

Stonepound Crossroads AQMA - Air Quality Modelling

Mid Sussex District Plan - Regulation 19

Mid Sussex District Council

Project number: 60671970

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Quality information

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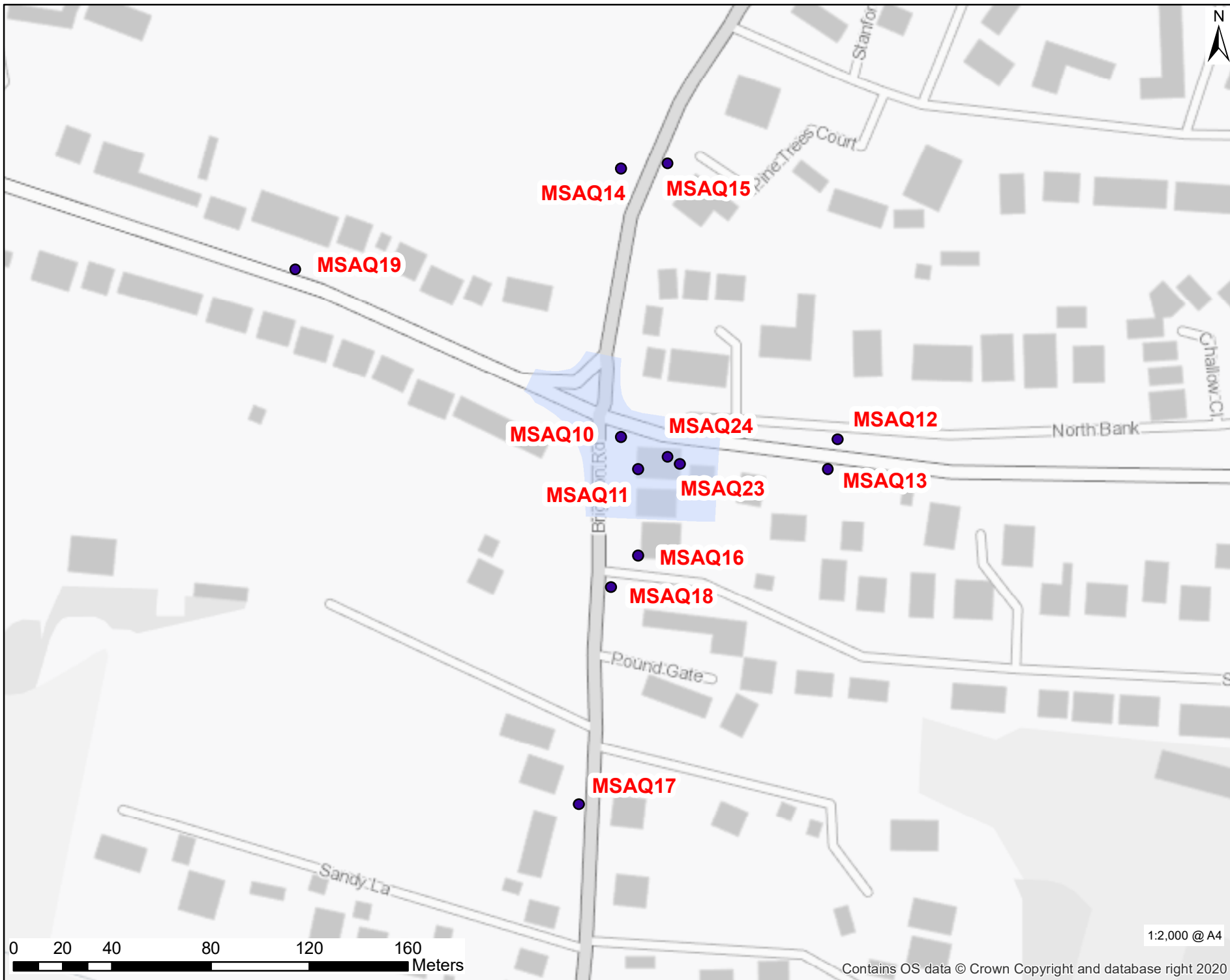
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1. Introduction

