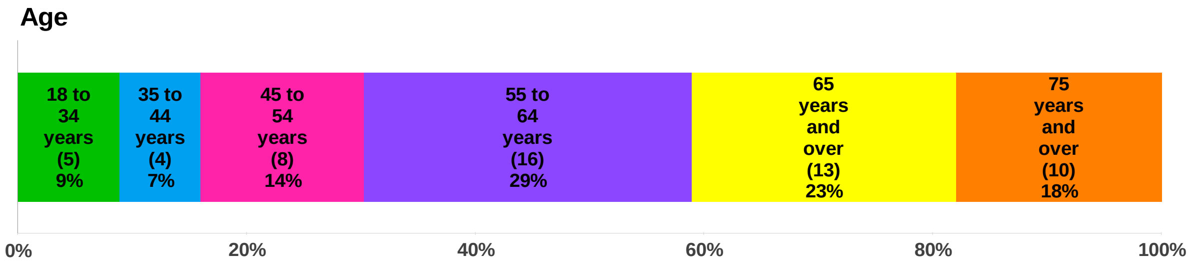

<u>Demographic Differences</u>

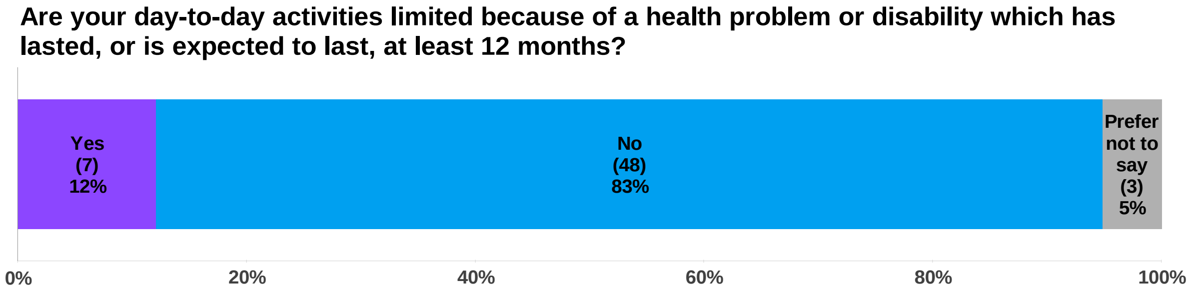
Respondents aged 75 years and over had a significantly greater proportion responding that measure 10 would have slight or no impact with 70% answering this way compared to the over result of 41%.

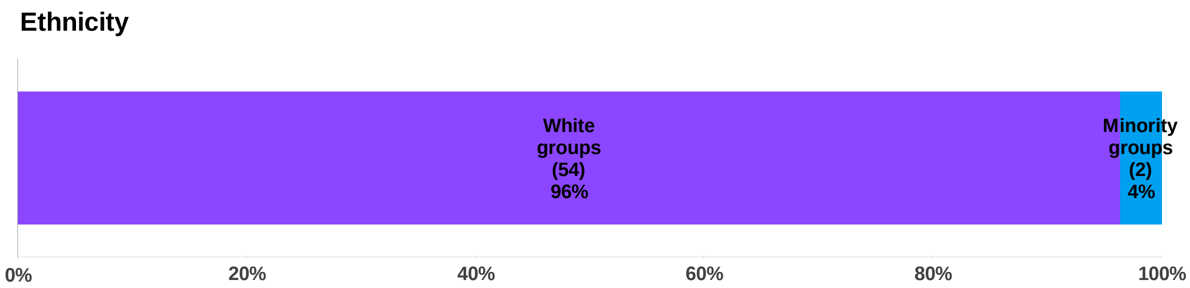
**Comments on Miscellaneous Measures (22)**

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

<u>Measure 1</u>

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.

<u>Measure 2</u>

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:

Experts in air quality
management & assessment

## Document Control

| Client | Tunbridge Wells Borough Council | Principal Contact | Stuart Maxwell |
|---|---|---|---|

| Job Number | J4114 |
|---|---|

| Report Prepared By: | David Bailey & Ricky Gellatly |
|---|---|

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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## Contents



## Tables

## Figures

# Introduction

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.

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.

## Background

### Air Quality Strategy

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

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

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

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).

