29 June 2021 at 7.00 pm

Council Chamber, Argyle Road, Sevenoaks
Published: 21.06.21

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Cleaner & Greener Advisory Committee

Membership:
Cllrs. Andrews, Barnett, Bayley, Dr. Canet, Carroll, Collins, G. Darrington, Firth, Griffiths, McArthur, Raikes and Roy

Agenda

There are no fire drills planned. If the fire alarm is activated, which is a continuous siren with a flashing red light, please leave the building immediately, following the fire exit signs.

		Pages	Contact
	Apologies for Absence		
1.	**Appointment of Chairman**		
2.	**Appointment of Vice Chairman**		
3.	**Minutes** To agree the minutes of the meeting of the Committee held on 16 March 2021, as a correct record.	(Pages 1 - 4)	
4.	**Declarations of Interest** Any interests not already registered.		
5.	**Actions from Previous Meeting (if any)**		
6.	**Update from Portfolio Holder**		
7.	**Referral from Cabinet or the Audit committee (if any)**		
8.	**Net Zero 2030 Update - Low Emission and Electric Vehicle Strategy**	(Pages 5 - 28)	Helen French Tel: 01732 227357

9.	**Air Quality - Update on the Development of a new Air Quality Action Plan**	(Pages 29 - 212)	Nick Chapman Tel: 01322 343160
10.	**Work Plan**	(Pages 213 - 214)	

EXEMPT INFORMATION

At the time of preparing this agenda there were no exempt items. During any such items which may arise the meeting is likely NOT to be open to the public.

If you wish to obtain further factual information on any of the agenda items listed above, please contact the named officer prior to the day of the meeting.

Should you need this agenda or any of the reports in a different format, or have any other queries concerning this agenda or the meeting please contact Democratic Services on 01732 227000 or democratic.services@sevenoaks.gov.uk.

CLEANER & GREENER ADVISORY COMMITTEE

Minutes of the meeting held on 16 March 2021 commencing at 7.00 pm

Present: Cllr. McArthur (Chairman)

Cllr. Carroll (Vice Chairman)

Cllrs. Andrews, Bayley, Dr. Canet, Collins, G. Darrington, Griffiths, Nelson and Raikes

An apologies for absence was received from Cllr. Foster

Cllr. Osborne-Jackson was also present.

55. Minutes

Resolved: That the Minutes of the Cleaner and Greener Advisory Committee held on 19 January 2021 be approved and signed by the Chairman as a correct record.

56. Declarations of Interest

No additional declarations of interest were made.

57. Actions from Previous Meeting

There were none.

58. Update from Portfolio Holder

The Portfolio Holder, and Chairman, expressed her thanks to the refuse collectors and teams would were still collecting high levels of waste. The waste transfer station had been closed due to the fire at the depot last year, and so the crews were having to travel further to empty the freighters. With the easing of lockdown restrictions, the already busy work load of Environmental Health and Licensing was expected to increase further.

59. Referral from Cabinet or the Audit committee

There were none.

60. Net Zero 2030 Update

The Principal Planning Officer (Policy) presented the report which updated Members on the progress to achieve the Net Zero 2030 Actions. The Net Zero ambition was relevant for all aspects of the Council and the Officer Working Group continued to identify how the actions would be achieved and monitor progress. Members were updated on a selection of ongoing projects in particular the NetZero 2030 website and the new email address netzero2030@sevenoaks.gov.uk for organisations, landowners community groups or anyone who was interested in partnering with the Council to deliver Net Zero 2030 were encouraged to get in contact by the email address. Work had also begun on the staff travel plan, as well as officers working with North West Kent Countryside Partnership to develop activities and interactive material for National Wildlife Week in April 2021. Due to the current Coronavirus restrictions the project could be delayed until the half term holidays in May to enable to make best use of the project and reach more people.

Members took the opportunity to discuss the report, with particular focus on electric and hydrogen based vehicles. In response to questions the Principal Planning Officer (Policy) advised that the points raised would be considered and addressed within the strategy, but further work and information was needed in regards to the emerging technology.

Resolved: That the report be noted.

61. Street Litter Binfrastructure & Draft Project Strategy 2021

The Head of Direct Services presented the report which advised Members on the street litter bin project and draft litter strategy, which was used to enable the council to apply for Government funding. The Draft Litter Strategy was still being developed, however it was a requirement of the Binfrastructure funding application, and a full Litter Strategy would be considered by Cabinet at a later date.