- 1.1 The requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act 1995 (as amended by the Environment Act 2021) (HM Government, 1995) places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether the air quality objectives are likely to be achieved. Where an exceedance is considered likely through monitoring or modelling, the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.
- 1.2 Mid Sussex District Council (MSDC) is undertaking a review of its adopted District Plan 2014-2031. The Council has commissioned AECOM Limited to conduct an air quality assessment to inform Regulation 19 of the District Plan Review and provide an evidence base.
- 1.3 The work presented in this report focuses on the impact of traffic related emissions due to planned development in the District Plan Review on one AQMA in the District – Stonepound Crossroads in Hassocks.
- 1.4 In March 2012, an AQMA at Stonepound Crossroads, Hassocks, was declared due to exceedances of the nitrogen dioxide (NO₂) annual mean objective. The high measured NO₂ concentrations have been attributed to the topography of the area, combined with the volume of traffic operating through the junction of the A273 and the B2116 Keymer Road to the west of Hassocks village centre. Since the AQMA was declared there has been an overall reduction in measured NO₂ concentrations and there have been no exceedances of the annual mean objective within the AQMA since 2018. The Stonepound Crossroads AQMA and the MSDC monitoring sites near the AQMA are shown in Figure 1.
- 1.5 The main aims of this study are to:
 - Identify potentially sensitive human receptor locations (such as houses and schools) within Stonepound Crossroads AQMA;
 - Predict annual mean NO₂ concentrations for several scenarios at selected receptors as detailed below:
 - Baseline year (2019): represents air quality in a past year (2019);
 - 2039 Do Minimum (DM) Reference Case: future assessment year which does not include the influence of planned development from the Mid Sussex District Plan Review, but does include the influence of forecast growth (using TEMPro) and strategic planned development in neighbouring local authorities;
 - 2039 Do Something (DS) Scenario: future assessment year builds on the Reference Case and includes the influence of planned development from the Mid Sussex District Plan Review;
 - Determine if there are any exceedances of the annual mean or hourly mean NO₂ objectives within Stonepound Crossroads AQMA in 2019 and 2039; and
 - Assess the air quality impacts of planned development in the District Plan Review – Regulation 19 on the Stonepound Crossroads AQMA.



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PROJECT
Mid Sussex District Plan Review – Regulation 19

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LEGEND

- Monitoring Sites
- AQMA

NOTES
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FINAL
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60671970
SHEET TITLE
Stonepound AQMA
monitoring sites

SHEET NUMBER
Figure 1

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2. Policy Context

National Air Quality Legislation

- 2.1 The principal air quality legislation within the United Kingdom is the Air Quality Standards Regulations (as amended 2016) (HM Government, 2016), including amendments, such as 'The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020' (UK Statutory Instruments, 2020).
- 2.2 The UK is no longer a member of the European Union, however, some types of EU legislation such as Regulations and Decisions, are directly applicable as law in an EU Member State. This meant that, as a Member State, these types of legislation applied automatically in the UK, under section 2(1) of the European Communities Act 1972 (c.68), without any further action required by the UK. These types of legislation are published by the Publications Office of the European Union on the EUR-Lex website and are now published on legislation.gov.uk as 'legislation originating from the EU'.
- 2.3 Other types of EU legislation, such as Directives, are indirectly applicable, which means they require a Member State to make domestic implementing legislation before becoming law in that State. Legislation as it applied to the UK on 31st December 2020 is now a part of UK domestic legislation, under the control of the UK's Parliaments and Assemblies. The Clean Air for Europe (CAFE) programme (European Union, 2001) revisited the management of Air Quality within the EU and replaced much of the existing air quality legislation with a single legal act, Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe (Council of European Union, 2008). This Directive repealed and replaced the EU Framework Directive 96/62/EC on Ambient Air Quality Assessment and Management and its associated Daughter Directives 1999/30/EC (Council of European Communities, 1999), 2000/69/EC (Council of European Communities, 2000), 2002/3/EC (Council of European Communities, 2002) (relating to limit values for ambient air pollutants) and the Council Decision 97/101/EC (Council of European Union, 1997) which established a reciprocal exchange of information and data within Member States.
- 2.4 The UK National Air Quality Standard (AQS) (Defra, 2000) was initially published in 2000, under the requirements of the Environment Act 1995 (HM Government, 1995), as amended by the Environment Act 2021 (HM Government, 2021). The 2007 version of the AQS (Defra, 2007) set objectives for key pollutants as a tool to help local authorities manage local air quality improvements, with the aim of avoiding, preventing or reducing harmful effects on human health and on the environment as a whole.

National Clean Air Strategy (2019)

- 2.5 In 2019, the UK government released its Clean Air Strategy 2019 (Defra, 2019), part of its 25 Year Environment Plan. The Strategy places greater emphasis on improving air quality in the UK than has been seen before and outlines how it aims to achieve this (including the development of new enabling legislation).
- 2.6 Air quality management focus in recent years has primarily related to one pollutant, NO₂, and its principal source in the UK, road traffic. However, the 2019 Strategy broadened the focus to other areas, including domestic emissions from wood burning stoves and from agriculture.