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 µg/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 7.

**Table 1: Air Quality Criteria for Nitrogen Dioxide**

| Pollutant | Time Period | Objective |
|---|---|---|
| **Nitrogen Dioxide** | 1-hour Mean | 200 µg/m$^3$ not to be exceeded more than 18 times a year |
| | Annual Mean | 40 µg/m$^3$ |

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.

# Assessment Methodology

## Modelling Methodology

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 2, together with the method used to derive background concentrations. Where assumptions have been made, a realistic worst-case approach has been adopted.

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 0.


**Figure 1: Receptor Locations**

Imagery © Google.

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*

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 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.

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 2). 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 2, the model performance is considered to be good.

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 0 and Appendix 0 for further details).

A1

# Results

## Monitoring Results

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**.

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).

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**

Imagery © Google.

Table 3: Measured Annual Mean Nitrogen Dioxide Concentrations (µg/m³) [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 0).

## Modelling Results

The modelled 2019 annual mean nitrogen dioxide concentrations at the selected receptors are presented in **Table 11** and **Figure 3**.

Table 4: Modelled Annual Mean Nitrogen Dioxide Concentrations in 2019 (µg/m³) [a]

| Receptor | Height | Modelled Annual Mean Nitrogen Dioxide Concentration (µg/m³) |
|---|---|---|
| **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 | Height | Modelled Annual Mean Nitrogen Dioxide Concentration (µg/m$^3$) |
|---|---|---|
| **Receptor 16** | 1.5 | **46.3** |
| **Receptor 17** | 1.5 | 34.9 |
| **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.

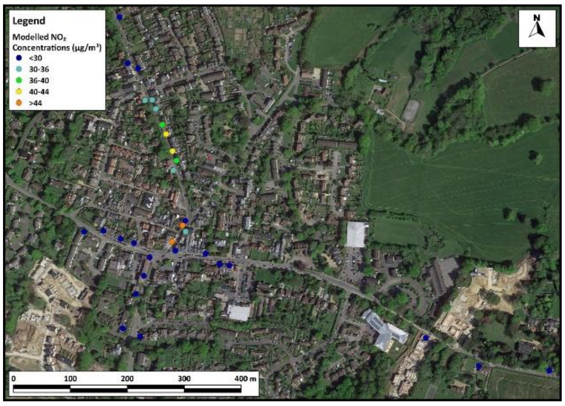


**Figure 3: Modelled Annual Mean Nitrogen Dioxide Concentrations in 2019 (µg/m$^3$)**

A2 Imagery ©2020 Google.

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 µg/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.

There are no modelled concentrations over 60 µg/m$^3$ and therefore the 1-hour nitrogen dioxide objective is unlikely to be exceeded.

The use of an average verification factor (see Appendix 2) 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.

The modelled concentration at receptor 18 (36.0 µg/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 µg/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.

Similarly, while the verified model has predicted the concentration at monitoring site TW69 reasonably accurately (to within 1 µg/m$^3$ of that measured), it has over-predicted the concentration at TW68 by more than 7 µg/m$^3$ and under-predicted that at TW63 by more than 5 µg/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.

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.

A3

# Source Apportionment

1.1 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).

1.2 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.

1.3 **Error! Reference source not found.** 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).

1.4 **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 (µg/m³) in 2019**

| Receptor | Annual Mean Contribution (µg/m³) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 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.