The funding application of £25,000 had been successful and would enable a pilot scheme to replace fifty street litter bins in the most rural locations with wood cladded larger bins with sensors. This would enable an automatic notification for the bins to be emptied instead of weekly unnecessary visits. The pilot would also provide special recycling bins at Enysford Riverside which would also be wood cladded.

In response to questions Members were advised that the pilot scheme was to enable smarter working with the resources available but the teams would continue to be responsive to waste problems. The number of crews working over the weekends had increased and as well as looking at the Binfrastructure it was also looking at making sure the right bins were in the right place and the strategy would determine this.

The Chairman advised that Cabinet would also be considering the same report.

Public Sector Equality Duty

Members noted that consideration had been given to impacts under the Public Sector Equality Duty.

Resolved: That the Draft Project Litter Strategy as set out at Appendix A to the report be noted.

62. Emergency Planning Update

The Head of Direct Services presented the report which detailed that under the Civil Contingencies Act 2004 Sevenoaks District Council was identified as a statutory Category 1 Responder for major incidents and emergencies.

The Council's emergency plans had been tested with multi-agency partners and were expected to work well in live situations. A huge amount of work had been undertaken over the last 12 months regarding the pandemic, EU transition and severe weather along with more localised emergencies. The Council constantly reviewed and improved its major plans, training and development and on-call 24/7 arrangements to ensure being ready to respond at any time.

The Chairman advised that Cabinet would also be considering the same report.

Public Sector Equality Duty
Members noted that consideration had been given to impacts under the Public Sector Equality Duty.

Resolved: That the report be noted.

63. Mill Pond Update

The Committee considered the report which provided an update on the work that had been carried out on Mill Pond, Seal Road and a work programme for further maintenance and repair.

The Head of Direct Services advised that despite the restrictions, challenges and reduced resources over the last 12 months due to the pandemic, maintenance work had continued by the Open Spaces team and included; grass cutting; repairs to the damaged boards on the boardwalk; spraying of the footpaths of weeds; removal of litter and objects from the pond; and removal of vegetation growing through the boardwalk.

An exemption licence from the Environment Agency to undertake the desilting works programme had been successfully applied for and these works were expected to take places between June and August 2021 at a cost of around £10,000.

Members expressed their thanks for the continued work at the pond.

Resolved: That the report be noted.

64. GreenSand Common Project Update 2020 to March 2021

The Head of Direct Services presented the report which updated Members on the activity within the project over the last 12 months. The Sevenoaks Greensand

Commons were managed by the Kent Wildlife Trust and the project was funded by the Heritage Lottery Fund and started in Autumn 2018 and ends on 30 June 2022. Despite restrictions the project had continued in a limited way with work around access, conservation, the landscape and social heritage virtual schools programmes, activities for young and excluded people and heritage interpretation.

Discussions with the Heritage Lottery Fund were taking place to see how the pandemic would affect the overall project and how to move forward. It was hopeful that there would be a small extension to the project.

Members took the opportunity to ask questions and expressed their thanks for the continued work on the project.

Resolved: That the report be noted.

65. Work Plan

The work plan was noted.

THE MEETING WAS CONCLUDED AT 7.43 PM

CHAIRMAN

NET ZERO 2030 – LOW EMISSION AND ELECTRIC VEHICLE STRATEGY

Cleaner and Greener Advisory Committee – 29 June 2021

Report of: Deputy Chief Executive and Chief Officer – Planning & Regulatory Services

Status: For Decision

Also considered by:

- Cabinet – 8 July 2021

Key Decision: Yes

This report supports the Key Aim of: The Council's commitment to Net Zero 2030 made in November 2019.

Portfolio Holder: Cllr. Margot McArthur

Contact Officer: Helen French, Ext. 7357; Trevor Kennett, Ext. 7407

Recommendation to Development and Conservation Advisory Committee:

That it be recommended to Cabinet to agree the Low Emission and Electric Vehicle Strategy

Recommendation to Cabinet:

To agree the Low Emission and Electric Vehicle Strategy

Reason for recommendation: To work towards the Council's commitment to Net Zero 2030 made in November 2019.

Introduction

1 The Council have committed to working towards achieving Net Zero emissions by 2030 on Council assets and services.

2 It has also been agreed that the Council will be a "community leader" and encourage low carbon measures across the District through education, best practice, incentives, policy and opportunities. This includes working collaboratively with Kent County Council, Parish and Town Councils, Local Interest Groups and the Local Government Association.