A Green Future: 25 Year Plan to Improve the Environment

- 2.7 The 25 Year Environment Plan, originally published in January 2018, sets out the actions the UK Government will take to help the natural world regain and retain good health (HM Government, 2018). The Environment Plan was updated in 2023 with the publication of the Environmental Improvement Plan 2023, which includes targets specifically for England (HM Government, 2023). The plan outlines several actions that are being taken to improve air quality, most notably the publication of the Clean Air Strategy (referenced earlier) and the introduction of several Clean Air Zones (CAZs) across England. Emphasis is also placed on PM_{2.5} concentrations, with several new targets for PM_{2.5} concentrations stated within the plan including:
 - "A legal target to reduce population exposure to PM_{2.5} by 35% in 2040 compared to 2018 levels, with a new interim target to reduce by 22% by the end of January 2028.

- A legal target to require a maximum annual mean concentration of 10 micrograms of PM_{2.5} per cubic metre (µg/m³) by 2040, with a new interim target of 12 µg/m³ by the end of January 2028.”

Environment Act (2021)

- 2.8 The Environment Act 2021 (HM Government, 2021) was approved on 9th November 2021, after being first introduced to Parliament in January 2020 to address environmental protection and the delivery of the Government’s 25-year Environment Plan following Brexit. It includes provisions to establish a post-Brexit set of statutory environmental principles and ensure environmental governance through an environmental watchdog, the Office for Environmental Protection (OEP). Part IV of the Environment Act (2021) requires the Government to update the AQS which contains standards, objectives and measures for improving ambient air quality. Details regarding the AQS and recent updates are provided below.
- 2.9 The Environment Act (2021) proposes that the Secretary of State will publish a report reviewing the AQS every five years (as a minimum and with yearly updates to Parliament), in the form of the Environmental Improvement Plan (HM Government, 2018).

UK Air Quality Strategy

- 2.10 A new AQS was published in April 2023 (Defra, 2023). It sets out the actions the government expects local authorities to take in support of achieving the new national PM_{2.5} targets, by reducing emissions from sources within their control.
- 2.11 The Air Quality Objectives set out in the AQS (Defra, 2007) (Defra, 2023) have been outlined in legislation solely for the purposes of local air quality management. The objectives for the pollutants of relevance to this assessment are displayed in Table 1 including the new national targets for PM_{2.5} concentrations stated within the Environment Act 2021, the Environmental Improvement Plan 2023 and the Air Quality Strategy 2023.

Table 1: UK AQS Objectives

Pollutant	Averaging Period	Value	Maximum Permitted Exceedances / Target
Nitrogen Dioxide (NO ₂)	Annual Mean	40 µg/m ³	None
	Hourly Mean	200 µg/m ³	18 times per year
Particulate Matter (PM ₁₀)	Annual Mean	40 µg/m ³	None
	24-Hour Mean	50 µg/m ³	35 times per year
Fine Particulate Matter (PM _{2.5})		^a 20 µg/m ³	None
	Annual Mean	^b 10 µg/m ³	By 2040
		^c 12 µg/m ³	Interim target, (by end of January 2028)
	Exposure reduction compared to 2017	^b 35%	By 2040
		^c 22%	Interim target, (by end of January 2028)

^a Air Quality Strategy 2007 ^b The Environment Act 2021 ^c Environmental Improvement Plan 2023, Air Quality Strategy 2023

Regional Planning Policy

- 2.12 The Air Quality and Emissions Mitigation Guidance for Sussex, 2021 (Sussex-air partnership, 2021) deals with the pollutants from transport which are regulated under the LAQM, and the assessment and control of dust during demolition and construction.
- 2.13 The guidance sets out that air quality is a material consideration in deciding a planning application and the document aims to:
- provide clarity to how authorities intend interpreting relevant Local Plan policies;
 - provide advice for developers and their consultants on how to assess and mitigate the impact that new developments may have on local air quality and
 - detail a consistent approach by developers and Local Planning Authorities (LPAs) to address impacts on local air quality; ensure optimum scheme design to reduce emissions and/or exposure and avoid unnecessary delays in the planning process.

The West Sussex Plan 2017-22

- 2.14 The West Sussex Plan 2017-2022 (West Sussex County Council, 2017) sets out how the County Council plans to shape its services for the next five years. It contains their vision for West Sussex and what they are trying to achieve for the residents and county. It includes a headline target for improving air quality in AQMAs; to improve concentrations in all ten AQMAs by 2022.