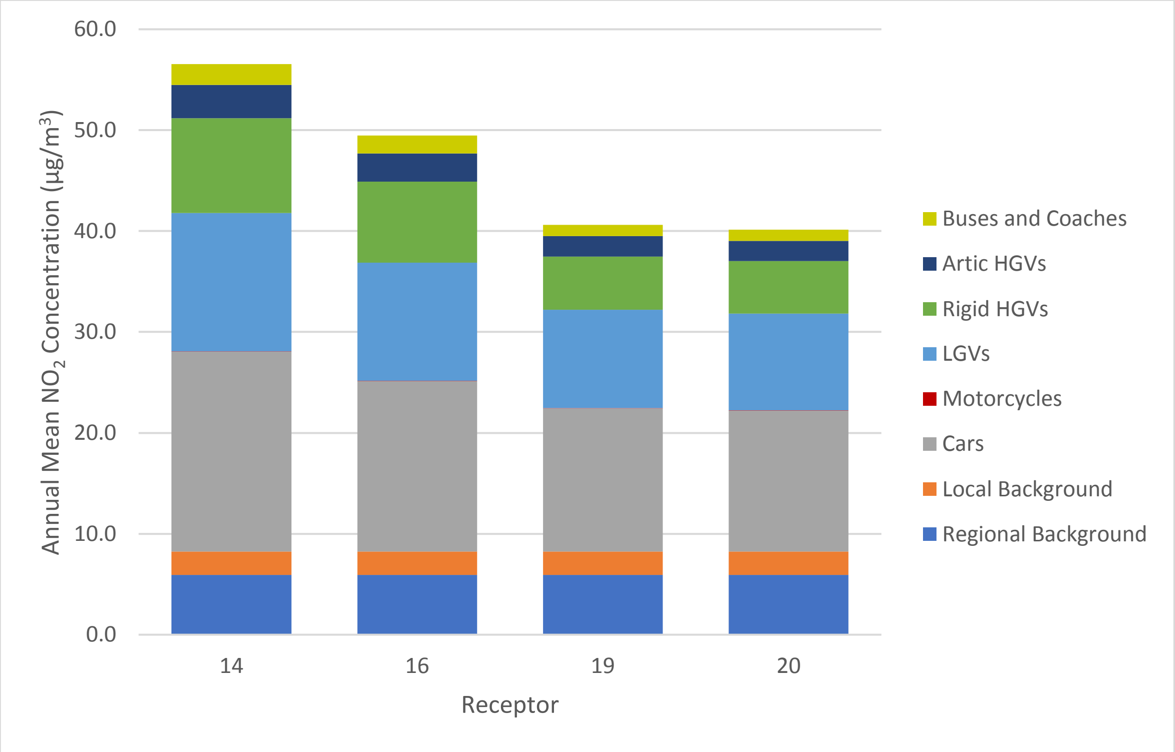


Figure 4: **Contributions of Different Sources to Total Predicted Annual Mean Nitrogen Dioxide Concentration (µg/m³) at Receptors Exceeding the Air Quality Objective in 2019**

Table 6: **Percentage Contributions of Different Sources to Total Predicted Annual Mean Nitrogen Dioxide Concentrations (µg/m³) in 2019**

| Receptor | Annual Mean Contribution (µg/m³) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 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.

