

Report

Bradford Local Plan

Air Quality Assessment

For City of Bradford Metropolitan District Council

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1 Introduction

- 1.1 This report has been prepared by Air Quality Consultants Ltd I Part of Logika Group (AQC). The experience of the authors is summarised in Appendix A1. The report describes the potential air quality impacts on public health associated with the emerging Bradford Local Plan.
- 1.2 The principal reason why development allocated in the emerging Local Plan might affect air quality is because of emissions from road traffic. New development will also generate emissions from other sources, such as construction dust and from boiler plant, however any air quality effects from these sources are only likely to occur close to each development. It is not, therefore, necessary to consider these sources explicitly in relation to the emerging Local Plan. This report therefore considers emissions from road traffic.
- 1.3 Developments contained within the local plan will each require individual planning approval. Where there is potential for significant air quality effects, it is expected that those effects will be considered at that stage, including the identifying any required mitigation. However, such assessments only consider the air quality effects of each development individually and therefore it is helpful to consider the combined effects of all expected growth in a strategic way. This assessment follows a strategic approach which is significantly less detailed than project-specific air quality assessments, but which highlights where there is the potential for future air quality impacts.

2 Pollutants of Concern

- 2.1 The main air pollutants of concern in relation to road traffic are nitrogen dioxide (NO₂) (which is formed in the atmosphere from emissions of nitrogen oxides (NO_x)), and fine particulate matter (PM₁₀ and PM_{2.5}). Road traffic also emits ammonia and Volatile Organic Compounds (VOCs), which react in the atmosphere to produce health-relevant air pollutants, but these reactions typically take place over distances of several kilometres and do not, therefore, require considering here.
- 2.1 UK-wide objectives for NO₂ and PM₁₀ were to have been achieved by 2005 and 2004 respectively and continue to apply in all future years thereafter. 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 will apply in its Local Air Quality Management Technical Guidance (Defra, 2022). The annual mean objectives for NO₂ and PM₁₀ apply at the façades of residential properties, schools, hospitals etc. The 24-hour mean objective for PM₁₀ applies at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for NO₂ applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets. For PM_{2.5}, the objective set by Defra for local authorities is to work toward reducing concentrations without setting any specific numerical value. In the absence of a numerical objective, it is convention to assess local air quality impacts against the limit value¹, originally set at 25 µg/m³ and currently set at 20 µg/m³. The relevant air quality criteria for this assessment are provided in Table 2-1.

Table 2-1: Air Quality Criteria for Nitrogen Dioxide, PM₁₀ and PM_{2.5}

Pollutant	Time Period	Value
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
PM ₁₀	24-hour Mean	50 µg/m ³ not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m ³ ^a
PM _{2.5}	Annual Mean	20 µg/m ³ ^b

^a A proxy value of 32 µg/m³ as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM₁₀ objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM₁₀ objective are possible (Moorcroft and Barrowcliffe et al, 2017).

^b There is no numerical PM_{2.5} objective for local authorities (see Paragraph 2.1). Convention is to assess against the UK limit value which is currently 20 µg/m³.

- 2.2 Defra has also set two new targets for PM_{2.5} concentrations in England. One target focuses on absolute concentrations, with the long-term target to achieve an annual mean PM_{2.5} concentration of 10 µg/m³ by the end of 2040 (referred to as the annual mean concentration target or AMCT). The second target relates to reducing overall population exposure to PM_{2.5}. By the end of 2040, overall population exposure to PM_{2.5} should be reduced by 35% compared with 2018 levels (referred to as the population exposure reduction target or PERT). The most recent interim targets published in the

¹ See Paragraph 2.3.

2025 Environmental Improvement Plan (Defra, 2025) aim to meet the AMCT 10 years early, by December 2030², with the interim PERT being a reduction of 30% by December 2030 (Table 2-2).

Table 2-2: Environment Act PM_{2.5} Targets

Metric	Target	Target year
AMCT	Interim target: 10 µg/m ³	2030
	Legally binding target: 10 µg/m ³	2040
PERT	Interim target: 30% reduction in exposure compared to 2018	2030
	Legally binding target: 35% reduction in exposure compared to 2018	2040

^a Annual Mean Concentration Target.

^b Population Exposure Reduction Target.

- 2.3 EU Directive 2008/50/EC sets limit values for NO₂, PM₁₀ and PM_{2.5}, and is implemented in UK law through the Air Quality Standards Regulations (2010) (as amended through The Air Quality Standards (Amendment) Regulations 2016 and The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020). The limit values for NO₂ and PM₁₀ are the same numerical concentrations as the UK objectives, but achievement of the limit values is a national obligation rather than a local one and concentrations are reported to the nearest whole number. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. However, Defra identified Bradford as an area with exceedances of the annual mean nitrogen dioxide limit value, resulting in the creation of a Clean Air Zone (CAZ) in the city (see Section 4.2).

² The 2040 target will be assessed using measurements from 2040. National targets are assessed against concentrations expressed to the nearest whole number, for example a concentration of 10.4 µg/m³ would not exceed the 10 µg/m³ target.

3 Methodology

Baseline Conditions

- 3.1 A review of existing air quality conditions in the District has been undertaken through a review of the City of Bradford Metropolitan District Council (CBMDC)'s 2025 Annual Status Report (City of Bradford Metropolitan District Council, 2026).

Air Quality Screening

National Highways

- 3.2 National Highways' guidance on the assessment of air quality impacts from road schemes is set out in the Design Manual for Roads and Bridges (DMRB). The current version of this guidance is LA 105 (National Highways, 2024), which states that the air quality impacts of each individual project should be scoped out from any further assessment where the changes caused by the project do not meet any of the following criteria:

- annual average daily traffic (AADT) $\geq 1,000$; or
- heavy duty vehicle (HDV) AADT ≥ 200 ; or
- a change in speed band; or
- a change in carriageway alignment by $\geq 5\text{m}$.

- 3.3 Although this guidance was intended for highway schemes, these thresholds are often used in the context of Local Plan Assessments; they are broadly taken to describe changes below which the combined effects of multiple individual developments can be discounted as not significant irrespective of the baseline air quality conditions.

IAQM Guidance

- 3.4 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)³ recommend a screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from road traffic generated by individual developments have the potential for significant air quality impacts. This compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds inside are:

- inside an Air Quality Management Area (AQMA):
 - 100 Light Duty Vehicles (LDVs) per day; or
 - 25 HDVs per day;
- outside of an AQMA:
 - 500 LDVs per day; or
 - 100 HDVs per day.

- 3.5 Developments which generate fewer additional vehicles than this are typically discounted as not significant with respect to air quality. This guidance is intended for air quality assessments for individual

³ The IAQM is the professional body for air quality practitioners in the UK.

developments, and the thresholds take account of the potential for multiple developments to have a cumulative effect. The thresholds are not, therefore, directly applicable to assessing the Local Plan, which already represents the combined effect of multiple developments. They nevertheless provide helpful context to consider the potential for changes to traffic volumes to give rise to significant changes to air quality.

Fall-Off Distance

- 3.6 Concentrations of traffic-related primary air pollutants tend to reduce quickly as the distance from the road increases (AQC, 2008), (Defra, 2022). Figure 3-1 illustrates how annual mean concentrations typically decline by around 85% over the first 50 m from the road. Consequently, the greater the distance from the pollution source, the lower the associated environmental and human health impacts are likely to be. This is important when considering the potential air quality effects caused by changes to traffic. A large increase in traffic on a road some distance from any locations with relevant exposure to the air quality objectives, may have a much smaller air quality effect than a small increase in traffic on roads close to homes.

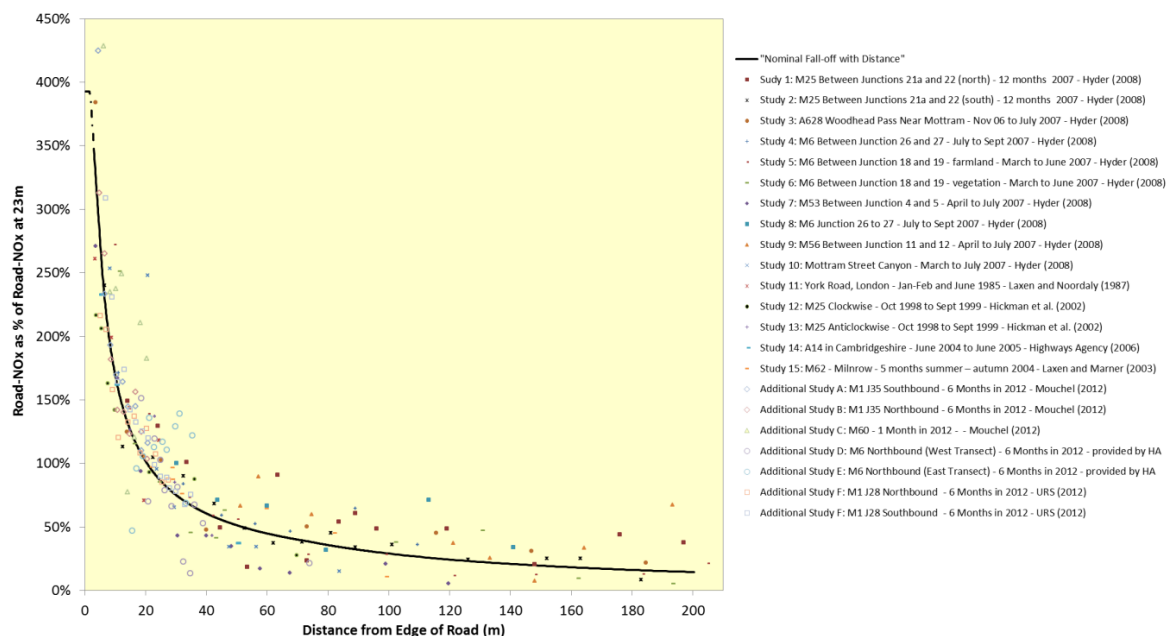


Figure 3-1: Rate of Change in Road Contribution to Annual Mean NOx Concentrations vs Distance from Road across 22 Monitoring Transects (AQC, 2021)

Traffic Data Scenarios

- 3.7 The traffic data used in the air quality screening exercise was provided by CBMDC and was derived from strategic transport modelling and testing of potential additional housing development locations beyond those identified within the currently adopted Local Plan. The modelling sought to assess the potential traffic implications of different development and transport policy futures in the plan period.
- 3.8 To support this assessment, CBMDC developed four transport scenarios:
- 2034 without the Local Plan;
 - 2034 with the Local Plan;
 - 2043 without the Local Plan; and

- 2043 with the Local Plan.

- 3.9 This assessment has taken consideration of the impact of the Local Plan by calculating the difference of the 'Without Local Plan' and 'With Local Plan' scenarios in 2034 and 2043.
- 3.10 A separate air quality assessment has been prepared to inform the Habitats Regulations Assessment (HRA) of the Local Plan. This follows specific requirements for HRA and therefore uses traffic scenarios which differ from those considered here. The differences relate to the treatment of development which is not provided by the Emerging Local Plan, and which is therefore not relevant to this current assessment.

4 Baseline Conditions

- 4.1 The Bradford district is diverse in character, with a population of over half a million, making it one of the largest metropolitan areas in England. It includes the city of Bradford and the important market towns of Keighley, Shipley, Bingley and Ilkley. While the district is primarily urban, two-thirds of its area is rural in character, comprising of villages, landscapes and open spaces.

Clean Air Zone

- 4.2 CBMDC implemented a CAZ in 2022 to improve air quality across the worst impacted areas of Bradford. The CAZ covers the area inside and including the Bradford outer ring road and extends along the Aire valley corridor to include Shipley and Saltaire, as shown in Figure 4-1. The UK Government mandated the introduction of the CAZ in Bradford in 2022, due to years of exceeding the legal NO₂ limits.

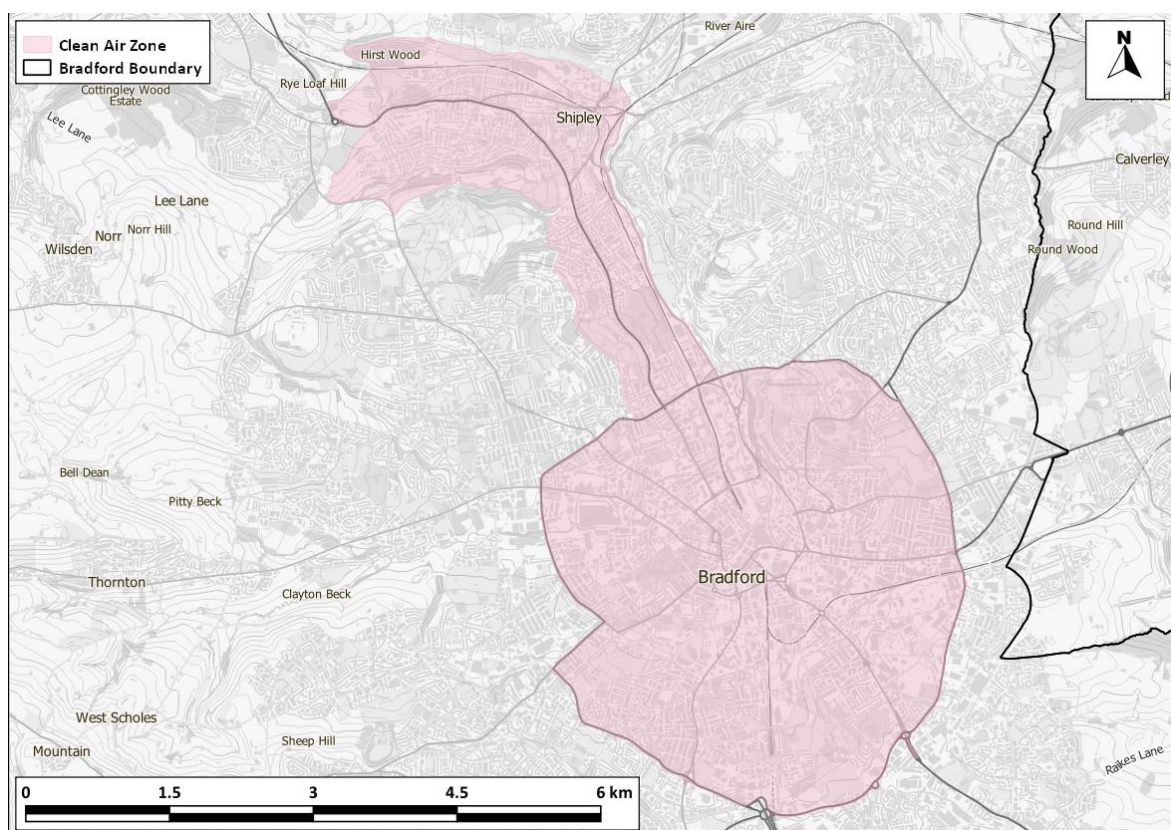


Figure 4-1: Bradford Clean Air Zone

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

- 4.3 It is a Class C+ CAZ, which imposes a daily fee on vehicles entering CAZ that don't meet the required emission standards. The zone applies to buses, Heavy Good Vehicles (HGVs), Light Good Vehicles (LGVs), coaches, hackney carriages, and private hire vehicles, but private cars are not affected. The money from the charges and fines goes directly into schemes designed to improve Bradford's air quality.