3 The Low Emission and Electric Vehicle Strategy (LEEVS) sets out the Council's positon and ambitions with regards to the electric vehicle charging infrastructure in the District and the Council's vehicle fleet.

4 The Strategy will help the Council achieve the following Net Zero 2030 Actions:

- Promote low carbon travel
- Improve the electric vehicle charging network across the District
- Continue our transition to a zero-carbon emissions vehicle fleet wherever practicable

5 The Council have also endorsed the Kent and Medway Energy and Low Emission Strategy (ELES) which identifies 10 priority actions for Kent, including a priority related to transport and travel. The ELES acknowledges the role that low emission and electric vehicles play in reducing carbon emissions across the county and commits to working with local authorities to improve the charging infrastructure.

6 Cabinet are asked to agree the Strategy as a starting point for the Low Emission and Electric Vehicle work. The Strategy will be updated as opportunities arise and with new advancements in technology. Therefore, it will remain as a "live" document and part of the ongoing Net Zero 2030 work and Movement Strategy.

Background

7 Transport remains the largest carbon emitting sector in the UK and accounts for 63% of total carbon emissions in Sevenoaks District. For SDC, transport accounted for over 70% of the Council's total emissions last year.

8 Low emission and electric vehicles will play an important role in reducing transport related emissions, alongside reducing the need to travel and using alternative modes of transport.

9 In March 2021, the Government confirmed 2030 as the phase out date for new petrol and diesel cars and vans, with all vehicles being required to have a "significant zero emissions capability" from 2030 and be 100% zero emissions from 2035[1].

Electric Vehicle Charging in Sevenoaks District

10 Sevenoaks District currently has the highest level of registered electric vehicle ownership in Kent and the number of electric vehicles has seen significant growth since 2014. This trend is expected to continue to 2030 and beyond.

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[1] Source: https://www.gov.uk/government/consultations/consulting-on-ending-the-sale-of-new-petrol-diesel-and-hybrid-cars-and-vans/outcome/ending-the-sale-of-new-petrol-diesel-and-hybrid-cars-and-vans-government-response

11 Currently the District has publically available charging points in 12 locations, which is one of the lowest in Kent. Figure 1 shows the type and distribution of charging points within the District.

12 The majority of charging points are clustered around the north of Sevenoaks Town. There are none around Edenbridge and only limited facilities within Swanley.

13 The Council has installed 10 charging points within SDC owned car parks as part of the redevelopment of the Sevenoaks Town and Bradbourne car parks. We have also committed to installing additional accessible charging points across other car parks under SDC control and at the Council depot and offices.

14 We will continue to work with partners, including the Kent County Council Transport Innovations team, to install new charging points across the district and to assist residents, businesses and communities to install their own points.

15 There are a number of SDC policy and strategy documents which relate to electric vehicle charging including the Movement Strategy, the Local Plan and the Air Quality Action Plan. The improvement of the electric vehicle charging network will be a key component in encouraging sustainable movement within and through the District and improving air quality.