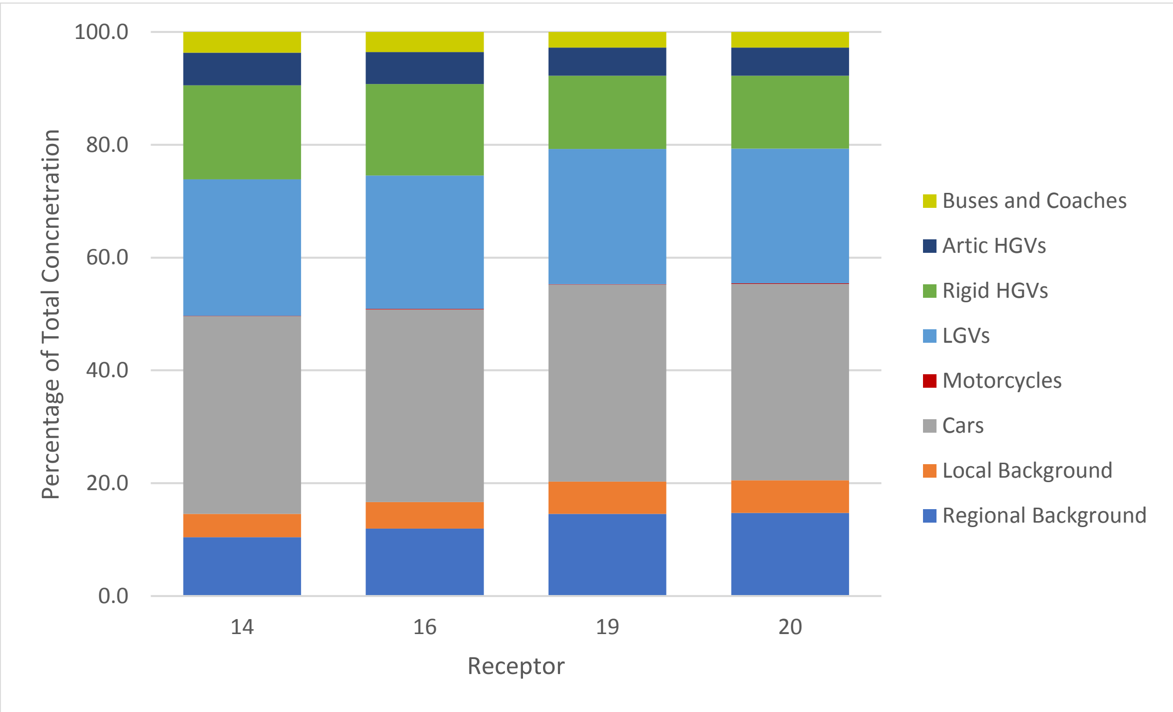


Figure 5: **Percentage Contributions of Different Sources to Total Predicted Annual Mean Nitrogen Dioxide Concentrations (µg/m³) at Receptors Exceeding the Air Quality Objective in 2019**

# 2 Discussion and Recommendations

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.

**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 µg/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 0 to 0) 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.

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.

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%).

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**

A4 Imagery ©2020 Google.

# 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: HYPERLINK "http://laqm.defra.gov.uk/" 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: HYPERLINK "http://www.dft.gov.uk/matrix/" 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.

# 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 |
| **$\mu g/m^3$** | Microgrammes per cubic metre |
| **NO** | Nitric oxide |
| **$NO_2$** | Nitrogen dioxide |
| **NOx** | 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 |

# Appendices

# Professional Experience

## Dr Clare Beattie, BSc (Hons) MSc PhD CSci MIEnvSc 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 MIEnvSc 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.

# Modelling Methodology

## Model Inputs

A4.1 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.

A4.2 Hourly sequential meteorological data from Herstmonceux for 2019 have been used in the model, which is considered suitable for this area.

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 AError! No text of specified style in document..1.

**Table A**Error! No text of specified style in document.**.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 |

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).

Figure AError! No text of specified style in document.**.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.

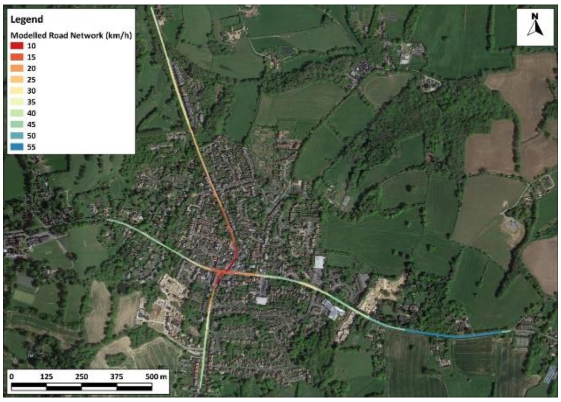


**Figure A**Error! No text of specified style in document.**.1: Modelled Road Network & Speed**

A5 Imagery © Google.

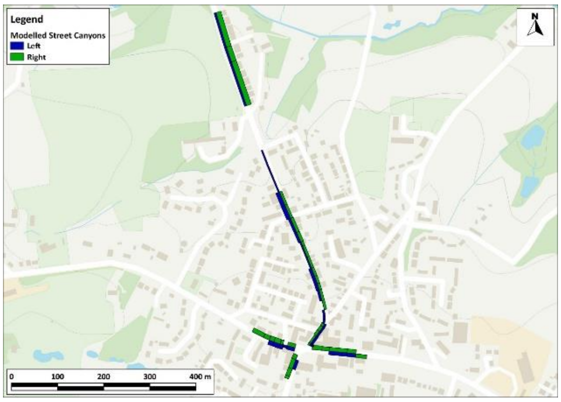


**Figure A**Error! No text of specified style in document.**.2: Modelled Street Canyons**



## Background Concentrations

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 µg/m$^3$.

## Model Verification

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 ($NOx = NO + NO_2$). The model has been run to predict the annual mean NOx 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.