Air Quality Management Areas

- 4.4 The main source of air pollution in the district is road traffic, but there are also contributions from industry, heat and power generation and agriculture. AQMAs are declared when there is an exceedance or likely exceedance of a UK air quality objective.
- 4.5 In 2006, CBMDC declared four AQMAs for exceedances of the annual mean objective for NO₂. These AQMAs are shown in Figure 4-2 and are:
- AQMA order 1 – Mayo Avenue;
 - AQMA order 2 – Manning Lane / Queens Road;
 - AQMA order 3 – Thornton Road; and
 - AQMA order 4 – Shipley Airedale Road.

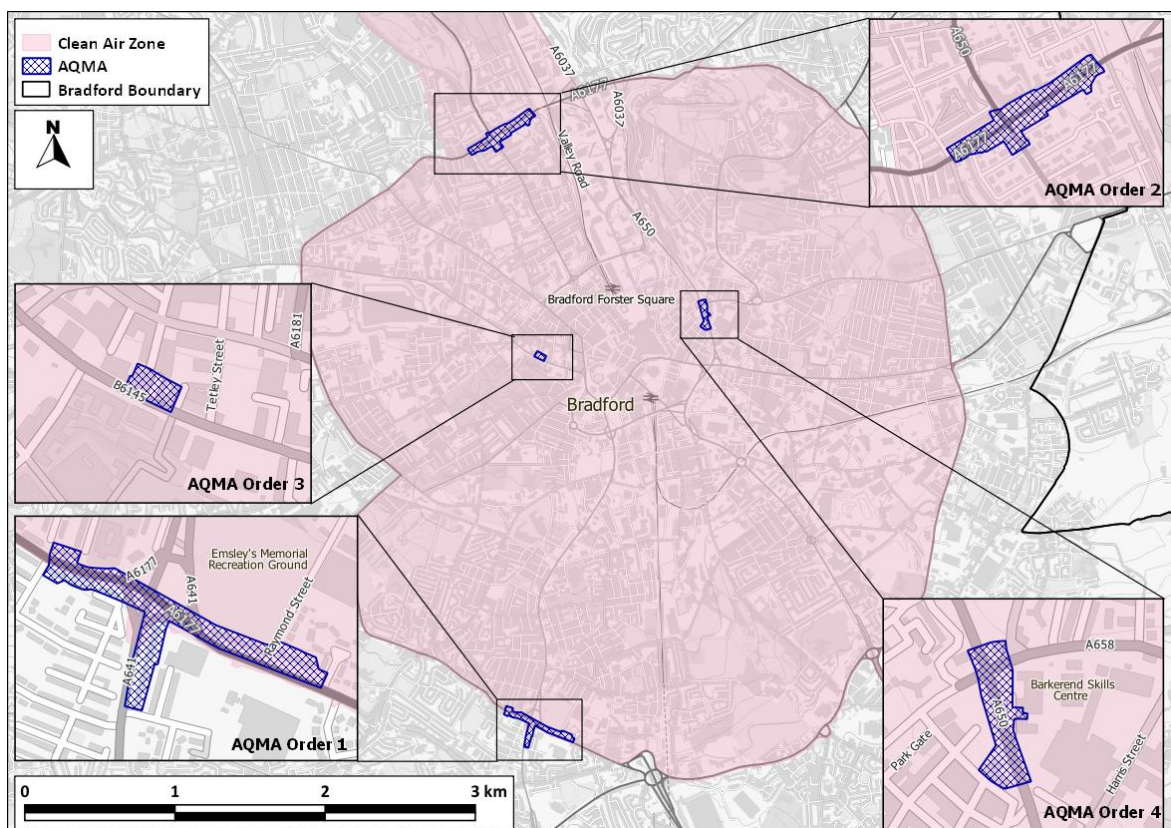


Figure 4-2: Bradford AQMAs

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Monitoring Results

NO₂ Monitoring

- 4.6 CBMDC undertakes a programme of air quality monitoring using a combination of automatic (continuous) analysers and non-automatic (passive) NO₂ diffusion tubes to assess pollutant concentrations across the district. Automatic monitoring provides high-resolution, continuous data at key locations, while diffusion tubes are used to provide wider spatial coverage at roadside and

background locations. Defra also undertakes a combination of automatic and non-automatic monitoring in Bradford as part of the Automatic Urban and Rural (AURN) and UK Urban NO₂ Network (UUNN) (Defra, 2026). Figure 4-3 presents a map showing the locations of all monitoring sites operating during 2025.

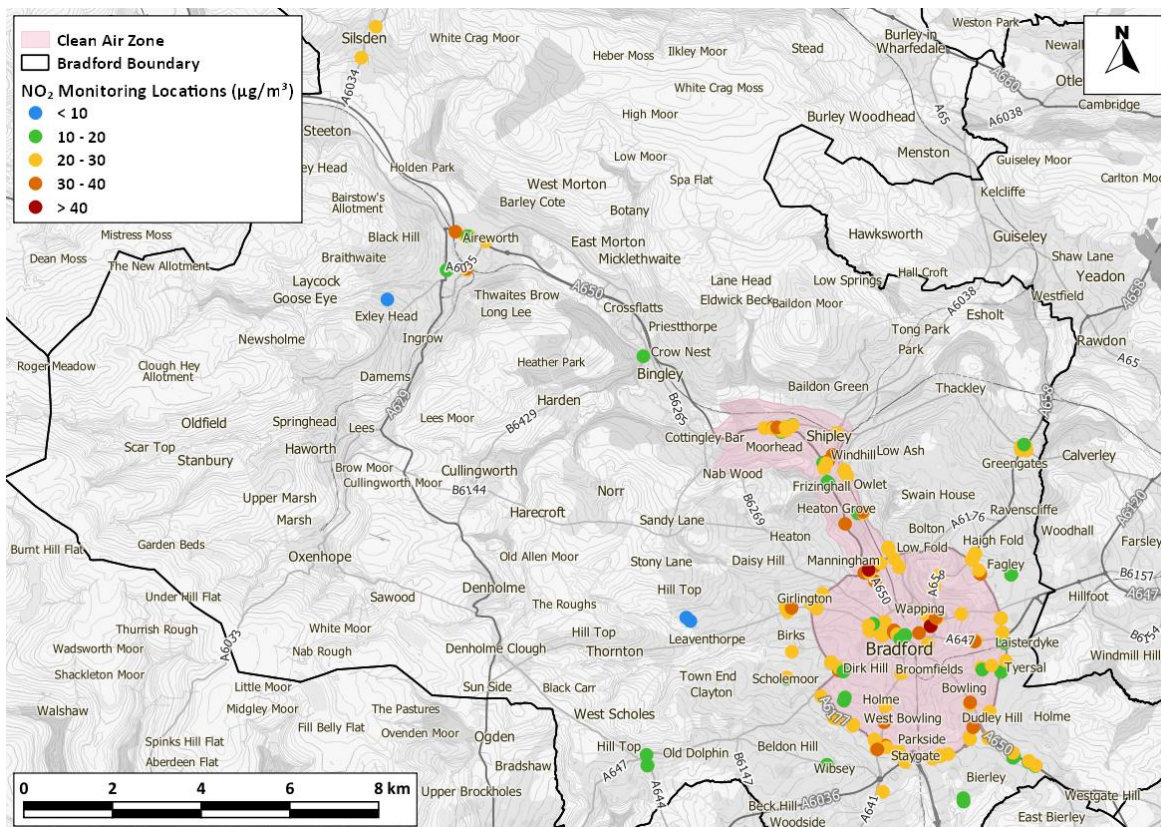


Figure 4-3: 2025 Bradford NO₂ Monitoring Locations and Measured Annual Mean Concentrations in 2025

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- 4.7 The 2026 annual status report (City of Bradford Metropolitan District Council, 2026) shows that air pollution in Bradford is improving, with 2025 recording some of the lowest NO₂ concentrations since Bradford's records began. Within Bradford City Centre there was a major improvement in air quality in 2025 due to recent pedestrianisation of a large proportion of city centre and changes to traffic routing. This reflects broader national improvements in air quality resulting from cleaner vehicle fleets and emissions standards, although evidence from Bradford (City of Bradford Metropolitan District Council, 2024) indicates that the Clean Air Zone has made a significant contribution to the observed reductions in NO₂ and the associated reductions in respiratory and cardiovascular health impacts.
- 4.8 The 2025 automatic monitoring results (City of Bradford Metropolitan District Council, 2026) show that both the long term and short term objectives for NO₂ were met at the seven automatic monitoring stations (comprising of six roadside locations and one urban centre).
- 4.9 In 2025, the diffusion tube locations measured two exceedances of the 40 µg/m³ annual mean NO₂ objective. The exceedances are outlined in Table 4-1 below. Defra recorded no limit value exceedances in 2025 at the UUNN sites.

Table 4-1: Non-Automatic Monitoring Sites with Exceedances of the Annual NO₂ Objective

Diffusion Tube ID	Site Name	In AQMA?	NO ₂ concentration in 2025 (µg/m ³)
Site DT12 ^a	Shipley Airedale Road	Shipley Airedale Road AQMA (order 4)	44.4
Site DT72	Queen's Road	Manningham Lane / Queen's Road AQMA (order 2)	42.9

^a Average of triplicate diffusion tubes.

- 4.10 Since the annual mean NO₂ concentration did not exceed 60 µg/m³ at any monitoring location, exceedances of the NO₂ 1-hour mean objective are unlikely.

PM₁₀ and PM_{2.5} Monitoring

- 4.11 The annual mean PM₁₀ and PM_{2.5} concentrations remained below the objectives 40 µg/m³ and 20 µg/m³ respectively. The 24-hour mean PM₁₀ objective was also met. Figure 4-4 presents a map showing the locations of all monitoring sites operating during 2025.

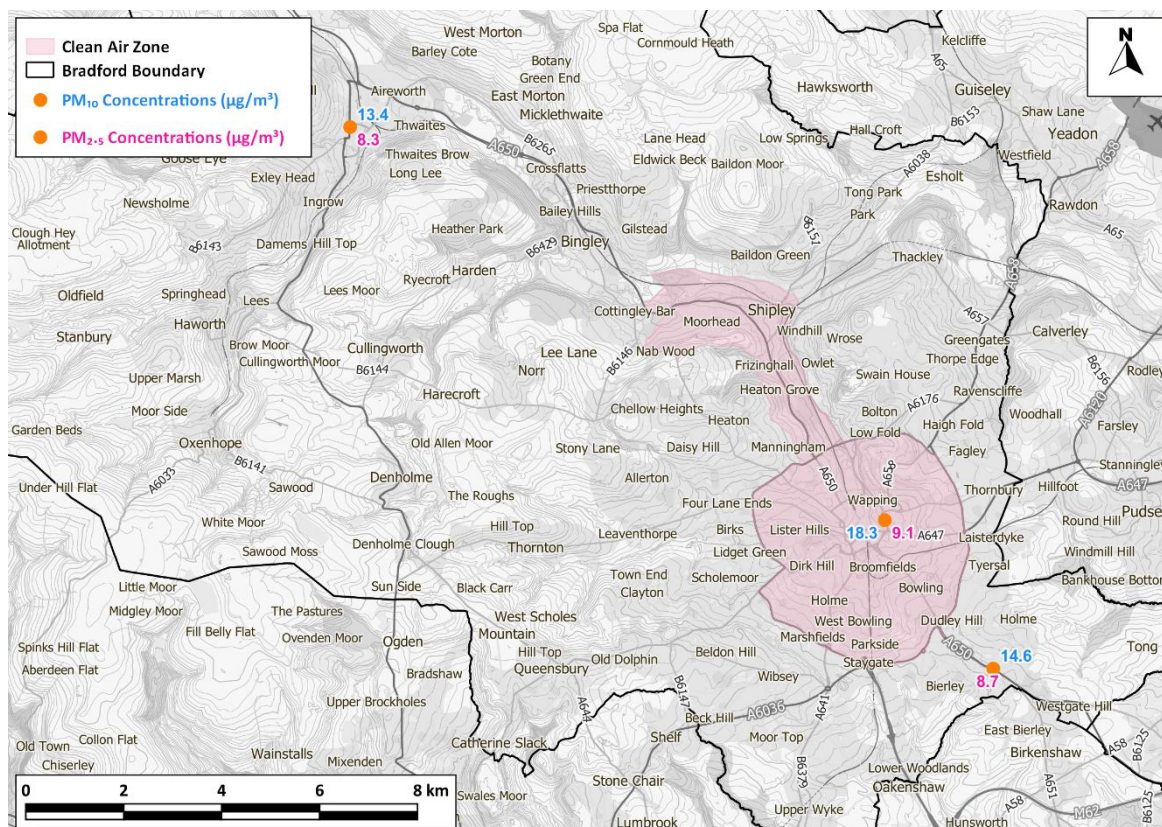


Figure 4-4: 2025 Bradford PM₁₀ and PM_{2.5} Monitoring Locations and Measured Annual Mean Concentrations in 2025

Future Trends in Traffic Emissions

- 4.12 Air pollution emissions from road traffic are falling over time. This is because of progressive tightening of vehicle emissions standards and a move to electric vehicles. The expected reductions in emissions of NO_x, PM₁₀ and PM_{2.5} are shown in Figure 4-5. These trends do not take explicit account of the Clean Air Zone and the reductions in the centre of Bradford may therefore be even greater in

practice. The forecast reductions in emissions of NO_x are dramatic, while those for PM₁₀ and PM_{2.5} are smaller; this reflects the fact that NO_x emissions are entirely from vehicle engine exhausts while those of PM₁₀ and PM_{2.5} also come from abrasion of brakes, tyres, and the road surface. In addition to these reductions, relevant emissions from other sources are also generally falling.