West Sussex Transport Plan 2022-2036

- 2.15 The West Sussex Transport Plan (West Sussex County Council, 2022) sets out the strategy for guiding future investment in highways and transport infrastructure. It also sets a framework for considering transport infrastructure requirements associated with future development across the county. The Plan includes the following five strategies to guide the approach to maintain, manage and invest in transport and to improve the quality of life for West Sussex residents:
- Active Travel Strategy;
 - Shared Transport Strategy;
 - Rail Strategy;
 - Access to Gatwick Airport Strategy; and
 - Road Network Strategy
- 2.16 A number of transport strategies form part of the Transport Plan. Each strategy focuses on delivering outcomes such as, to tackle the root causes of safety, security and health issues; reduce casualties and fear of crime; and improve air quality and public health.
- 2.17 The strategy is supported by a range of initiatives that aim to achieve a transport network that feels and is safer and healthier to use.

West Sussex Our Council Plan 2021-2025

- 2.18 The Plan sets out the priorities for the Council over the next four years for people who live and work in West Sussex (West Sussex County Council, 2021). The Plan focuses on four priorities which are underpinned by a cross-cutting theme of tackling climate change:
- Keeping people safe from vulnerable situations;
 - A sustainable and prosperous economy;
 - Helping people and communities to fulfil their potential; and
 - Making the best use of resources.
- 2.19 The Plan also contains a set of performance indicators that will be used to measure the impact of the work in the county and whether the four priorities have been delivered.

West Sussex Air Quality Plan

- 2.20 The County Council, District and Borough Councils have developed a joint approach to deliver actions and interventions to tackle air pollution. The 'Breathing Better' document (West Sussex County

Council, 2023) provides information on the partnership approach to improving air quality in West Sussex. The council recognises that although they are not a large city and therefore don't suffer with the same difficulties, there are areas where average levels breach air quality limits and that improvements are needed to combat this. Nevertheless, the council are continuing to encourage behavioural awareness and choices such as anti-idling, switching to electric, or walking and cycling. These are considered important interventions for partners to encourage for environmental and public health reasons that go beyond improving air quality.

- 2.21 The Plan includes the responsibilities of the local authorities, the health and environmental impacts and the pollutants of concern. It also covers the strategic context within which the Council is working. The Plan also contains the activity related to air quality that is currently being undertaken and the approach that will be taken going forward.

The West Sussex Walking and Cycling Strategy 2016-26

- 2.22 The West Sussex Walking and Cycling Strategy (West Sussex County Council, 2016) sets out the aims and objectives for walking and cycling in West Sussex. The strategy contains a prioritised list of over 300 potential walking and cycling improvements suggested by a range of stakeholders and partner organisations. The importance of increasing levels of walking and cycling in helping to tackle poor air quality is a key focus of this strategy.

The Rights of Way Management Plan 2018-28

- 2.23 The Rights of Way Management Plan 2018-28 (West Sussex County Council, 2018) sets out West Sussex County Council's approach to managing the Public Rights of Way (PRoW) network, as well as signposting how improvements can be achieved over the next ten years. The Plan highlights the importance of green space in improving air quality.

Mid Sussex District Plan 2021-2039

- 2.24 The Mid Sussex District Plan (Mid Sussex District Council, 2023) will shape the future of Mid Sussex up to 2039 by providing a framework for new development, employment growth, infrastructure, and measures to ensure the protection of the countryside.
- 2.25 Draft Policy DPT1: Placemaking and Connectivity requires new development to demonstrate that all sustainable travel interventions have been fully explored and sustainable mitigation maximised. Improved air quality is a benefit of encouraging more people to walk and cycle through active travel measures.
- 2.26 Draft Policy DPN9: Air Quality requires development to demonstrate that there is not an unacceptable impact on air quality and development proposals likely to have an impact on local air quality, including in or near AQMAs, will need to demonstrate that measures and/or mitigation are incorporated into the design to minimise any impacts associated with air quality.

Stonepound Crossroads Air Quality Action Plan

- 2.27 The Action Plan (Mid Sussex District Council, 2020) sets out measures intended to deliver improvements to air quality by reducing pollution emitted from vehicles and the amount of traffic passing through the crossroads. It also sets out the rationale behind the measures, costs and benefits and a timetable for implementation. The AQAP includes direct actions specific to the area of the crossroads and measures relevant to the District as a whole.

Other Relevant Policy, Standards and Guidance

- 2.28 There is currently no statutory guidance on the method by which an air quality assessment should be undertaken. Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) (Environmental Protection UK (EPUK) & IAQM, 2017) and the Department for Environment, Food and Rural Affairs (Defra) (Defra, 2022) have published their own guidance for carrying out air quality assessments for development control. These guidance documents have been used in this air quality assessment to present best practice for mitigation measures and for the significance of effects of the District Plan Review.