The model output of road-NOx (i.e. the component of total NOx coming from road traffic) has been compared with the 'measured' road-NOx. Measured road-NOx has been calculated from the measured $NO_2$ concentrations and the predicted background $NO_2$ concentration using the NOx from $NO_2$ calculator (Version 7.1) available on the Defra LAQM Support website (Defra, 2020).

The unadjusted model has under predicted the road-NOx 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-NOx concentration for each receptor to provide adjusted modelled road-NOx concentrations.

The total nitrogen dioxide concentrations have then been determined by combining the adjusted modelled road-NOx concentrations with the predicted background $NO_2$ concentration within the NOx to $NO_2$ calculator. Figure A2.4 compares final adjusted modelled total $NO_2$ at each of the monitoring sites to measured total $NO_2$, and shows a close agreement.

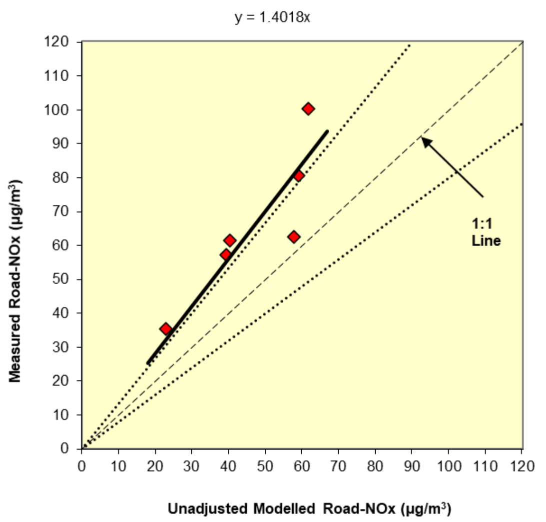


**Figure A**Error! No text of specified style in document.**.3: Comparison of Measured Road NOx to Unadjusted Modelled Road NOx Concentrations. The dashed lines show ± 25%.**

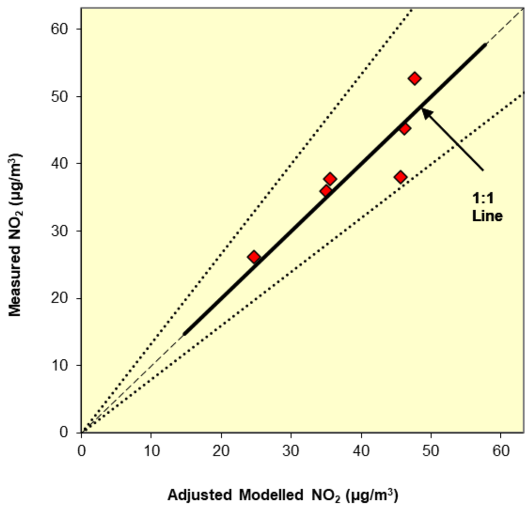


**Figure A**Error! No text of specified style in document.**.4: Comparison of Measured Total $NO_2$ to Final Adjusted Modelled Total $NO_2$ Concentrations. The dashed lines show ± 25%.**

6.1.1 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 A**Error! No text of specified style in document.**.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. µg/$m^3$). TG16 (Defra, 2018a) outlines that, ideally, a RMSE value within 10% of the air quality objective (4µg/$m^3$) would be derived. If RMSE values are higher than 25% of the objective (10 µg/$m^3$) 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

The model predicts road-NOx concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background $NO_2$ concentration, has been processed through the NOx to $NO_2$ 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 $NO_2$ based on the adjusted road-NOx and the background $NO_2$.

# Adjustment of Monitoring Data to Annual Mean

## Calculating Annualisation Factors

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%).

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.