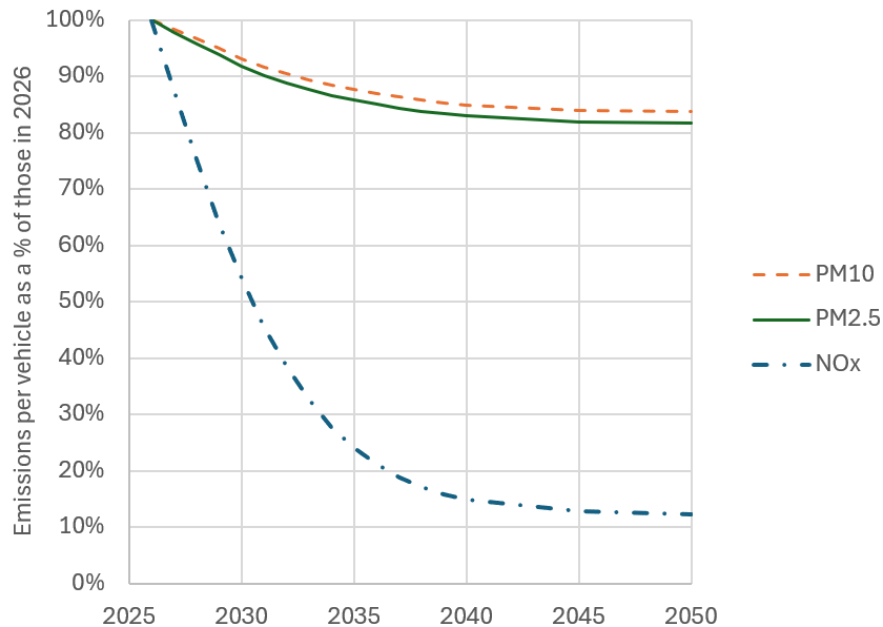


Figure 4-5: Predicted Average Emissions Per Vehicle PM₁₀, PM_{2.5} and NO_x as Percentages of those in 2026 (based on Defra's Emissions Factors Toolkit V14.2, for an urban road in England with an average speed of 50 kph and with 5% Heavy Duty Vehicles)

- 4.13 New road traffic associated with the emerging Local Plan may therefore increase air pollution in comparison to the concentrations which would otherwise exist, but overall, it is still likely that air quality will be better than it is at present.

5 Assessment

- 5.1 This section discusses traffic flows in terms of total traffic volume. For the impact of the scenarios on HDV flows specifically see Appendix A2. In general, the predicted changes in HDV numbers are less likely to give rise to significant air quality effects than the changes in total traffic volumes. Appendix A2 therefore shows fewer road links predicted to exceed the HDV traffic screening criteria than are highlighted in the section below. Where there are areas in which potentially significant increases in HDV volumes are predicted which are not also highlighted for total traffic, they are identified in the text below.

Bradford CAZ

2034

- 5.2 As discussed in Sections 4.2 and 4.3, a CAZ operates within Bradford to improve air quality and reduce the associated health impacts in the areas most affected by pollution. The CAZ covers Bradford city centre, encompassing the area within the Bradford Outer Ring Road and extending along the Aire Valley corridor, including Shipley and Saltaire.
- 5.3 Within the Bradford CAZ, the draft Local Plan is not expected to result in a breach the 1,000 AADT threshold. Projected changes in traffic volumes range from a decrease of approximately 500 AADT to an increase of up to 500 AADT, as illustrated in Figure 5-1. The CAZ has historically contained the highest NO₂ concentrations in the district, as discussed in Sections 4.2 to 4.3. Furthermore, Bradford city centre contains the highest volume of sensitive receptors, such as residential properties, within the district. The predicted changes to traffic within the CAZ are mostly increases, which will consequently have an overall adverse effect on exposure to poor air quality.
- 5.4 While the overall picture is one of traffic increases, there will be a number of roads experiencing decreases in traffic volumes, as shown in Figure 5-1. The largest reduction occurs on Ransdale Road in the southwest of the CAZ.

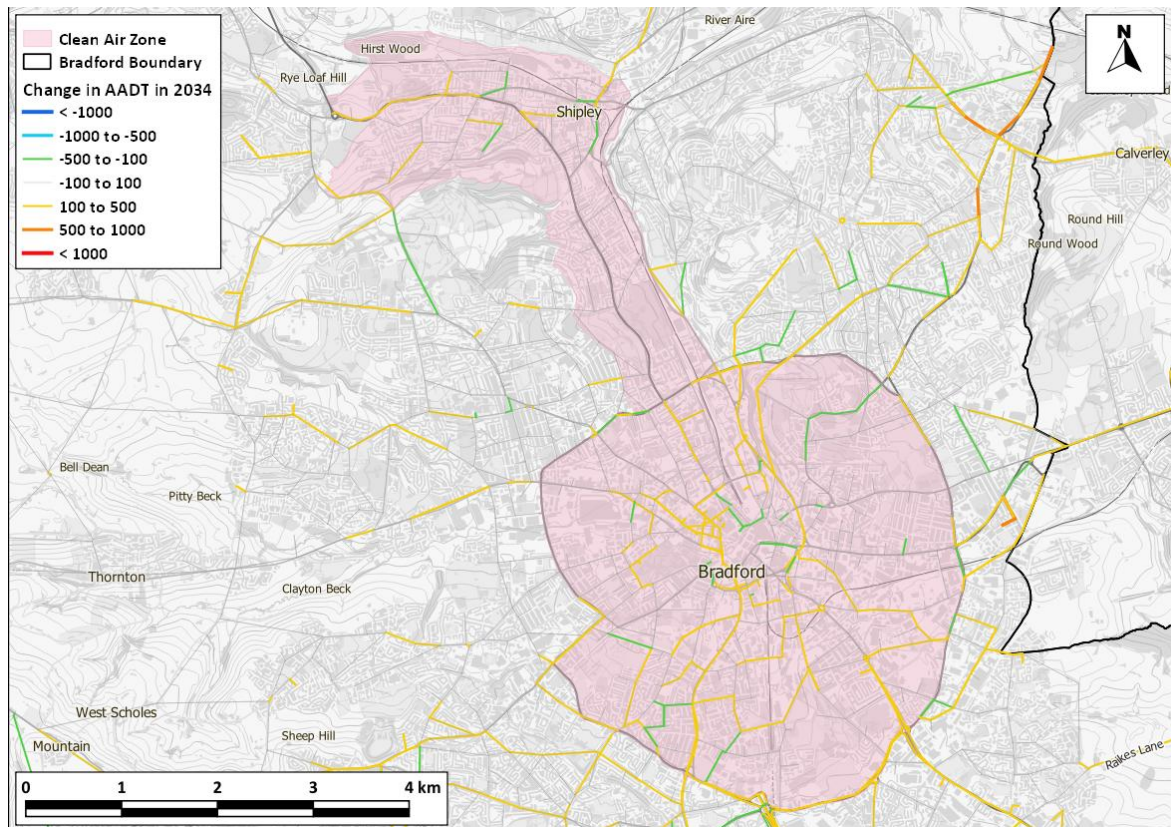


Figure 5-1: Bradford CAZ with the impact of the draft Local Plan in 2034

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- 5.5 The most notable change in traffic flows within the CAZ is an increase of 466 AADT within the Mayo Avenue AQMA, which is discussed further in Section 5.8.
- 5.6 The corridor comprising the A641 Manchester Road / Prince's Way / Godwin Street is expected to experience increases in traffic flows of approximately 400 AADT. This section of road is primarily bordered by council and museum buildings, which are not sensitive receptors to annual mean concentrations as defined in Section 2. Consequently, this increase is not expected to result in a significant air quality impact.

AQMAs

- 5.7 The four AQMAs are areas of historically high NO₂ concentrations (as discussed in Section 4.4 to 4.5) and are a particular focus when considering air quality impacts in Bradford.
- 5.8 Mayo Avenue AQMA (order 1) is not expected to experience any traffic increases above 1,000 AADT in 2034. The greatest changes within the AQMA are increases of up to 466 AADT along the A641 Manchester road. All roads within the AQMA will experience an increase in traffic flows, apart from the westbound carriageway on the A6177 which will have a decrease of approximately 85 AADT. Although the traffic flows within the AQMA increase, these increases remain below the 1,000 AADT criterion.

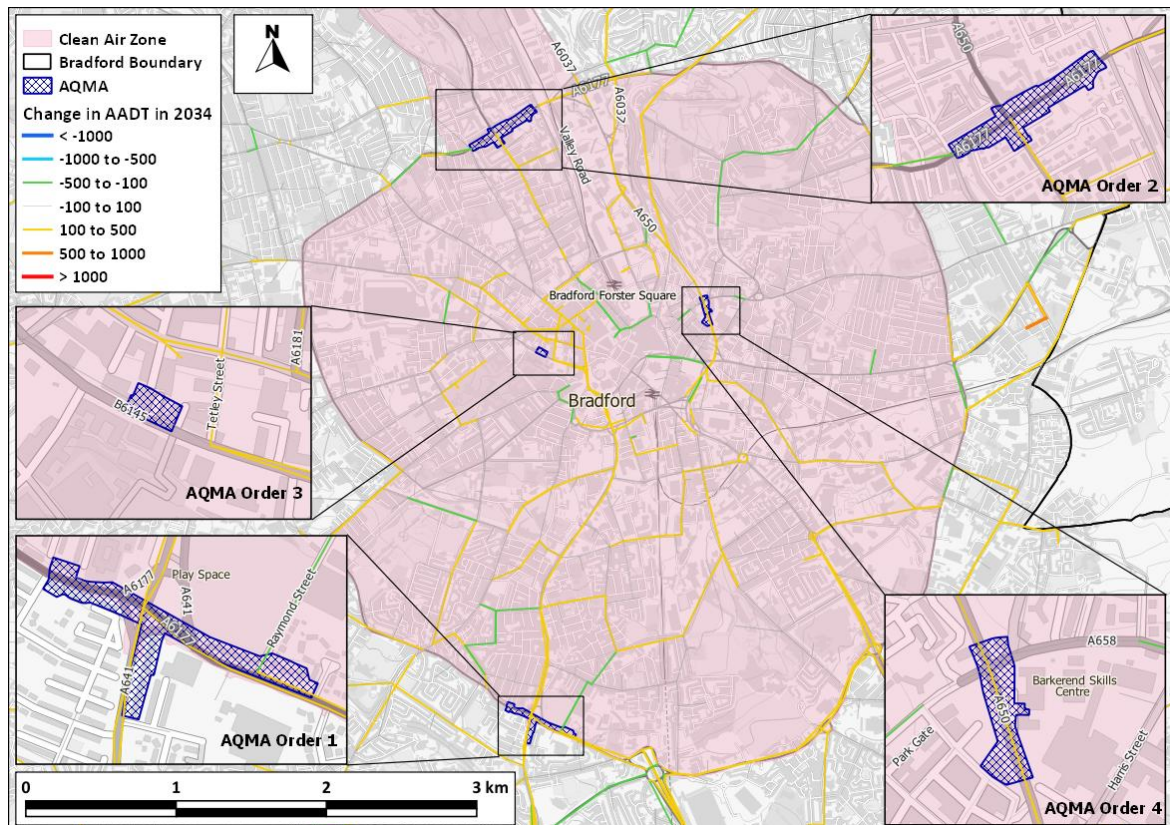


Figure 5-2: Bradford AQMAs with the impact of the draft Local Plan in 2034

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- 5.9 Morning Lane / Queens Road AQMA (order 2) is not expected to experience major changes in traffic flows in 2034, with only one road experiencing a change in traffic flows of more than 100 AADT (southbound Manningham Lane, south of the junction will experience an increase of 121 AADT). These changes in flow are well below the 1,000 AADT threshold.
- 5.10 Thornton Road AQMA (order 3) is not expected to experience major changes in traffic flows in 2034, with the road not experiencing a change in traffic flows of more than 100 AADT in either direction, remaining well below the 1,000 AADT threshold.
- 5.11 Shipley Airedale Road AQMA (order 4) is not expected to experience any traffic increases above 1,000 AADT in 2034. An increase of up to 297 AADT on the southbound A650 Shipley Airedale Road represents the greatest change within the AQMA, remaining well below the 1,000 AADT threshold.

2043

- 5.12 In 2043, the draft Local Plan will have much greater impacts on the traffic flows within the Bradford CAZ compared to 2034. However, as explained in Paragraph 4.12, by 2043, average emissions per vehicle will be lower. As Figure 5-3 shows, the majority of roads are expected to experience an increase in traffic flows of more than 100 AADT in 2043, as well as numerous road links which are expected to exceed the 1,000 AADT threshold. A number of these roads are bounded by residential properties, which are classed as high sensitivity receptors by IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), meaning they are more susceptible to air quality issues.

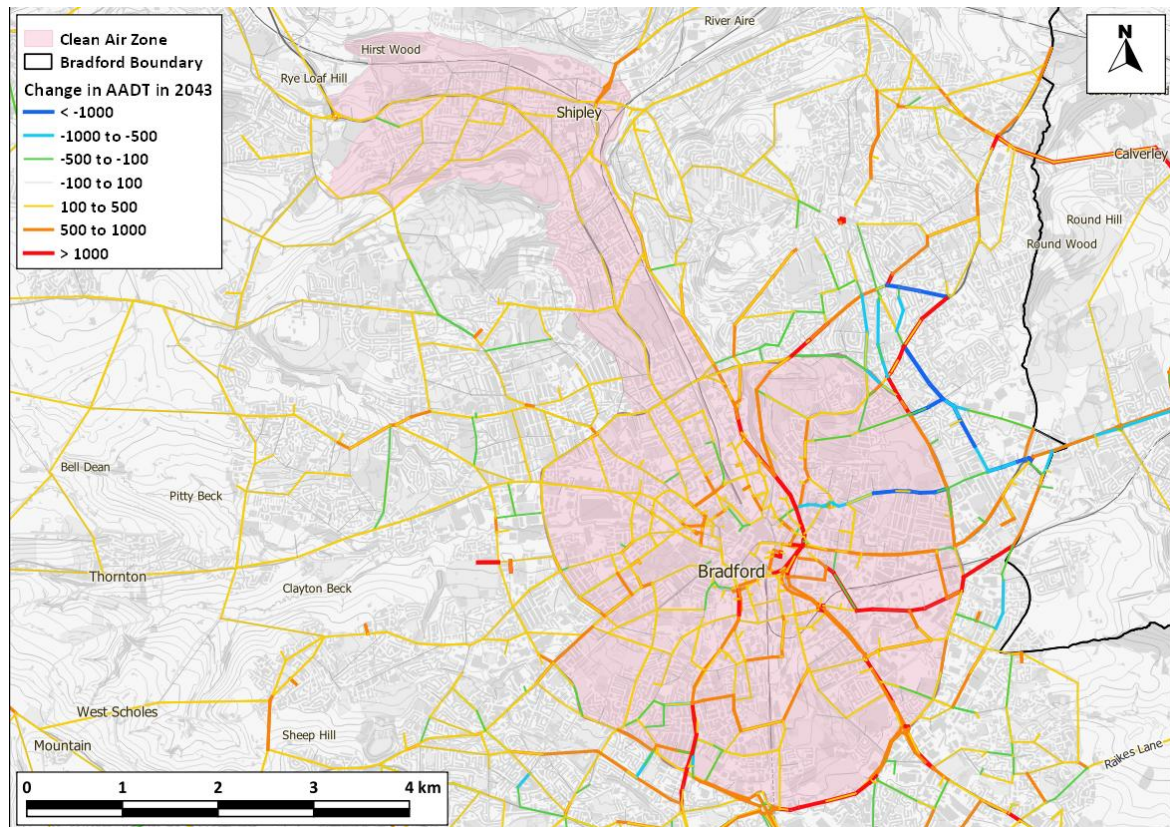


Figure 5-3: Bradford CAZ with the impact of the draft Local Plan in 2043

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- 5.13 The A6037 Canal Road and A650 Shipley Airedale Road are predicted to have increases of over 1,000 (of up to 2,165 AADT) from the junction between King's Road to Dryden Street. Hammerton Street, starting at Buck Street, and along Bowling Back Lane to the end of the CAZ will also experience increased traffic flows over the 1,000 AADT threshold, with increases of up to 1,163 AADT. As Figure 5-3 shows, there are numerous other roads that also experience increases above the 1,000 AADT threshold, including the A6177, A650 Wakefield Road and A641 Manchester Road. As discussed in Sections 4.2 to 4.3, the CAZ covers the worst-affected areas of Bradford. Consequently, these projected traffic increases may exacerbate existing poor air quality across the city.
- 5.14 As Figure 5-3 shows, there are also a few road links which are expected to experience decreases in 2043. In particular, the B6381 Barkerend Road is expected to have decreases of up to 1,408 AADT. This will have beneficial impacts on the air quality of the local area, which is bounded by residential properties, health centres and Bradford Moor Community Primary School, all highly sensitive receptors.