3. Methodology

- 3.1 This section presents the methodology used to model the air quality in the study area.
- 3.2 The following sources of information and data have been used to form the basis of the air quality assessment:
 - Department for Environment, Food and Rural Affairs (Defra)'s Air Quality Background Concentration Maps based on a 2018 base year (Defra, 2023a);
 - Defra's Vehicle Emission Factors (Defra, 2023b);
 - Air quality monitoring data for 2019 (Mid Sussex District Council, 2020); and
 - Traffic count and speed data provided by MSDC /SYSTRA Limited for 2019 and 2039.
- 3.3 The modelling assessment was conducted following methodology within Defra's LAQM.TG(22) Technical Guidance (Defra, 2022).

Traffic Data

- 3.4 Traffic data were provided by the Mid Sussex District Council /SYSTRA Transport team for a series of road links within the AQMA at Stonepound Crossroads. These links are shown in Figure 2 and are as follows:
 - London Road A273,
 - Brighton Road A273,
 - Keymer Road B2116, and
 - Hurst Road B2116.
- 3.5 Traffic data were provided for each of these links, in the form of 24-hour Annual Average Daily Traffic (AADT) flows, with percentage heavy duty vehicle (HDV) flows and average speed. Queuing traffic was taken into account in the model by reducing vehicle speeds to 10 kilometres per hour (kph) at all four roads into the crossroads. The length of queues back from Stonepound Crossroads were 15 metres (m) on London Road, 17m Brighton Road, 14m on Hurst Road and 11m on Keymer Road.
- 3.6 A summary of the traffic data used in the air quality assessment is given in Table 2. Data for 2019 were provided as the baseline year, and 2039 for the future year scenarios.

Table 2: Traffic Data used in the Air Quality Assessment

Link	Road Name	2019 Base AADT	2019 Base HDV %	2019 Base Speed (kph)	2039 DM AADT	2039 DM HDV %	2039 DM Speed (kph)	2039 DS AADT	2039 DS HDV %	2039 DS Speed (kph)
21117_21102	London Road	6542	3.09%	18.3	8100	2.09%	17.3	8227	2.06%	17.2
21230_21102	Keymer Road	4169	1.82%	23.5	5297	2.59%	21.3	5345	2.52%	21.1
12814_21102	Brighton Road	5251	5.01%	21.6	4613	5.87%	19.4	4631	5.79%	19.3
21224_21102	Hurst Road	4618	2.01%	27.1	6014	1.91%	25.4	6330	1.70%	24.0

Receptors

- 3.7 A desk-top review using aerial mapping was conducted to select representative locations where people are likely to be present, such as residential properties or schools.
- 3.8 The locations of the chosen sensitive receptors within and in the vicinity of the AQMA are included in Figure 2 and in Table 3.
- 3.9 All receptors were modelled at ground floor level, at a height of 1.5 metres above ground, which represents the typical breathing zone height of an average person.

Table 3: Selected Receptor Locations

AQMA Receptor ID	Road Name	Within AQMA	X co-ordinate (m)	Y co-ordinate (m)	Height (m)
1	Keymer Road/ Brighton Road	Yes	529918	115484	1.5
2	Brighton Road	Yes	529917	115465	1.5
3	Keymer Road	Yes	529949	115477	1.5
4	Hurst Road/ London Road	No	529881	115539	1.5
5	London Road/ Keymer Road	No	529920	115514	1.5
6	Brighton Road/ Hurst Road	No	529881	115486	1.5
7	Hurst Road	No	529753	115574	1.5
8	Hurst Road	No	529675	115565	1.5
9	Hurst Road	No	529503	115644	1.5
10	Hurst Road	No	529342	115709	1.5
11	Hurst Road	No	529212	115742	1.5
12	Hurst Road	No	529168	115812	1.5
13	London Road	No	529934	115592	1.5
14	London Road	No	529966	115698	1.5
15	London Road	No	530070	115791	1.5
16	London Road	No	530089	115898	1.5
17	Keymer Road	No	530130	115496	1.5
18	Keymer Road	No	530025	115468	1.5
19	Keymer Road	No	529954	115511	1.5
20	Keymer Road	No	530269	115469	1.5
21	Keymer Road	No	530452	115475	1.5
22	Brighton Road	No	529886	115351	1.5
23	Brighton Road	No	529921	115388	1.5
24	Brighton Road	No	529908	115299	1.5



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Model Setup

- 3.10 Road traffic emissions of nitrogen oxides (NO_x) were derived using Defra's latest version of the Emission Factor Toolkit (EFT v11.0) at the time of assessment and associated guidance and tools¹.
- 3.11 Detailed dispersion modelling was undertaken using the current version of ADMS-Roads (v5.0) to model concentrations of NO_x using the parameters in Table 4 for the following scenarios:
- 2019 Baseline – 2019 AADT, 2019 emission factors and 2019 background concentrations;
 - 2039 Do Minimum (Reference Case) – 2039 AADT without Local Plan, 2030 emission factors and 2030 background concentrations;
 - 2039 Do Something (Scenario) – 2039 AADT with Local Plan, 2030 emission factors and 2030 background concentrations;
- 3.12 Version 11.0 of the EFT and Defra's associated tools provide data from 2019 to 2030. For this reason, 2019 emission rates and background concentrations were used for the baseline year scenario, and 2030 emission rates and background concentrations were used for the future year scenarios.