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 A**Error! No text of specified style in document.**.3: TW66 Annualisation Factor Calculation**

| Period | Exposure Days | Raw Diffusion Tube Mean $NO_2$ Conc. (μg/m³) | Automatic Mean $NO_2$ Conc. (μg/m³) 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 AError! No text of specified style in document..4: 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 AError! No text of specified style in document..5: 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 AError! No text of specified style in document..6: Average Annualisation Factors**

| TW66 | TW67 | TW68 | TW69 | TW70 |
|---|---|---|---|---|
| 1.035 | 1.101 | 1.071 | 1.101 | 1.101 |

## Bias Adjustment

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:**
Executive summary

Experts in air quality
management & assessment

## Document Control

| Client | Tunbridge Wells Borough Council | Principal Contact | Dr Stuart Maxwell |
|---|---|---|---|

| Job Number | J4114 |
|---|---|

| Report Prepared By: | Paul BENTLEY |
|---|---|

Document Status and Review Schedule

| Report No. | Date | Status | Reviewed by |
|---|---|---|---|
| J4114B/1/F1 | [Publish Date] | 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 |

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

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

5 [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.

## Contents



## Tables



## Figures

# Introduction

5.1 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.

5.2 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.

5.3 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.

# Background

## Air Quality Strategy

5.4 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

5.5 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

5.6 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

5.7 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 7: Air Quality Criteria for Nitrogen Dioxide**

| Pollutant | Time Period | Objective |
|---|---|---|
| **Nitrogen Dioxide** | Annual Mean | 40 µg/m$^3$ |

5.8 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

5.9 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:

4. a qualitative or quantitative description of the impacts on local air quality arising from the development; and

5. a judgement on the overall significance of the effects of any impacts.

### *Impact Descriptors*

5.10 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 8** 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 8: 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 |

6 [a] Values are rounded to the nearest whole number.

7 [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.

7.1 Table 8 can usefully be adapted to apply specifically to annual mean nitrogen dioxide concentrations, as shown in **Table 9.**

**Table 9: Air Quality Impact Descriptors for Individual Receptors for Annual Mean Nitrogen Dioxide Concentrations**

| Annual Mean Concentration At Receptor In Assessment Year (µg/m³) | Change in Concentration (µg/m³) | | | | |
|---|---|---|---|---|---|
| | <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*

7.2 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:

**6.** the existing and future air quality in the absence of the development;

**7.** the extent of current and future population exposure to the impacts;

8. the influence and validity of any assumptions adopted when undertaking the prediction of impacts;

9. 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

10. 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.

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

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

# Assessment Methodology

7.5 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 2, 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.

7.6 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 likely[4] have been considered in this assessment, as adverse impacts elsewhere are unlikely other than for a very large development.

7.7 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).

7.8 Further predictions of future concentrations have then been made 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 $NO_2$ per additional car. While the conversion of NOx emitted by these additional cars to $NO_2$ is not truly linear, over the small magnitudes of change that are being considered (typically <2 µg/m$^3$) the relationship is so close to linear (see **Figure 8**) that using a more complex relationship is judged to be unnecessary.

7.9 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.

[4] I.e receptors above 37.8 µg/m$^3$ for consistency with Table 9.

### *Uncertainty*

7.10 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 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.

7.11 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 2). 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.

7.12 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).

7.13 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.

7.14 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.

7.15 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).

7.16 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 NOx emissions from the latest vehicles (Euro VI[5]) are now very low when compared with those from older models (ICCT, 2017).

7.17 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 NOx than previous (Euro 5 and earlier) models.

7.18 AQC has analysed trends in measured NOx 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 NOx emissions decline in the future at an 'average' site in the UK. In practice, the balance of evidence thus suggests that NOx 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.

7.19 The baseline traffic flows for future years (see Table A2.1 in Appendix 2) 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.

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

# Baseline Concentrations

## Monitoring Results

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

## Background Concentrations

7.21 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 10 and have been derived as described in Appendix 2. The background concentrations are all well below the objectives.

**Table 10: Estimated Annual Mean Background $NO_2$ Concentrations (µg/m$^3$)**

| 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** | | | | | | | | |

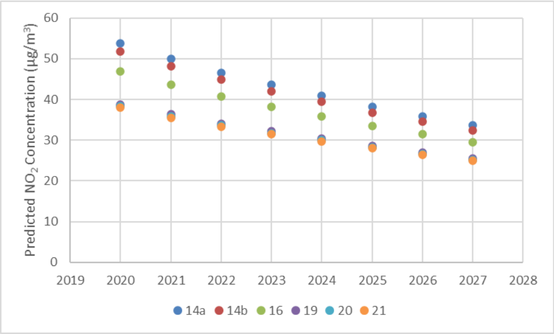
## Baseline Dispersion Modelling Results

7.22 Modelled baseline annual mean nitrogen dioxide concentrations are presented in **Table 11** and **Figure 7** for all years 2019 to 2027. The future year concentrations have allowed for traffic growth, as discussed in Paragraphs 7.7 and 7.19.