AQMAs

- 5.15 Mayo Avenue AQMA (order 1) is expected to have more substantial increases in 2043 compared to 2034, as shown in Figure 5-4. The A641 Manchester Road northbound is expected to experience an increase of the 1,541 AADT as a result of the draft Local Plan. The A6177 Smiddles Lane and Mayo Avenue are also expected to experience increases between 135 AADT and 759 AADT. These increases will have a further detrimental effect to an area of existing poor air quality (as discussed in section 4.4 to 4.5).

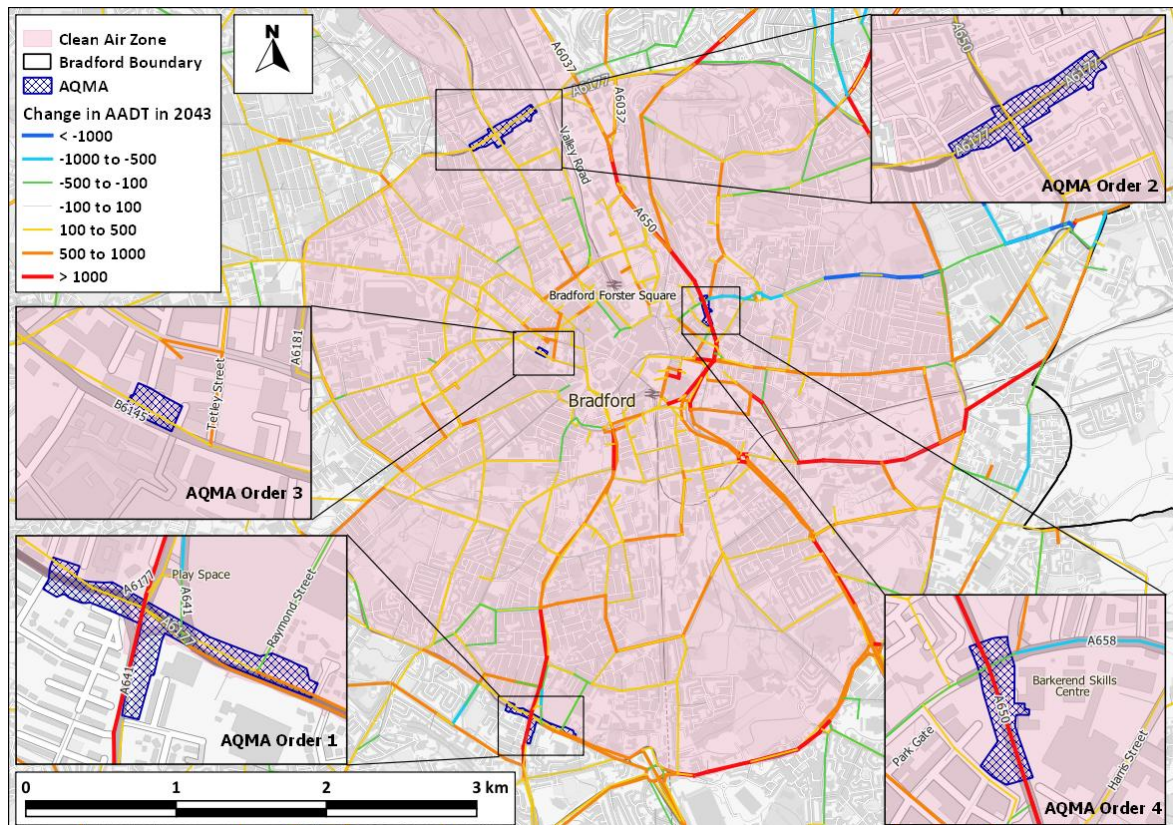


Figure 5-4: Bradford AQMAs with the impact of the draft Local Plan in 2043

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

- 5.16 Morning Lane / Queens Road AQMA (order 2) will have traffic flow increases between 32 AADT to 359 AADT, which are below the 1,000 AADT threshold.
- 5.17 Thornton Road AQMA (order 3) is not expected to experience major changes in traffic flows in 2043, with Thornton Road not experiencing a change in traffic flows of more than 225 AADT in either direction, remaining well below the 1,000 AADT threshold.
- 5.18 The draft Local Plan is expected to have a more substantial effect on Shipley Airedale Road AQMA (order 4) in 2043 compared to 2034. The A650 Shipley Airedale Road is expected to have increases of up to 2,165 AADT. This is well above the 1,000 AADT threshold and will have a further detrimental effect to an area of existing poor air quality (as discussed in Section 4.4 to 4.5).

North Bradford

2034

- 5.19 The north of Bradford District is characterised primarily by large rural areas of the Yorkshire Dales, as well as key urban areas such as the towns of Keighley, Ilkley and Bingley which contain many residential properties.
- 5.20 The draft Local Plan is not expected to have significant impacts on traffic flows in the North of Bradford district in 2034. The majority of roads are only expected to experience reductions and increases of less than 100 AADT as shown in Figure 5-5. These changes in traffic flows are well below the 1,000

AADT threshold as well as the 100 AADT screening criterion outlined in Section 3.4, and therefore the air quality impacts are not expected to be significant.

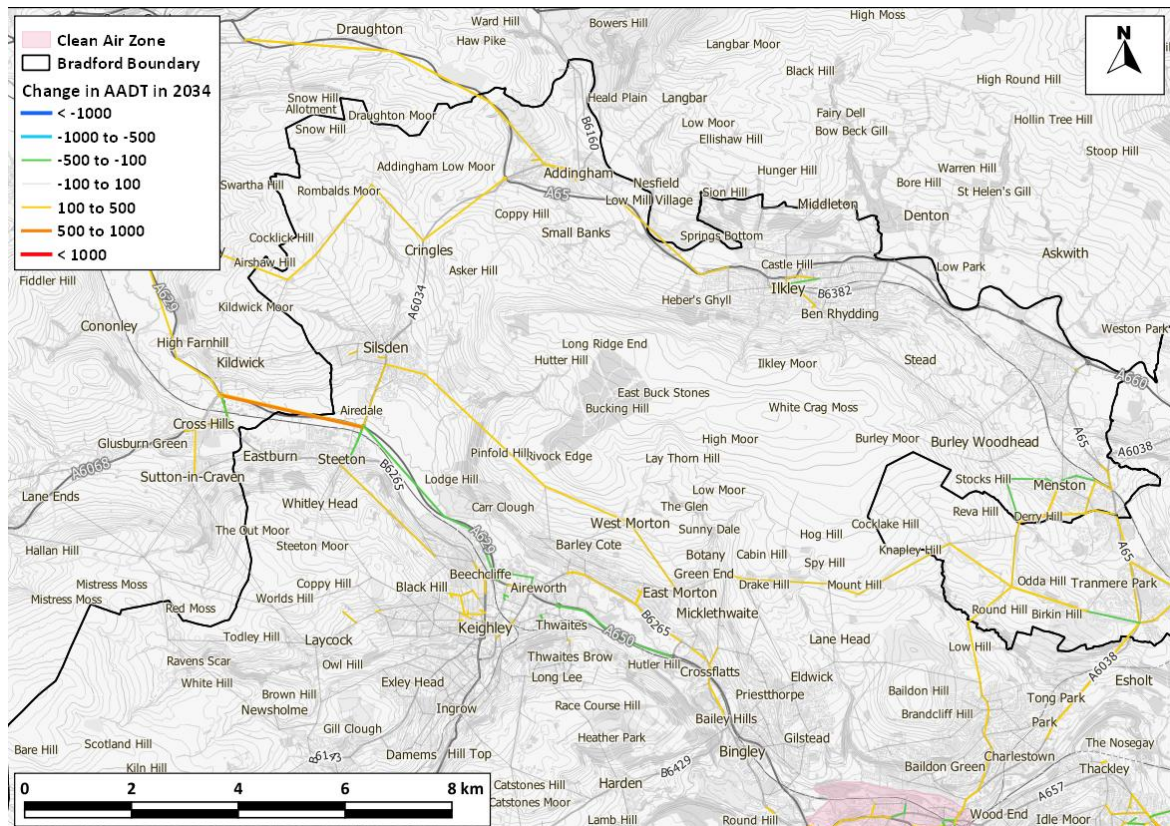


Figure 5-5: North Bradford with the impact of the draft Local Plan in 2034

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

- 5.21 The greatest change in traffic flows in the North of Bradford is expected to be an increase of approximately 550 AADT on the A629 to the west of Steeton and Silsden train station, which is still well below the 1,000 AADT threshold.
- 5.22 As shown in Figure 5-5, there are a small number of road links which will experience a decrease in traffic flows. Predominantly, decreases of up to 243 AADT are seen on the A650 and A629 across the northern outskirts of Keighley. Decreases of approximately 130 AADT will be seen on the B6142 through Haworth, as well as decreases of up to 170 AADT through Oxenhope, both of which are adjacent to many high sensitivity residential receptors. These decreases in traffic flows will have beneficial impacts on air quality in the local area.

2043

- 5.23 In 2043, traffic generation associated with the draft Local Plan is generally not expected to breach the 1,000 AADT threshold. Projected changes in traffic volumes primarily range from a decrease of approximately 500 AADT to an increase of up to 500 AADT, as illustrated in Figure 5-6. As these changes are below the IAQM screening thresholds for outside of an AQMA, these changes in traffic flows are not expected to have significant effects on the local air quality.

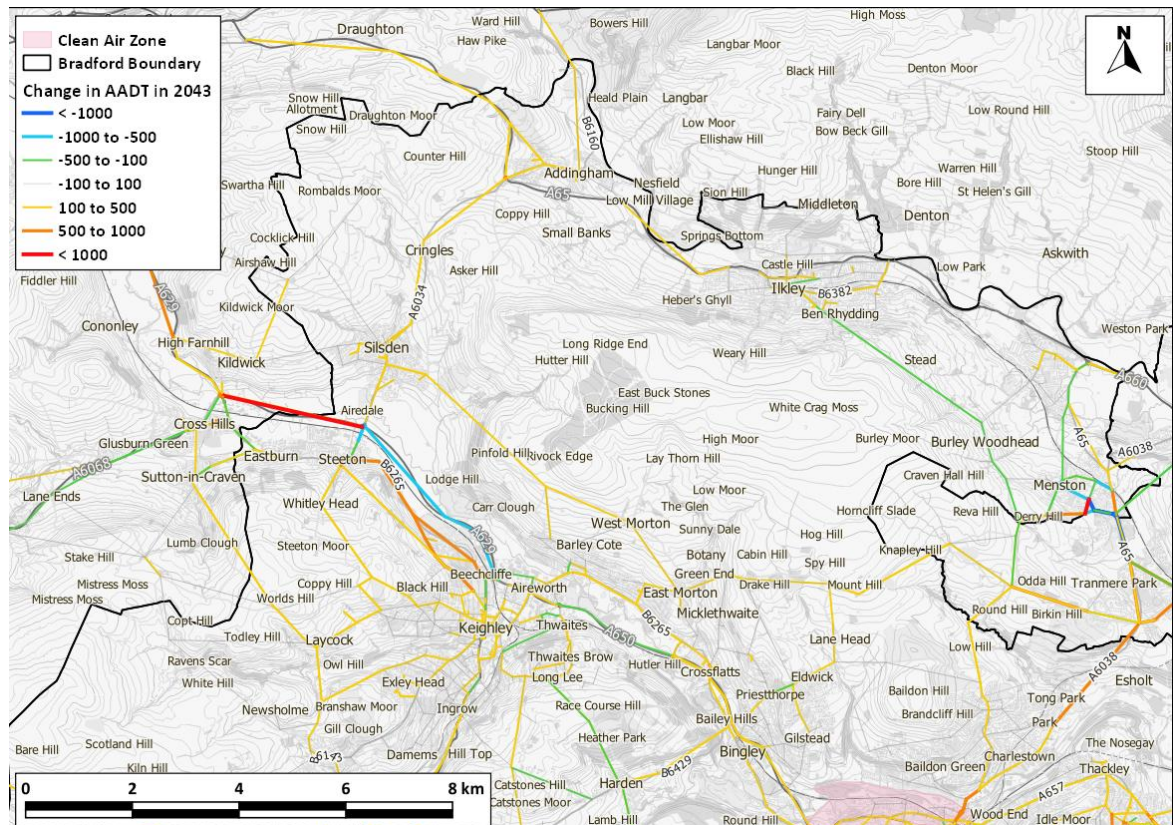


Figure 5-6: North Bradford with the impact of the draft Local Plan in 2043

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

- 5.24 The only increase of traffic flows that exceed the 1,000 AADT threshold is along the A629, that runs westbound from Steeton and Silsden station (which is expected to see increases of up to 1,289 AADT). These areas do not contain sensitive receptors as defined in Section 2. Consequently, this increase is not expected to result in a problematic air quality impact at present.
- 5.25 The greatest reductions seen in northern Bradford are along the A629 running eastbound between Steeton and Keighley, with reductions of up to 1,080 AADT in 2043. This section of road is primarily bordered by agricultural land and an industrial estate along Riparian Way and so there will not be notable benefits to pollution exposure.
- 5.26 The A650 Hard Ings Road, adjacent to the Keighly Retail Park, is expected to decrease by up to 241 AADT HDVs. Although this road is not adjacent to any highly sensitive receptors, this decrease is above the threshold outlined in Section 3.2.

East Bradford

2034

- 5.27 The east of Bradford District is characterised by residential suburbs to the east of the City of Bradford. These residential areas contain high sensitivity receptors for air quality as defined in Section 2.
- 5.28 In 2034 in the east of Bradford, there are not expected to be changes that will breach the 1,000 AADT threshold. The majority of roads will experience changes between increases and decreases of 100

AADT, which are below the IAQM screening threshold of 500 AADT (as outlined in Section 3.4). Therefore, the draft Local Plan is not expected to have significant impacts on air quality in the area.