Table 4: General ADMS-Roads Model Conditions

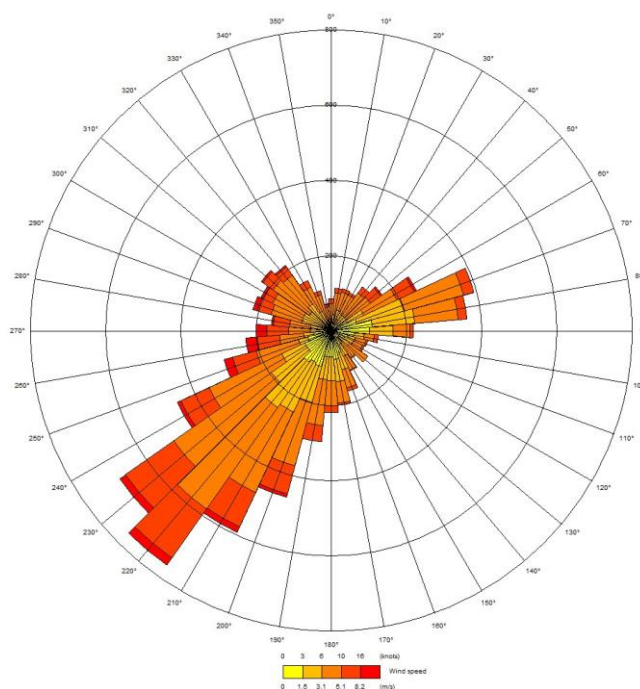
Variables	ADMS-Roads Model Input
Surface roughness at source	0.5m
Surface roughness at Meteorological Site	0.2m
Minimum Monin-Obukhov length for stable conditions	30m
Terrain types	Flat
Receptor location	x, y coordinates determined by GIS, z = 1.5m for human receptors.
Emissions	NO _x – Defra's EFT v11.1
Meteorological data	1 year (2019) hourly sequential data from Gatwick meteorological station.
Receptors	Selected receptors
Vehicle Queue Speed	10kph
Queue Road Lengths	London Road:15m, Brighton Road:17m Hurst Road:14m Keymer Road:11m
Model output	Long-term (annual) mean NO _x concentrations.

Meteorological Data

- 3.13 One year (2019) of hourly sequential observation data from Gatwick meteorological station was used in this assessment to correspond with the baseline traffic data and monitoring data used for model verification. The station is located approximately 33 km north of the AQMA and experiences meteorological conditions that are representative of those experienced within the air quality study area.
- 3.14 Figure 3 shows that the dominant direction of wind was from the south-west, as is typical for the UK.

¹ <https://laqm.defra.gov.uk/>

Figure 3: Wind Rose, Gatwick Airport Meteorological Data, 2019



Background Data

- 3.15 Background concentrations of nitrogen dioxide (NO₂) and NO_x for 2019 and 2030 were sourced from Defra’s 2018-based 1x1km background maps (Defra, 2023a).
- 3.16 The background data presented in Table 5 shows that the mapped background concentrations are predicted to decrease between 2019 and 2030. Contributions from explicitly modelled source sectors were removed from the background concentrations, as outlined in Table 5, in accordance with Defra guidance (Defra, 2022).

Table 5: Defra Mapped Background Pollutant Concentrations (µg/m³)

Receptor ID	Grid Square (X, Y)	Annual Mean Concentrations (µg/m ³)			
		2019 NO ₂	2019 NO _x	2030 NO ₂	2030 NO _x
1-14,19, 22-24	529500,115500	9.4	12.2	6.7	8.6
15-18, 20, 21	530500,115500	9.7	12.6	7.1	9.1

Note: Sectors removed as emissions included in detailed dispersion modelling: Motorway (in of 1x1km grid square), Trunk A road (in of 1x1km grid square) and Primary A Road (in of 1x1km grid square)

Verification

- 3.17 Model verification is the process by which the performance of the model is assessed to identify any discrepancies between modelled and measured concentrations at air quality monitoring sites within the study area.
- 3.18 Modelled predictions were made for annual mean NO₂ concentrations at local authority monitoring sites in order to compare monitored and modelled NO₂ concentrations. The comparison of model outputs was made to 2019 monitoring data in order to correspond with the baseline year of assessment, traffic data and meteorological data.
- 3.19 From these sites, only those representative of modelled sensitive receptor locations and with sufficient data capture (2019) were considered suitable for the purposes of model verification. Following detailed analysis of each monitoring location in the study area, a total of four

monitoring sites were taken forward in the model verification process. Table 6 details the sites used in model verification.