**Table 11: Modelled Baseline Annual Mean $NO_2$ Concentrations (µg/m$^3$) [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** | | | | | | | | |

8 [a] Exceedances of the annual mean objective are shown in bold.




**A7 Figure 7: Predicted Baseline $NO_2$ Concentrations (µg/m$^3$)**

8.1 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/m$^3$ in all years from 2020 to 2027.

8.2 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 AQMA[6].

8.3 The annual mean nitrogen dioxide concentrations are all below 60 µg/m$^3$ at every receptor; it is, therefore, unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded.

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

# 9 Future Development Impacts

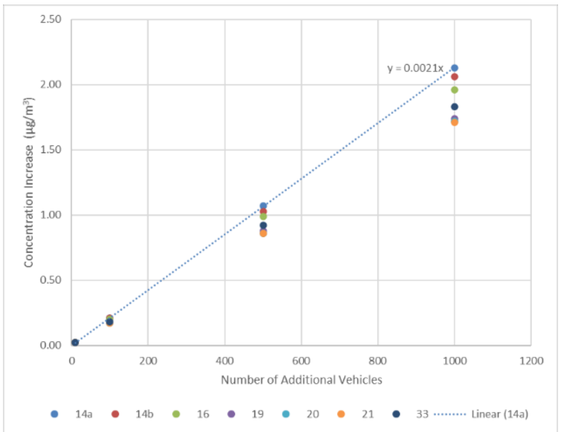
## Modelled Changes in Concentrations

9.1 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 12**. A sample graph from which the equation for Receptor 14a was calculated for 2020 is presented in **Figure 8**.

**Table 12: Modelled Nitrogen Dioxide Contributions from Increased Car Flows (µg/m$^3$)**

| 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 | |
| **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 | 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 14a** | 0.02 | 0.19 | 0.93 | 1.86 | 0.00186x |
| **Receptor 14b** | 0.02 | 0.18 | 0.90 | 1.80 | 0.0018x |
| **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 |




A8 **Figure 8: Modelled Nitrogen Dioxide Contributions from Increased Car Flows in 2020**

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

## Resultant Impacts

10.1 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 µg/m$^3$, 0.6 µg/m$^3$, 2.2 µg/m$^3$ and 4.2 µg/m$^3$ can be calculated for each receptor in each year (these magnitudes of change being the column headers from **Table 8**/**Table 9**). These are presented in Table A4.1 in Appendix 3.

10.2 The number of additional cars that would result in the total concentration moving into the next concentration band presented in **Table 8**/**Table 9** can also be calculated; these are presented in Table A4.3 in Appendix 3.

10.3 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 3.

10.4 These three sets of highly technical data are included in Appendix 3 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*

10.5 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 13**. 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 13: 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 |

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

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

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

# 14 Discussion and Conclusions

14.1 The three threshold categories presented in **Table 13** 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 13**, 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 11** and **Table 12**), 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 7.2, 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 13** is intended to be used, thus it has been assumed that any substantial adverse impacts are unacceptable.

14.2 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.

14.3 The bottom two rows of **Table 9** show that, where total concentrations are above 41.0 µg/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 µg/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 µg/m$^3$.

14.4 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.

14.5 It should also be noted that when the results from **Table 13** 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 7.19. As such the results in **Table 13** represent the worst-case impacts if used to assess against multiple developments traffic.

### *Summary*

14.6 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 13 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.**

14.7 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

14.8 The inherent uncertainty within the modelling, as described in Section 0, 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.

14.9 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.

# 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: HYPERLINK "http://www.dft.gov.uk/matrix/" 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.