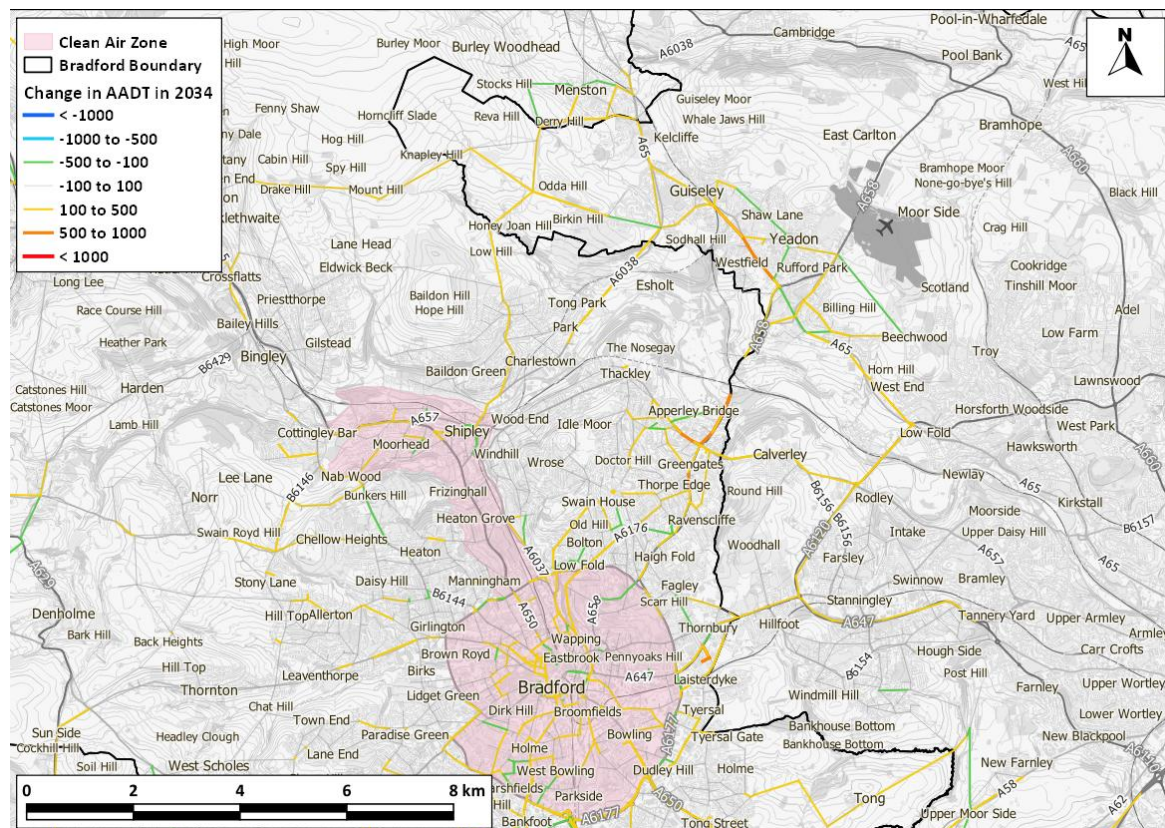


Figure 5-7: East Bradford with the impact of the draft Local Plan in 2034

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

- 5.29 The only roads exceeding the IAQM screening threshold are increases between 500 to 775 AADT. These are along the A658, A657, Petrie Road and Lower Rushton Road. There are numerous high sensitivity receptors (as defined by IAQM guidance (Moorcroft and Barrowcliffe et al, 2017)) including residential receptors and Thornbury Primary School, therefore there are possibilities of air quality impacts along these roads.
- 5.30 There are a few roads with decreases in traffic flows of more than 100 AADT throughout the east of Bradford, as shown in Figure 5-7, which will likely have a positive impact on air quality in the local area.

2043

- 5.31 In 2043, the draft Local Plan has more pronounced impacts on the traffic flows in the east of Bradford. The majority of roads are expected to have increases of 100 to 1,000 AADT, as shown in Figure 5-8.

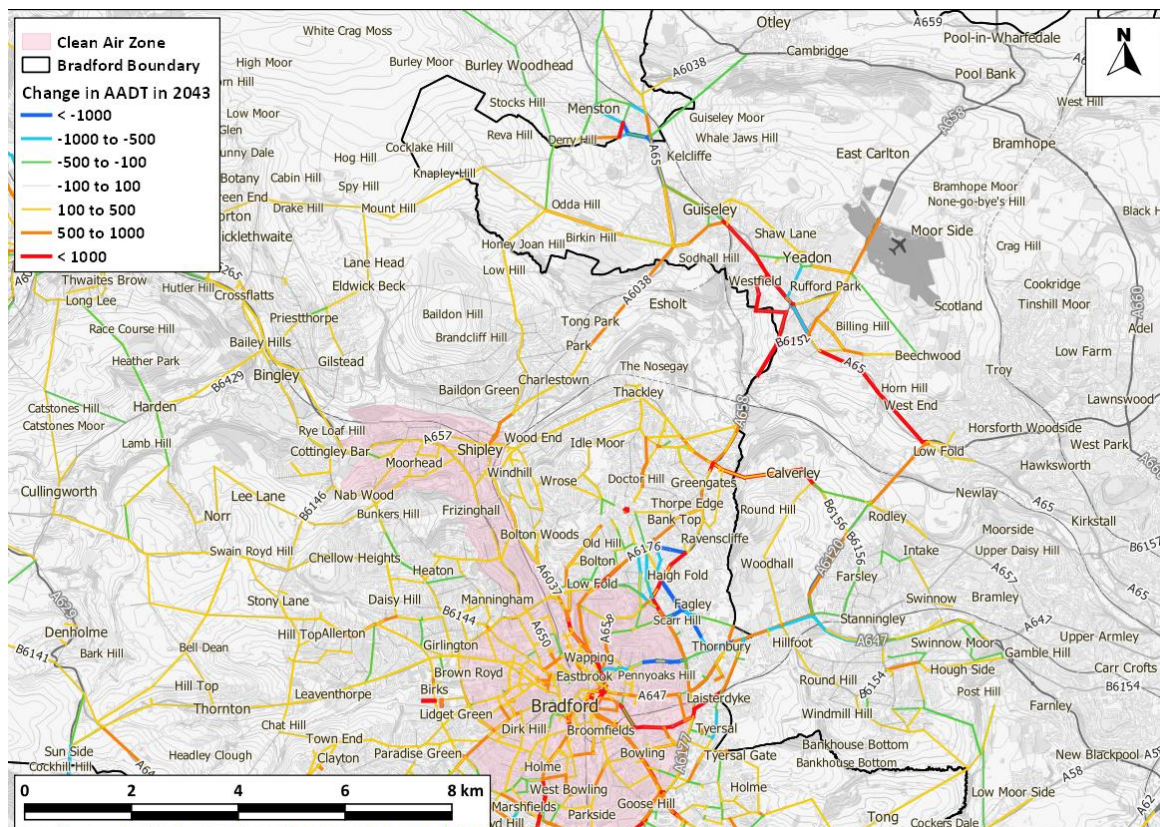


Figure 5-8: East Bradford with the impact of the draft Local Plan in 2043

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

- 5.32 There are some roads which are expected to have an increase of over 1,000 AADT threshold. The greatest increases of up to 2,076 AADT are seen along the A658 Harrogate Road and A6177 Killinghall Road, as shown in Figure 5-8. Whilst these roads are bordered by highly sensitive residential receptors, these properties are largely set back from the road, which will reduce the potential magnitude of air quality impacts associated with the increased traffic flows.
- 5.33 Whilst the A659 Harrogate Road is expected to experience increases in traffic flows of over 2,000 AADT, the number of HDVs is expected to decrease by 183 AADT.
- 5.34 As Figure 5-8 shows, in 2043 there will be exceedances of the 1,000 AADT threshold outside of Bradford boundaries. In Rawdon (within the Leeds District Boundary), the A65 Leeds Road, Warm Road, Greenlea Road and the A658 Apperley Lane are expected to have increases in traffic flows of up to 2,137 AADT. Many of these roads are adjacent to residential properties, which are sensitive receptors with respect to air quality. The increase in traffic flows has the potential to have adverse effects on air quality.
- 5.35 The draft Local Plan is also expected to introduce major reductions in traffic flows in 2043. The greatest reductions will be seen on the A6176 Pullan Avenue, B6381 Leeds Old Road, Fagley Road, and Leeds Road, with reductions of up to 2,025 AADT. This will cause improvements in the air quality in the local area.

South Bradford

2034

- 5.36 South Bradford is composed predominantly of suburban areas, containing a large concentration of high sensitivity receptors as defined in Section 2. In 2034, across the south of Bradford, overall, the draft Local Plan is expected to increase traffic flows, with a few roads expected to breach the 1,000 AADT threshold. Projected changes in traffic volumes range from a decrease of more than 500 AADT to an increase of over 1,000 AADT, as illustrated in Figure 5-9. The predicted changes to traffic across South Bradford are predominantly increases, which will consequently have adverse effects on air quality.

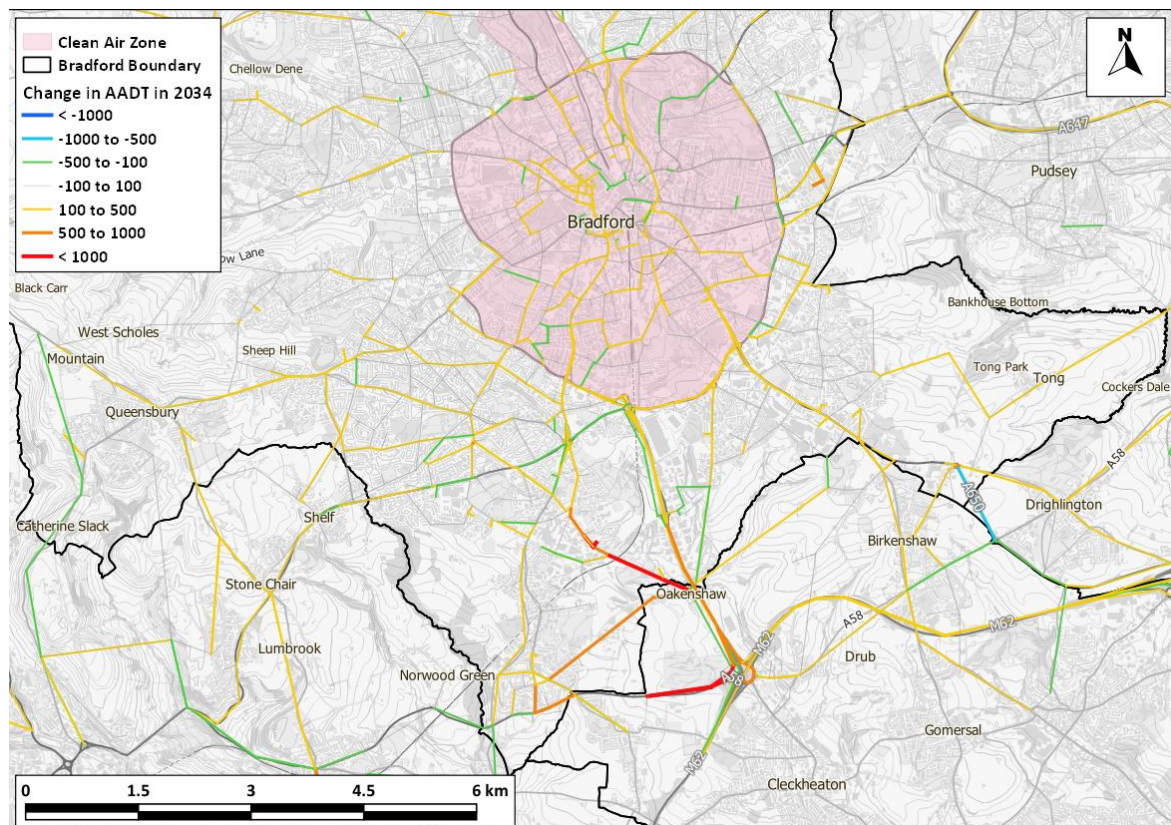


Figure 5-9: South Bradford with the impact of the draft Local Plan in 2034

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

- 5.37 On the border of Bradford District and Kirklees, in the Oakenshaw area, the majority of road links are expected to see major increases of over 500 AADT, with a couple exceeding the 1,000 AADT threshold, as shown in Figure 5-9. The A58 Whitehall is expected to have an increase of over 1,322 AADT in 2034, however there are no high sensitivity receptors (as defined by IAQM guidance (Moorcroft and Barrowcliffe et al, 2017)) bordering this road and consequently this increase is not expected to result in a significant air quality impact. However, along Cleckheaton road, there are expected to be increases in the traffic flows of approximately 1,030 AADT. This road is primarily bordered by residential properties, which are high sensitivity receptors in regard to air quality.
- 5.38 The draft Local Plan will also lead to traffic reductions in 2034 across South Bradford, with many roads seeing reductions of up to 500 AADT. The most substantial reduction is on the A650 to the east of Birkenshaw, which is expected to see a decrease in more than 525 AADT in 2034. These decreases in traffic flows will be beneficial to the air quality of the local area.

2043

- 5.39 In 2043, the draft Local Plan is expected to cause larger changes in South Bradford in traffic flows compared to 2034. Whilst the majority of road links are still expected to experience changes ranging from a decrease of 100 AADT to an increase of 100 AADT, there is an increase in the number of roads forecast to see traffic growth of between 100 and 1,000 AADT, as shown in Figure 5-10.
- 5.40 Compared to 2034, there are also expected to be a higher number of road links which will see a decrease in traffic flows, especially between 100 to 1,000 AADT. The A650 heading southbound from Tong will see the greatest decrease in traffic in the south of Bradford with a decrease of 1,143 AADT which will lead to an improvement in the air quality of the local area. However, there are also links along the A650 Tong Street, which are also expected to see increases of up to 1,144 AADT. These are adjacent to residential properties which are highly sensitive receptors as defined in Section 2, meaning they are more susceptible to air quality issues.