- 3.20 Two diffusion tube sites located adjacent to bus stops (MSAQ14, MSAQ18) were excluded from model verification to prevent the influence of localised emissions from buses idling. Diffusion tubes MSAQ11, MSAQ16, MSAQ23 and MSAQ24 were located on building façades set back at least 5m from the kerb. While representative of relevant exposure, these sites are not suitable for the purposes of model verification, due to their proximity to driveways and associated vehicular emissions. Two further sites (MSAQ12 and MSAQ13) were also excluded due to them not being representative of sensitive receptors, with the likely occurrence of a street canyon effect from dense woodland either side of the road.

Table 6: Local Authority Monitoring Sites used in Model Verification

Site ID	Site Type	Site Name	Grid reference (X, Y)
MSAQ10	Roadside	Stonepound Crossroads Hassocks	529911, 115489
MSAQ15	Kerbside	London Road	529930, 115600
MSAQ17	Kerbside	Brighton Road	529894, 115340
MSAQ19	Roadside	Hurst Road	529779, 115556

- 3.21 Following Defra's Technical Guidance LAQM.TG(22), model performance was analysed at these four monitoring sites. Without adjustment the root mean square error (RMSE) was 13.0 $\mu\text{g}/\text{m}^3$. The RMSE should ideally be less than 10% of the relevant air quality objective (for NO_2 , 4.0 $\mu\text{g}/\text{m}^3$) but less than 10.0 $\mu\text{g}/\text{m}^3$ is acceptable.

- 3.22 As such a model adjustment factor was calculated (2.63) and applied to the model results. After adjustment the RMSE was 4.1 $\mu\text{g}/\text{m}^3$ (see Table 7).

Table 7: Verification details

Number of Sites	Number of Monitoring Sites within $\pm 10\%$ of the Monitored Concentration Pre-Adjustment	RMSE pre-adjustment ($\mu\text{g}/\text{m}^3$)	Model Adjustment Factor	Number of Sites within $\pm 10\%$ of the Monitored Concentration Post Adjustment	RMSE post adjustment ($\mu\text{g}/\text{m}^3$)	Fractional Bias post adjustment)
4	1	13.0	2.63	2	4.1	0.0

4. Baseline Air Quality

Local Air Quality Management

- 4.1 Under the requirements of Part IV of the Environment Act (1995) (as amended by the Environment Act 2021), MSDC has carried out a review and assessment of local air quality.
- 4.2 MSDC undertake non-automatic monitoring of NO₂ at 33 diffusion tube sites across the district. Measured concentrations were below the annual mean objective value in 2020, ranging from 6.1 µg/m³ to 32.5 µg/m³.
- 4.3 MSDC's diffusion tube monitoring locations around the Stonepound Crossroads AQMA are shown in Table 8 and in Figure 1.
- 4.4 NO₂ concentrations have declined slightly since 2016 and there have been no exceedances of the annual mean objective since 2018. In 2020, there was a further decrease compared to concentrations measured in 2019. This is largely as a result of impacts from COVID-19 and the associated restrictions on activity during lockdown which led to lower traffic flows across the country.

Table 8: MSDC NO₂ Diffusion Tube Monitoring Data in the Study Area

Site ID	Annual Mean NO ₂ Concentration (µg/m ³)						
	2016	2017	2018	2019	2020	2021	2022
MSAQ10	43.4	38.8	41.2	39.4	28.4	31.3	30.7
MSAQ11	43.2	38.5	40.1	36.3	27.6	29.6	30.4
MSAQ12	38.2	33.7	33.5	33.9	23.9	25.2	23.7
MSAQ13	44.7	43.8	38.9	36.6	26.1	30.0	29.1
MSAQ14	36.0	32.5	34.0	33.5	26.0	26.1	26.9
MSAQ15	37.9	35.1	35.1	34.0	26.0	27.7	27.8
MSAQ16	20.7	19.8	19.9	18.0	13.6	N/A	N/A
MSAQ17	28.0	25.7	28.7	24.3	20.6	22.0	22.5
MSAQ18	33.4	29.5	28.1	29.3	17.9	21.5	17.4
MSAQ19	18.7	18.6	17.4	15.7	11.9	13.5	12.47
MSAQ23	35.3	33.9	34.5	33.4	23.4	24.4	25.7
MSAQ24	28.3	23.1	24.0	22.9	17.8	19.3	18.8

Note: Values in bold exceed the annual mean objective value of 40 µg/m³

Background Concentrations

- 4.5 The selected sensitive receptors and their adjusted background concentrations from Defra's latest background maps (Defra, 2023a) are shown in Table 5. The data show that the mapped background concentrations are well below the NO₂ annual mean air quality objective within the study area.