# Glossary

A9 **AADT** Annual Average Daily Traffic

**A10** **ADMS-Roads** Atmospheric Dispersion Modelling System model for Roads

A11 **AQC** Air Quality Consultants

A12 **AQMA** Air Quality Management Area

A13 **AQO** Air Quality Objective

A14 **Defra** Department for Environment, Food and Rural Affairs

A15 **DfT** Department for Transport

A16 **EFT** Emission Factor Toolkit

A17 **EPUK** Environmental Protection UK

A18 **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

A19 **HDV** Heavy Duty Vehicles (> 3.5 tonnes)

**A20** **HMSO** Her Majesty's Stationery Office

**A21** **HGV** Heavy Goods Vehicle

**A22** **IAQM** Institute of Air Quality Management

**A23** **kph** Kilometres Per hour

**A24** **LAQM** Local Air Quality Management

**A25** **LGV** Light Goods Vehicle

A26 **µg/m³** Microgrammes per cubic metre

**A27** **NO** Nitric oxide

A28 **$NO_2$** Nitrogen dioxide

A29 **NOx** Nitrogen oxides (taken to be $NO_2$ + NO)

**A30** **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

**A31** **Standards** A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal

**A32** **TWBC** Tunbridge Wells Borough Council

# Appendices

# 1 Professional Experience

## Dr Clare Beattie, BSc (Hons) MSc PhD CSci MIEnvSc 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 MIEnvSc 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.

# 2 Modelling Methodology

## Model Inputs

A32.1 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.

A32.2 Hourly sequential meteorological data from Herstmonceux for 2019 have been used in the model, which is considered suitable for this area.

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 AError! No text of specified style in document..**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 flows[7].

[7] 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 A**Error! No text of specified style in document.**.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 |

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-NOx outputs.

## Model Post-processing

The model predicts road-NOx concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background $NO_2$ concentration, has been processed through the NOx to $NO_2$ 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 $NO_2$ based on the adjusted road-NOx and the background $NO_2$.

# 3 Calculation of Concentration Increases and Impacts from Additional Cars

Using the equations shown in **Table 12**, the maximum number of additional cars that could be accommodated without triggering a change of more than 0.2 µg/m³, 0.6 µg/m³, 2.2 µg/m³, and 4.2 µg/m³ has been calculated, as presented in Table A4.1. These concentration values represent the column change thresholds for impact descriptors in **Table 9**. 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 A**Error! No text of specified style in document.**.2: Maximum Additional Cars Without Exceeding Concentration Threshold**

| Receptor | Concentration Threshold | | | |
|---|---|---|---|---|
| | <0.2 µg/m³ | <0.6 µg/m³ | <2.2 µg/m³ | <4.2 µg/m³ |
| **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 | Concentration Threshold | | | |
|---|---|---|---|---|
| | <0.2 µg/m³ | <0.6 µg/m³ | <2.2 µg/m³ | <4.2 µg/m³ |
| **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 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 |

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 12** with the impact descriptor matrix in Table 8.

**Table A**Error! No text of specified style in document.**.3: 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 | Impact at Receptor with Concentration Increase | | | |
|---|---|---|---|---|
| | <0.2 µg/m³ | <0.6 µg/m³ | <2.2 µg/m³ | <4.2 µg/m³ |
| **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 |
| **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 |

In some cases an increase in concentration that is between two of the threshold values used in **Table A**Error! No text of specified style in document.**.2** and **Table A**Error! No text of specified style in document.**.3** will cause the total concentration to move into a higher concentration band (See Table 8), 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 12, 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 A**Error! No text of specified style in document.**.4: 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 | 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 |
| **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 |
| **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 |

Utilising the information from Table A4.1, **Table A**Error! No text of specified style in document.**.3** 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 µg/m$^3$ causes the impact to increase from 'negligible' directly to 'moderate adverse', as occurs in the bottom two rows of Table 8 and **Table 9**. In these cases, any additional cars above the number stated in the 'negligible' column impacts would lead to 'moderate adverse' impacts.

**Table A**Error! No text of specified style in document.**.5: 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 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 | Negligible | Slight Adverse | Moderate Adverse |
|---|---|---|---|
| **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 |
| **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

<Please add a description of any abbreviation included in the AQAP – An example is provided below>

| 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](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-Strategy-2015-26-low-res.pdf
- http://www.phoutcomes.info/public-health-outcomes-framework#page/0/gid/1000043/pat/6/par/E12000008/ati/101/are/E07000114