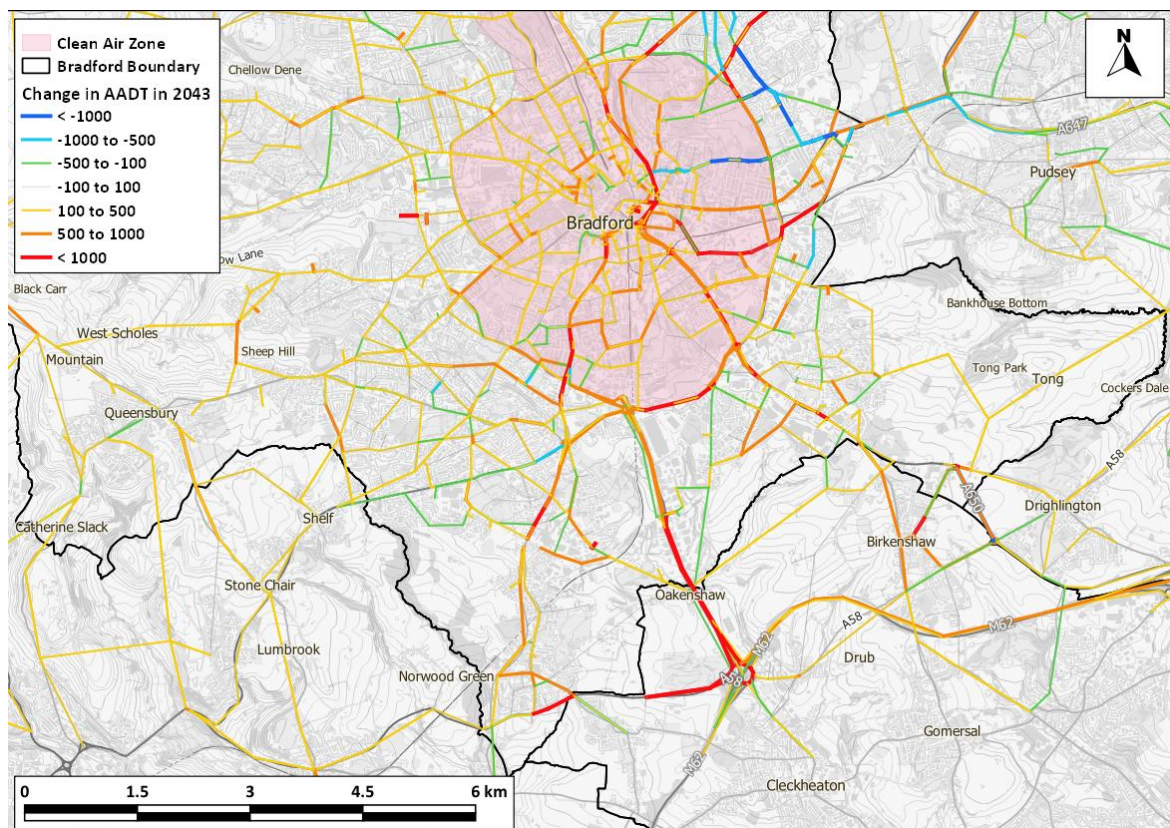


Figure 5-10: South Bradford with the impact of the draft Local Plan in 2043

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

- 5.41 As Figure 5-10 shows, there are a small number of roads which exceed the screening threshold and are expected to see increases of 1,000 AADT. The M606 heading out of Bradford towards the M62 is expected to see increases of up to 2,135 AADT. This road is also expected to see increase in HDV traffic of up to 379 AADT, which exceeds the threshold outlined in Section 3.2. These increases will have detrimental effects on local air quality; however, the road is not bound by any highly sensitive receptor as defined in Section 2 meaning this increase is not expected to result in a significant air quality impact.

- 5.42 The A6036 Rooley Avenue westbound is also expected to exceed the threshold of 200 HDVs per day, with increases expected of up to 308 AADT. Although this road is bound by highly sensitive residential receptors, these properties are set back from the road which will reduce the potential air quality impacts of this HDV increase.
- 5.43 In the Low Moor area, the A641 Huddersfield Road and Sal Royd Road are also expected to see increases of up to 1,318 AADT. These increases exceed the 1,000 AADT threshold and the roads are bound by highly sensitive residential receptors, which are more susceptible to air quality issues.
- 5.44 The number of HDVs on Cleckheaton Road and Bradford Road is expected to decrease by up to 416 AADT. This is above the threshold outlined in Section 3.2, and will be expected to improve the air quality in the surrounding area.

West Bradford

2034

- 5.45 The west of Bradford District is characterised by residential suburbs to the west of Bradford city centre, whilst the remainder of the area consists largely of rural land and outlying villages including Oxenhope, Cullingworth, and Haworth. These residential areas contain high sensitivity receptors for air quality as defined in Section 2.
- 5.46 The draft Local Plan is not expected to result in substantial changes to traffic flows in western Bradford in 2034, as seen in Figure 5-11. The greatest increase is of 375 AADT on Acacia Drive off the B6146 in northern Allerton, which remains below the IAQM screening threshold of 500 AADT (as outlined in Section 3.4). There are only a small number of road links with increases of over 100 AADT, with the vast majority of road links within western Bradford having changes in traffic flows of less than 100 AADT.
- 5.47 There are some road links in western Bradford which will experience decreases in traffic flows, with decreases of up to 195 AADT expected in 2034 on the B6141, Trough Lane and B6429 between Oxenhope and Cullingworth.

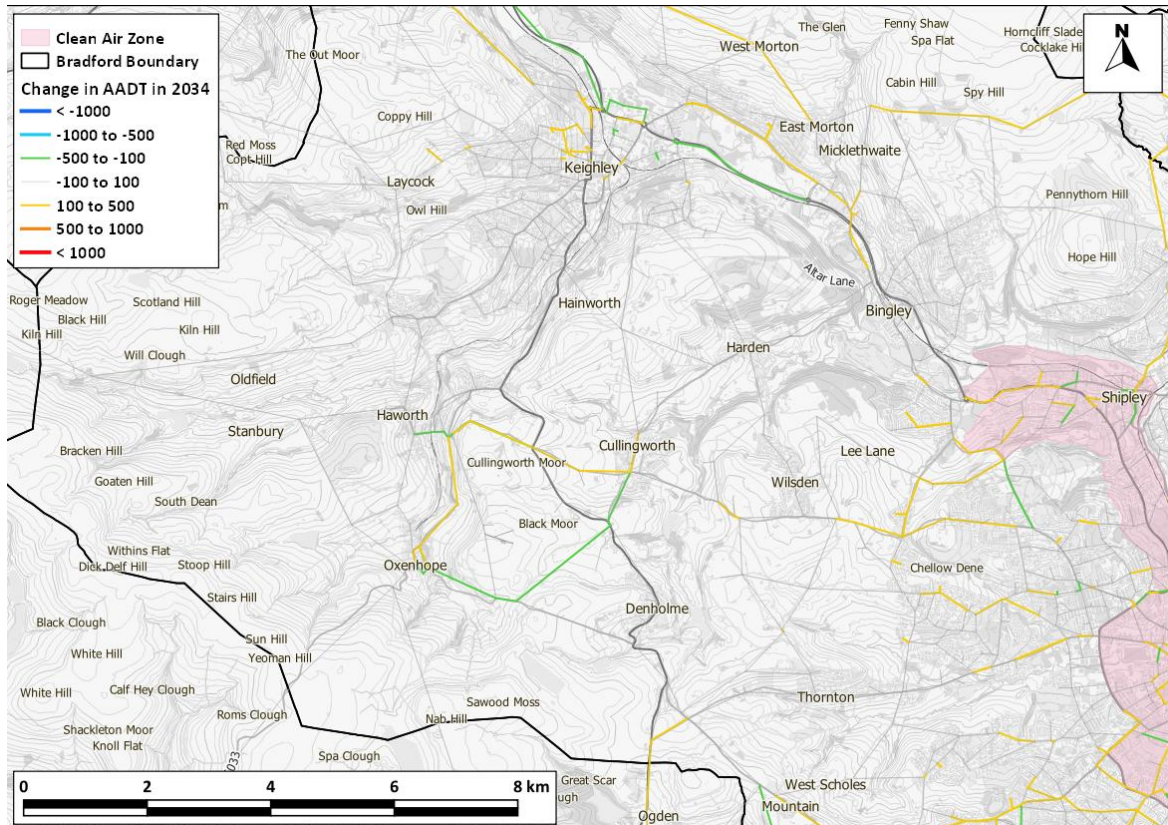


Figure 5-11: West Bradford with the impact of the draft Local Plan in 2034

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2043

5.48

In the west of the Bradford District, the Local Plan has greater effects on the traffic flows in 2043 compared to 2034. A large proportion of the roads that in 2034 had a change in traffic between decreases to increases of 100 AADT, in 2043 are expected to have an increase of up to 500 AADT. As these increases are below the IAQM screening threshold (Moorcroft and Barrowcliffe et al, 2017), they are not expected to have a significant influence on the air quality.

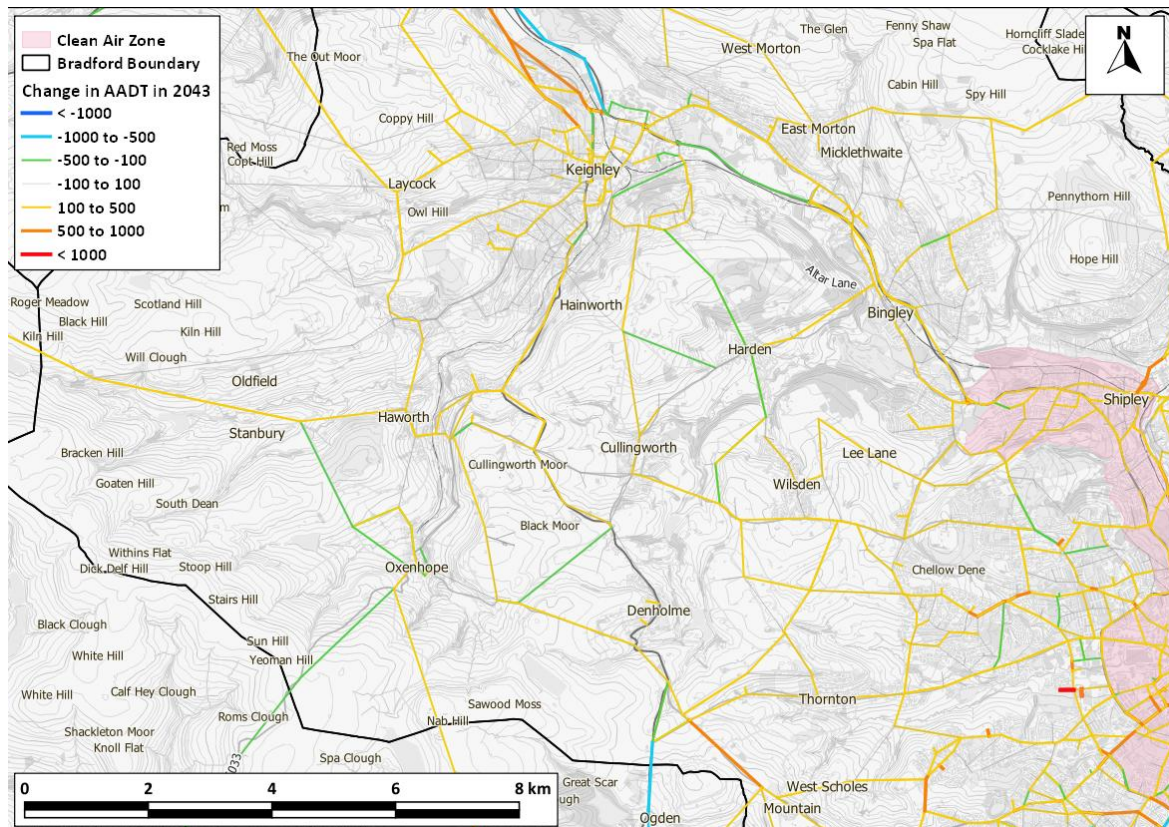


Figure 5-12: West Bradford with the impact of the draft Local Plan in 2043

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- 5.49 As seen in Figure 5-12, there are very few roads in the west of Bradford that will experience increases greater than 500 AADT. The only road that is expected to breach the 1,000 AADT threshold, is Birks Fold which is expected to increase by up to 1,334 AADT. Birks Fold is adjacent to Lidget Green Primary School, which is a highly sensitive receptor as defined in Section 2, meaning it is more susceptible to air quality issues.
- 5.50 Whilst there are some roads with decreases expected in the west of Bradford, there are not expected to be any decreases greater than 500 AADT as shown in Figure 5-12.

6 Conclusions

- 6.1 This Air Quality Assessment has examined the potential impacts of the draft Bradford District Local Plan to local air quality in 2034 and 2043. The assessment focused on emissions from road traffic and utilized a screening approach based on DMRB LA 105 and IAQM screening criteria.

Overview of Findings

- 6.2 The assessment demonstrates that the implementation of the Local Plan is likely to result in limited impacts on air quality within the district in 2034, however by 2043 there will be more substantial impacts. These findings should be considered in the context of continuing reductions in vehicle emissions and the likelihood that overall air quality will improve compared with current conditions.
- 6.3 In 2034, the draft Local Plan is not predicted to cause large air quality impacts. Traffic volume changes across the vast majority of the district road network remain well below the 1,000 AADT screening threshold, and changes within the CAZ and AQMAs are minor. Where traffic changes exceed the IAQM screening threshold, these locations may warrant further assessment as individual developments come forward or when any future strategic transport solutions are being developed, particularly where sensitive receptors are present.
- 6.4 In 2043, cumulative Local Plan-related growth across the district results in more extensive traffic increases, with several key corridors exceeding the screening thresholds. However, the draft Local Plan also introduces substantial traffic reductions on key links, which will deliver meaningful air quality benefits to sensitive receptors. The results identify locations where air quality considerations may need to be incorporated into future transport planning and project-level assessments, allowing any necessary mitigation measures to be identified and implemented.

Impact on Bradford CAZ and AQMAs

- 6.5 The Bradford CAZ and four AQMAs represent areas with historically elevated baseline NO₂ concentrations and the highest density of sensitive receptors.
- 6.6 In 2034, no road links within the CAZ or AQMAs are predicted to exceed the 1,000 AADT threshold. The greatest increase occurs on the A641 Manchester Road within AQMA 1, of less than 500 AADT. Modest reductions are also predicted on some links, most notably Ransdale Road.
- 6.7 In 2043, traffic growth is substantially higher within the CAZ, with multiple routes exceeding the 1,000 AADT threshold. Substantial increases, which exceed the 1,000 AADT threshold, are forecast within AQMA 1 and 4. These increases are highest on the A650 Shipley Airedale Road corridor and the A641 Manchester Road northbound.
- 6.8 The B6381 Barkerend Road within the CAZ will experience a significant traffic reduction of up to 1,408 AADT in 2043, providing local air quality benefits to adjacent high-sensitivity receptors, including residential dwellings, health centres, and Bradford Moor Community Primary School.

Impact across Greater Bradford

- 6.9 In 2034, traffic changes are minimal across North Bradford, with the greatest increase 550 AADT on the A629. In 2043, the A629 exceeds the 1,000 AADT threshold. However, this road is not adjacent to sensitive receptors, so these increases are unlikely to result in materially greater air pollution exposure.
- 6.10 In East Bradford, the traffic increases are expected to remain below 1,000 AADT in 2034. However, by 2043 there are increases above the 1,000 AADT threshold along the A658 Harrogate Road and A6177 Killinghall Road. Although these road links are adjacent to residential properties, these are set back

from the road so the air quality impacts will be minimised. However, there will also be major reductions of up to 2,025 AADT along the A6176 Pullan Avenue and B6381 Leeds Old Road / Fagley Road corridor, providing local air quality improvements.