5. Modelled Pollutant Concentrations

5.1 Modelled results at all receptors are presented in Table 9. The key results are summarised in the paragraphs below the table.

Table 9: Predicted Annual Mean NO₂ Concentrations at Selected Receptors

Receptor ID	X co-ordinate	Y co-ordinate	Height (m)	NO ₂ Annual Mean (µg/m ³)			Change between DS and DM
				2019 Baseline	2039 Ref Case (DM)	2039 Scenario (DS)	
1	497611	149266	1.5	26.4	13.2	13.3	<0.1<0.1
2	498041	150386	1.5	23.0	11.8	11.7	<0.1<0.1
3	497710	149413	1.5	19.0	10.6	10.6	<0.1<0.1
4	497700	149413	1.5	20.6	11.0	11.0	<0.1<0.1
5	498097	150573	1.5	28.4	14.0	14.1	0.1<0.1
6	498421	150809	1.5	20.9	11.0	11.0	<0.1<0.1
7	498422	150794	1.5	18.0	10.1	10.1	<0.1<0.1
8	497898	149991	1.5	14.3	8.6	8.6	<0.1<0.1
9	497880	150002	1.5	14.7	8.8	8.8	<0.1<0.1
10	497789	149767	1.5	21.0	11.3	11.4	<0.1<0.1
11	498618	150869	1.5	13.6	8.4	8.4	<0.1<0.1
12	497797	149519	1.5	14.7	8.8	8.8	<0.1<0.1
13	496993	148897	1.5	24.3	12.3	12.4	0.1<0.1
14	497970	150157	1.5	25.2	12.7	12.7	<0.1<0.1
15	497974	150153	1.5	17.6	10.1	10.1	<0.1<0.1
16	498869	150912	1.5	18.3	10.3	10.3	<0.1<0.1
17	497749	149548	1.5	14.8	9.3	9.3	<0.1<0.1
18	498179	150609	1.5	16.7	10.0	10.1	<0.1<0.1
19	497829	150051	1.5	18.2	10.2	10.2	<0.1<0.1
20	497845	150025	1.5	16.1	9.9	10.0	<0.1<0.1
21	497989	150016	1.5	12.6	8.4	8.4	<0.1<0.1
22	498655	150788	1.5	19.3	10.2	10.2	<0.1<0.1
23	498017	150248	1.5	18.7	10.0	10.0	<0.1<0.1
24	497653	150024	1.5	23.6	11.8	11.8	<0.1<0.1

5.2 Annual mean NO₂ concentrations were modelled at 24 selected sensitive receptors close to and within the AQMA study area.

5.3 All of the 24 selected receptors were predicted to have annual mean NO₂ concentrations below the annual mean 40 µg/m³ air quality objective in all years. There are therefore unlikely to be any exceedances of the hourly mean objective. Concentrations are predicted to decline in 2039 due to future improvements in vehicle fleet and a reduction in background levels.

5.4 In 2039, modelled NO₂ concentrations ranged from to 8.4 µg/m³ (at receptors 11 and 21) to 14.0 µg/m³ (at receptor 5) in the Reference Case scenario. Receptors located close to the crossroads generally had the highest NO₂ annual mean concentrations, with the maximum concentration predicted at Receptor 5 at the corner between London Road and Keymer Road.

- 5.5 In 2039 with the Local Plan in place (DS), concentrations increased slightly at some receptors compared to the 2039 Reference Case. A maximum concentration of $14.1 \mu\text{g}/\text{m}^3$ was predicted at Receptor 5.

6. Summary and Recommendations

- 6.1 This report presents the results of the air quality assessment for the Mid Sussex District Plan Review for Stonepound Crossroads AQMA for a baseline year of 2019, one 'do minimum' (DM) scenario in 2039 (Reference Case) and the future 'do something' (DS) scenario in 2039, with the Local Plan in place.
- 6.2 Based on the modelling presented herein, all concentrations of NO₂ (for which the AQMA was designated) at the selected receptors are below the annual mean objective of 40 µg/m³ in the 2019 baseline year and 2039 future assessment year. The increases in concentration due to the Local Plan are very small and are not considered to be significant.
- 6.3 MSDC will continue to implement measures within their AQAP which will continue to further reduce pollutant concentrations. No mitigation measures for the District Plan Review are therefore required or recommended.

7. References

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