- 6.11 In 2034, there are exceedances of the 1,000 AADT threshold on the A58 Whitehall and Cleckheaton Road in South Bradford. By 2043, the traffic flows increase further, and exceedances occur on the M606, Sal Royd Road / A641 Huddersfield Road and sections of A650 Tong Street. These increases will be detrimental to the air quality in the area. However, in 2043 significant traffic reductions are also forecast on the southbound A650 from Tong and the A650 east of Birkenshaw.
- 6.12 In West Bradford, traffic changes are minimal in 2034 and remain well below 500 AADT. In 2043, only one link exceeds the 1,000 AADT threshold (Birks Fold), which is adjacent to Lidget Green Primary School and which is highly sensitive to air quality issues.

Heavy Duty Vehicles (HDVs)

- 6.13 Screening of HDVs (in Appendix A2) shows that HDV flow changes are less extensive in relation to relevant screening criteria than the total traffic changes. In 2034, there are no major impacts due to HDV increases. In 2043, there are specific links with HDV increases exceeding the 200 AADT HDV criterion, including the M606 and A6036 Rooley Avenue westbound, which will have an impact on air quality. There are also reductions in HDVs forecast in 2043 along the A658 Harrogate Road and the Cleckheaton Road / Bradford Road corridor, mitigating air quality impacts along these residential links.

Summary

- 6.14 In summary, the draft Bradford Local Plan is expected to cause relatively modest impacts in 2034. By 2043, while widespread traffic reductions will improve conditions in several sensitive communities, significant traffic increases are predicted along key strategic routes within the CAZ, AQMA 1, AQMA 4, and specific residential corridors across East, South, and West Bradford.
- 6.15 Concurrent improvements in vehicle technology mean that air quality is still most likely to improve between 2026 and 2043 despite the increases in traffic. However, in these areas, growth provided by the Local Plan will cause air quality to be worse than it otherwise would be. The findings of this strategic assessment may therefore inform where future more detailed studies may be needed, as individual developments come forward or when any future strategic transport solutions are developed.

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8 Glossary

AADT	Annual Average Daily Traffic
AMCT	Annual Mean Concentration Target (for PM _{2.5})
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
CAZ	Clean Air Zone
CBMDC	City of Bradford Metropolitan District Council
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
EPUK	Environmental Protection UK
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HGV	Heavy Goods Vehicles
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (< 3.5 tonnes)
LGV	Light Good Vehicles
µg/m ³	Microgrammes per cubic metre
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides (taken to be NO ₂ + NO)
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
PERT	Population Exposure Reduction Target (for PM _{2.5})
PM ₁₀	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM _{2.5}	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
Standards	A nationally defined set of concentrations for nine pollutants based on assessment of the effects of each pollutant on human health, including the effects on sensitive sub-groups.

VOC Volatile Organic Compounds

9 Appendices

A1 Professional Experience

Dr Ben Marner, BSc (Hons) PhD CSci MEnvSc MIAQM

Dr Marner is the Director of Air Quality Modelling and Assessment at AQC and has more than 20 years' relevant experience. He has been responsible for air quality and greenhouse gas assessments of road schemes, rail schemes, airports, power stations, waste incinerators, commercial developments and residential developments in the UK and abroad. He has acted as expert witness at public inquiries, where he has presented evidence on health-related air quality impacts, the impacts of air quality on sensitive ecosystems, and greenhouse gas impacts. He has developed a range of widely-used air quality models and contributed to the development of best practice. Dr Marner has provided support and advice to foreign governments, Highways England, Transport Scotland, Transport for London, Greater London Authority, the Joint Nature Conservation Committee, the Environment Agency, and numerous local authorities. He is a Member of the Institute of Air Quality Management and a Chartered Scientist. He currently advises the UK Government on air quality as part of its Air Quality Expert Group (AQEG), where his specific area of expertise relates to air quality assessment in the development control process, and has separately provided advice on air quality issues to Defra's Chief Scientific Adviser, the UK Chief Medical Officer, and the UK Chief Planner.

Lola McAuley, MChem (Hons)

Miss McAuley is an Assistant Consultant with AQC and joined in 2025. Throughout her Chemistry integrated master's degree (MChem) at the University of Leeds, she developed an interest in climate change and atmospheric chemistry, with her master's research project using an atmospheric simulation chamber to measure oxidation reactions of key pollutants. The application of this is to improve the effectiveness of satellite measurements for air quality and pollution monitoring. She is currently gaining experience undertaking a variety of assessments, ranging in scope from standalone assessments to contributions to EIA developments, across both air quality and climate change disciplines. She is an Associate Member of the Institute of Environmental Sciences and an Affiliate Member of the Institute of Air Quality Management.

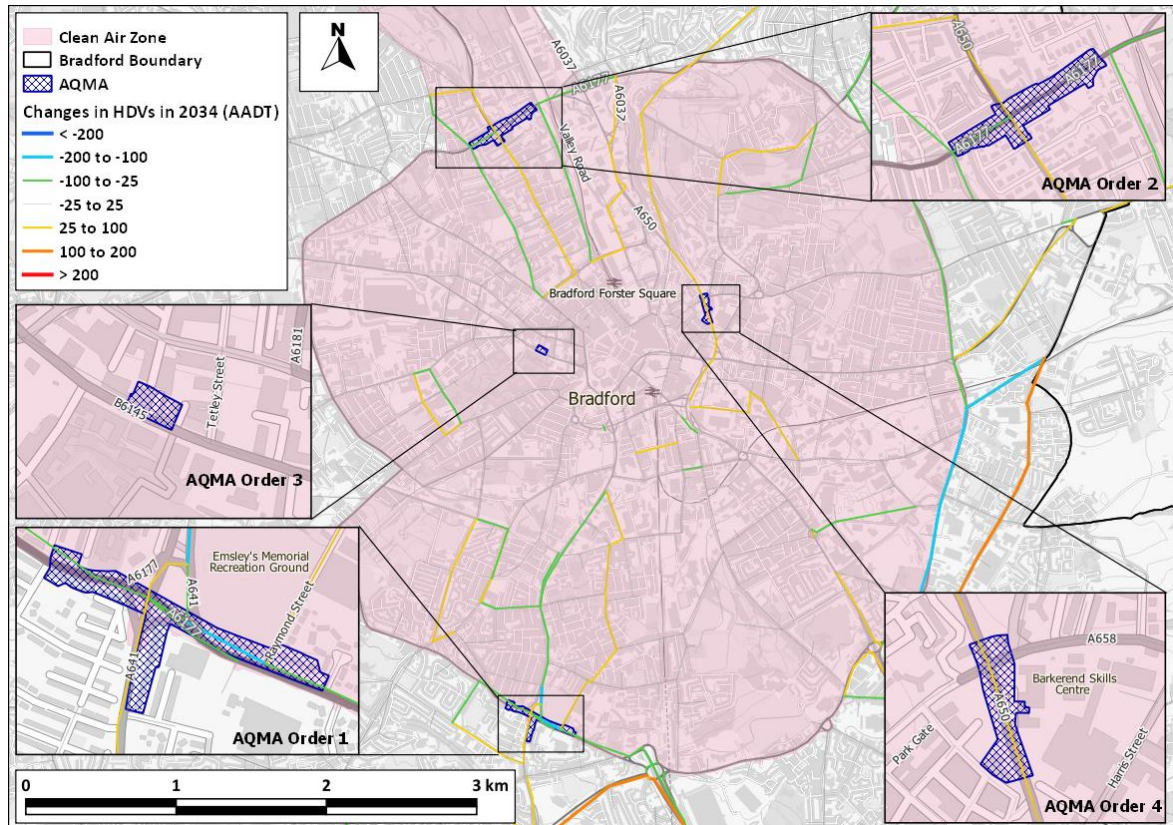


Figure A2-2: Bradford AQMAs with the impact on HDV flows in 2034

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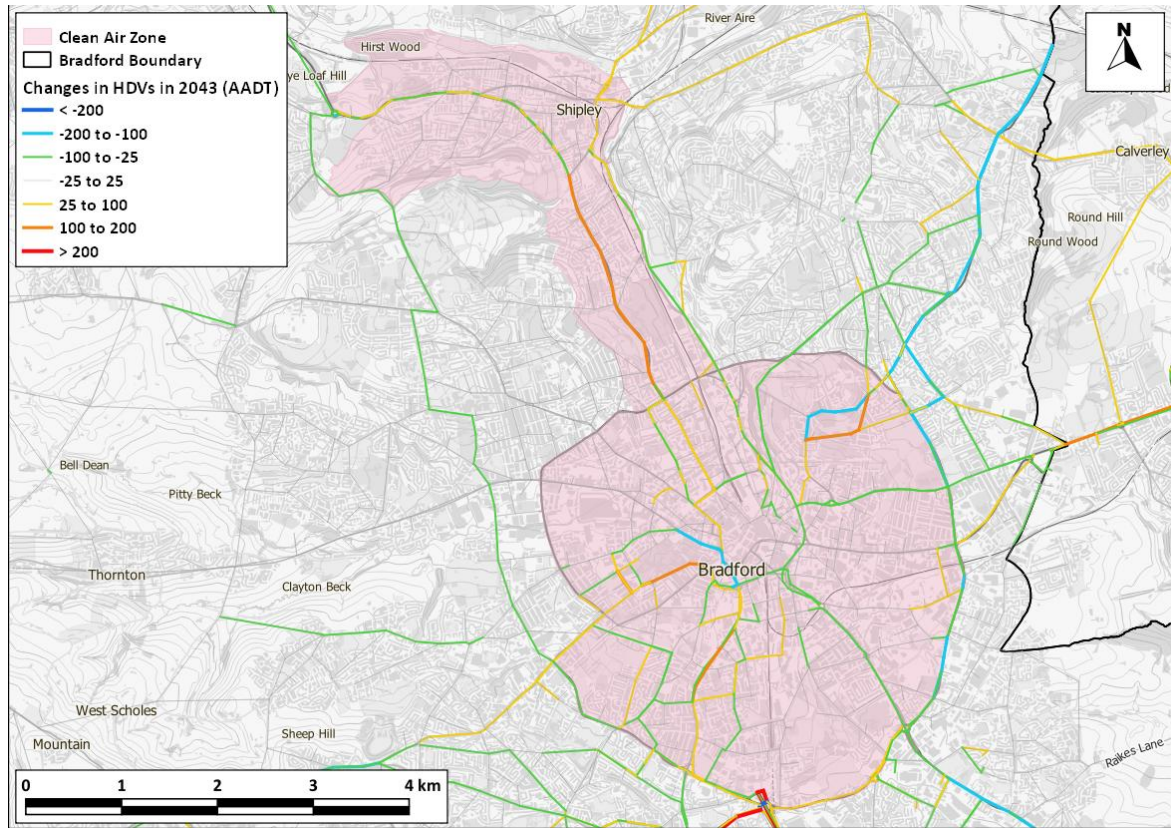


Figure A2-3: Bradford CAZ with the impact on HDV flows in 2043

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24 September 2026

Clean Air Zone
Bradford Boundary

Changes in HDVs in 2034 (AADT)

- < -200
- 200 to -100
- 100 to -25
- 25 to 25
- 25 to 100
- 100 to 200
- > 200

Map showing the Bradford region with various place names and road numbers. The map includes a scale bar from 0 to 8 km and a north arrow.

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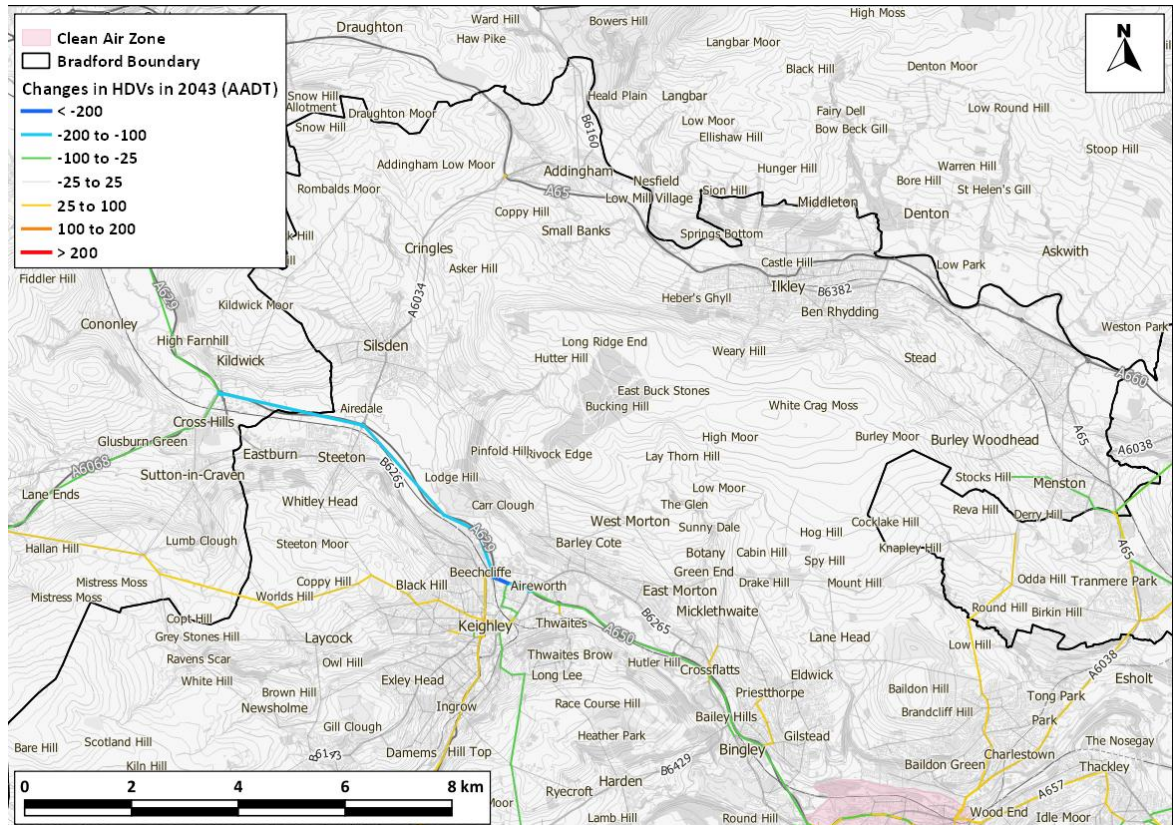


Figure A2-6: North Bradford with the impact on HDV flows in 2043

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East Bradford

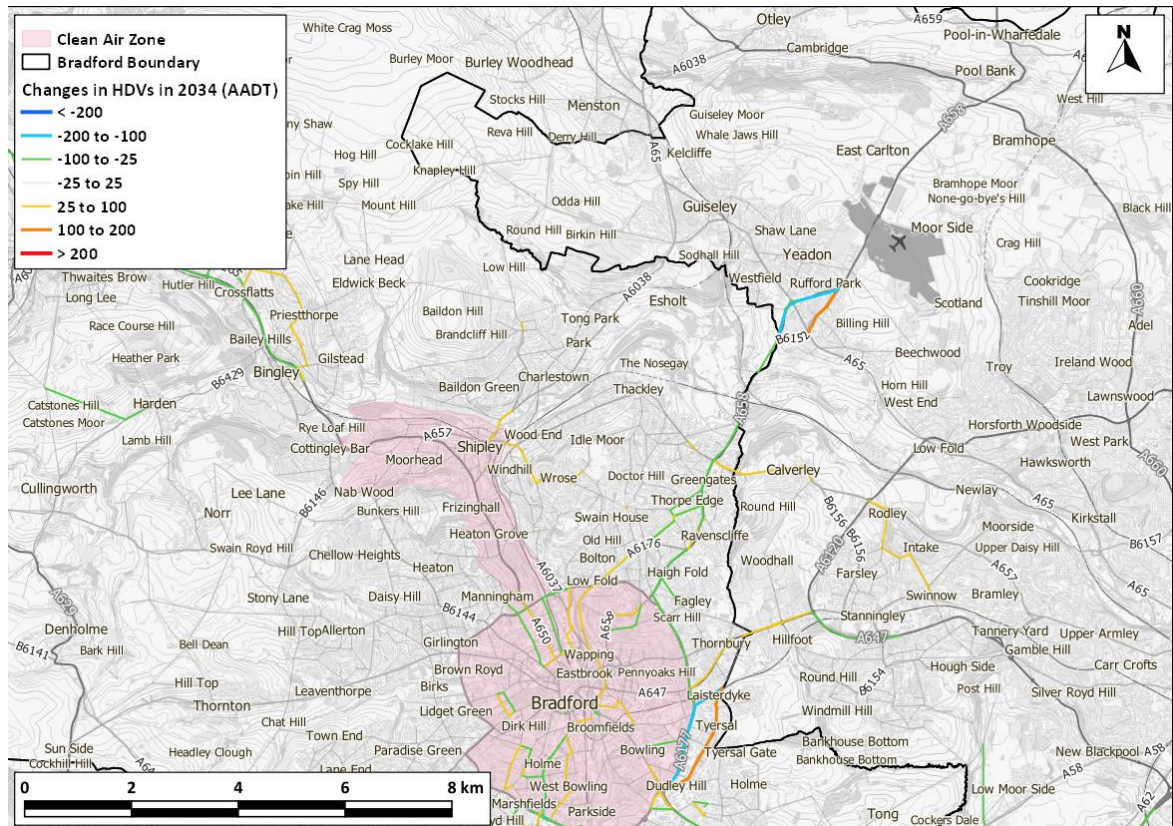


Figure A2-7: East Bradford with the impact on HDV flows in 2034

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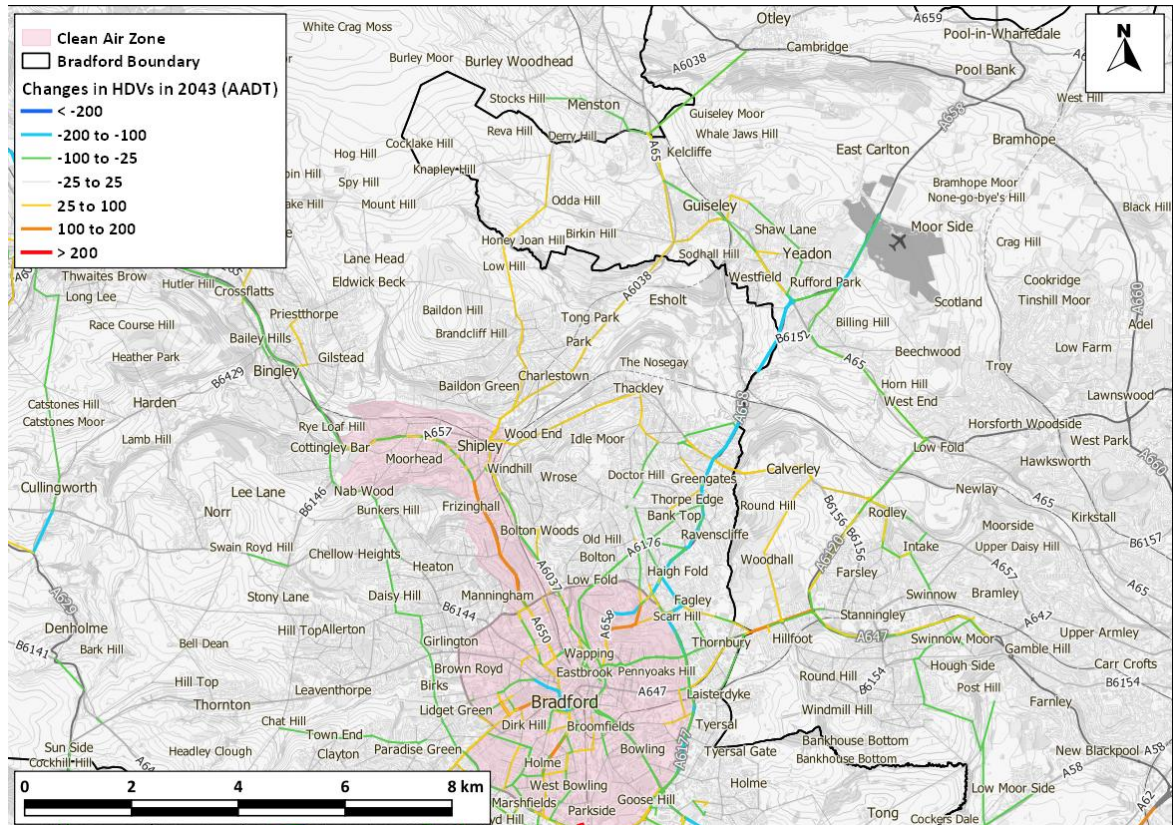


Figure A2-8: East Bradford with the impact on HDV flows in 2043

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South Bradford

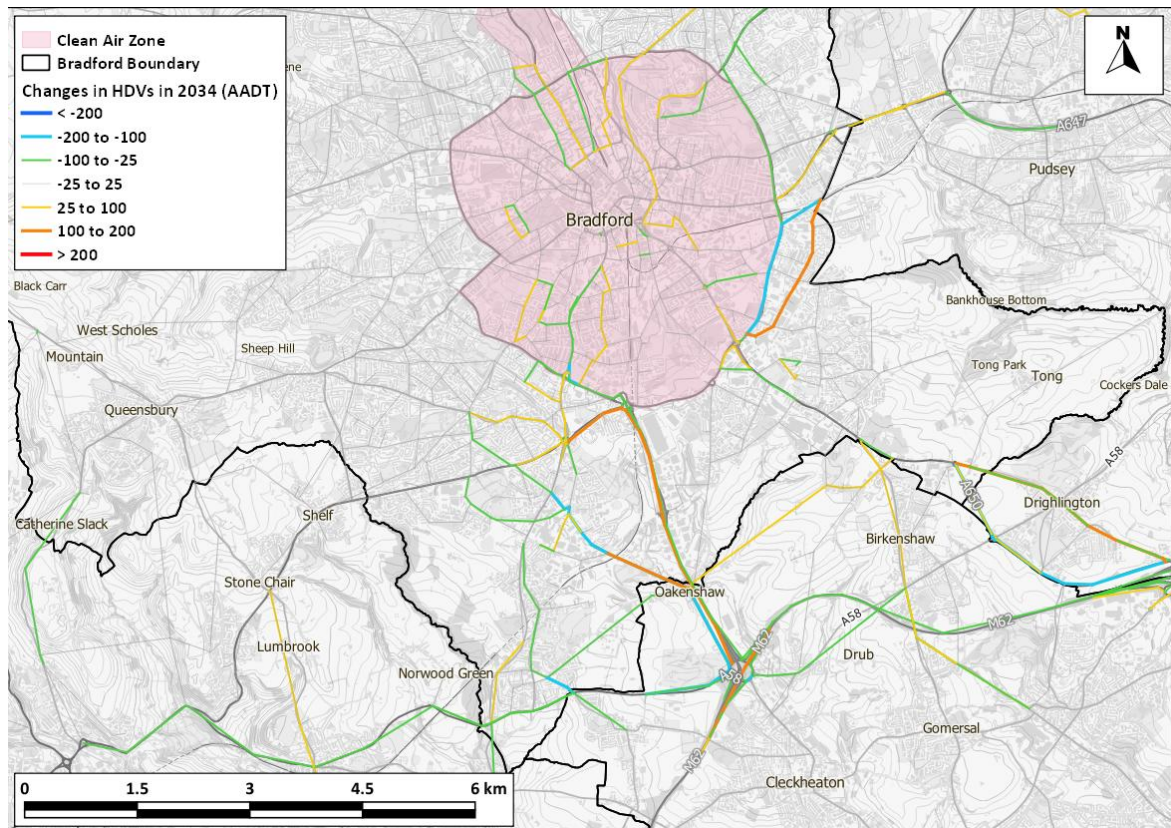


Figure A2-9: South Bradford with the impact on HDV flows in 2034

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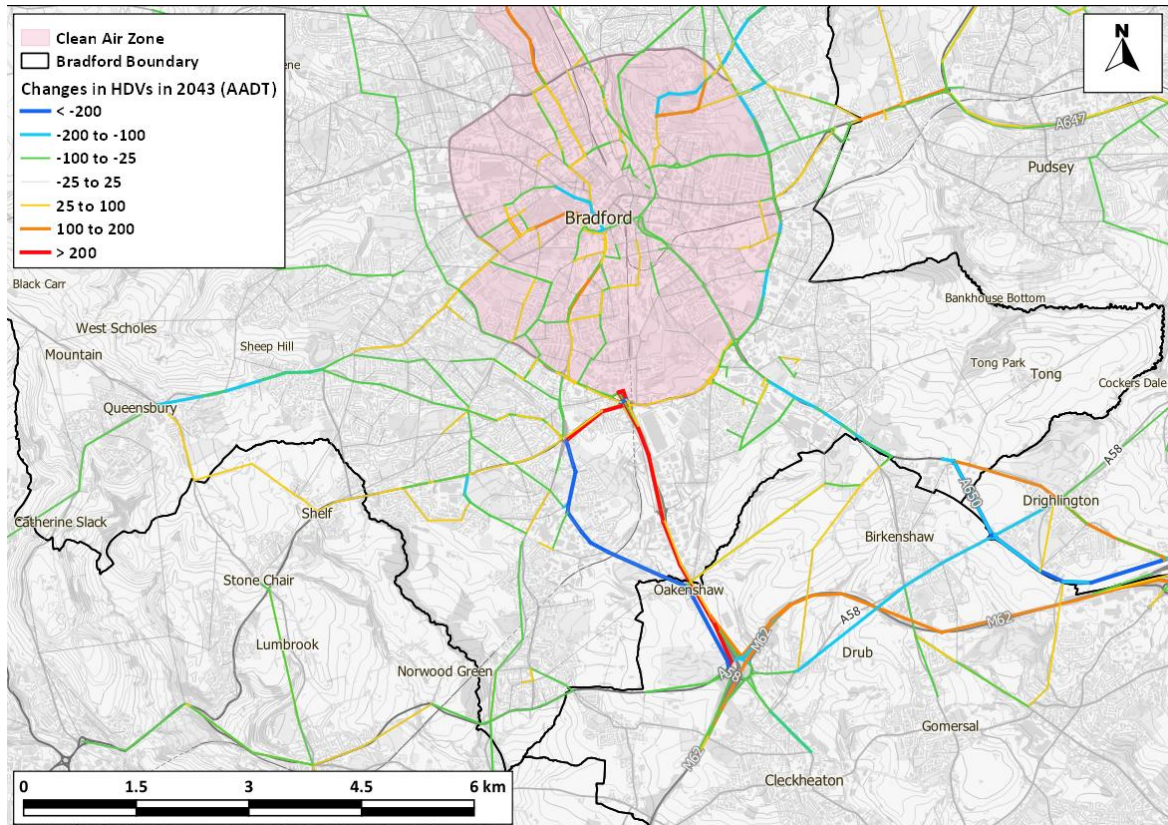


Figure A2-10: South Bradford with the impact on HDV flows in 2043

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

West Bradford

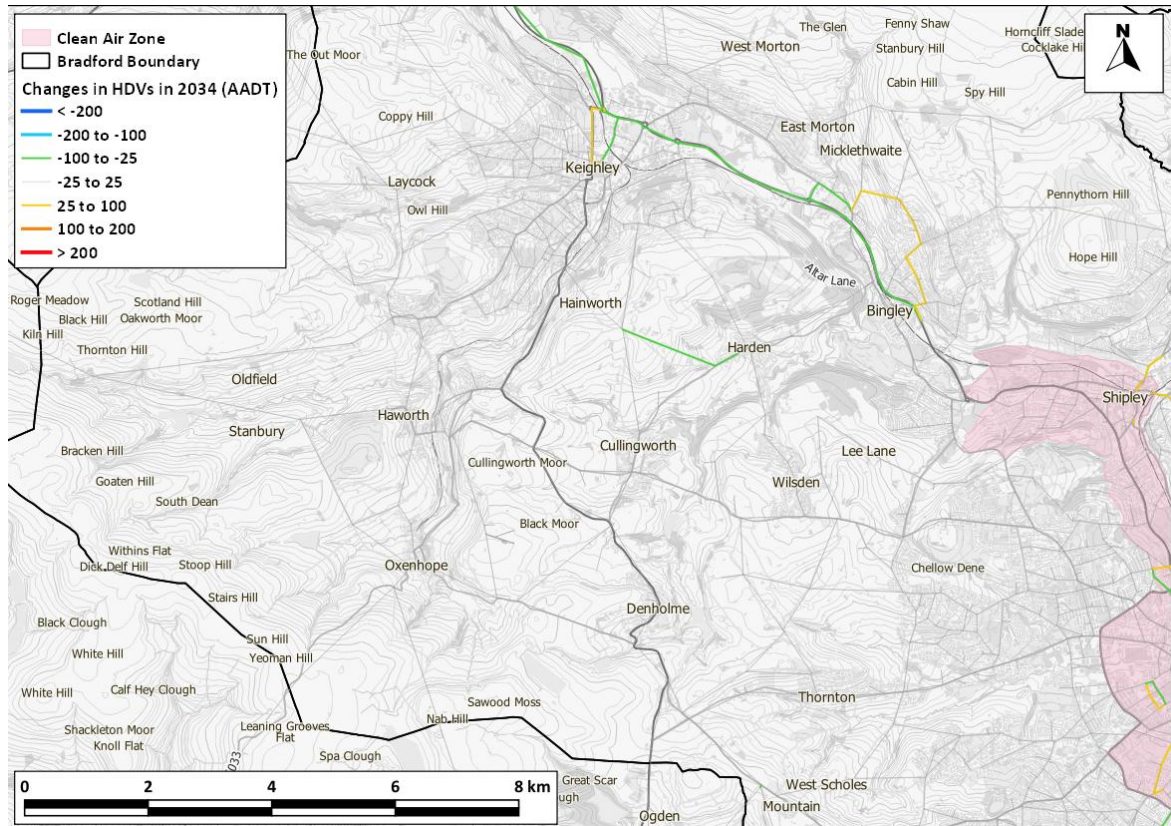


Figure A2-11: West Bradford with the impact on HDV flows in 2034

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