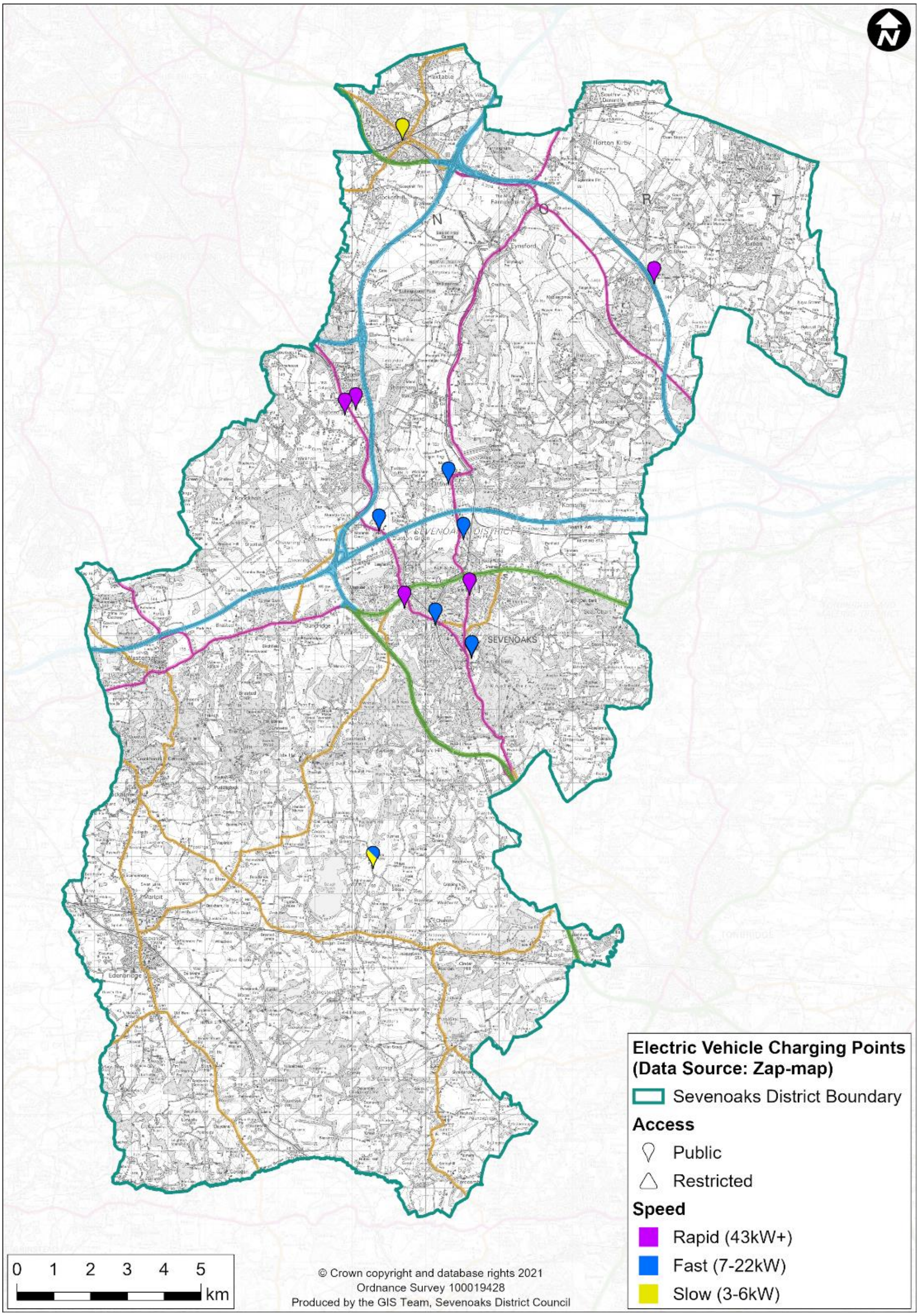
Sevenoaks District Council Fleet

16 The majority of the Council's carbon emissions arise from the Council's fleet of vehicles accounting for over 70% of the total emissions last year.

17 We have already begun reducing the carbon emissions from our existing fleet. The fleet consists of 93 vehicles, 4 of which are fully electric. We are investigating the replacement of the vehicle fleet with low carbon alternatives. We will invest in electric cars and vehicles where feasible and also consider future fuel technologies such as hydrogen.

18 We will also continually review how our vehicles operate and seek to identify future savings. This includes the new waste collection round review, which aims to decrease the mileage we cover in the vehicles by at least 5%, therefore reducing carbon emissions.

Figure 1: Electric Vehicle Charging Points within Sevenoaks District



Ambitions and Actions

19 The Strategy identifies ambitions and actions. The Council will:

- Improve the District's electric vehicle network by increasing the number of charging points within SDC owned car parks and on SDC owned land.
- Support suitable schemes and projects to install charging points throughout the District.
- Ensure new developments make provision for electric vehicle charging through Local Planning Policy.
- Continue to work with Kent County Council, and other partners, to explore new charging options.
- Implement ways to reduce the carbon emissions from the fleet including through reducing fleet mileage and replacing the existing fleet with electric and low carbon alternatives, where feasible and as soon as possible.
- Support residents, businesses and communities to install suitable charging points including through providing information on available grants and funding opportunities.
- Encourage the replacement of traditional combustion engines and low emission vehicles with fully electric vehicles within the District.

Next Steps

20 Officers will continue to work with partners to achieve the ambitions and actions set out in the Low Emission and Electric Vehicle Strategy and therefore the Net Zero 2030 Actions.

21 The Strategy will be updated and reviewed where necessary to take account of changing technologies, circumstances and new opportunities.

Other options Considered and/or rejected

The Council have made a commitment to Net Zero 2030 including relevant actions for 2021-22.

Key Implications

Financial

Any cost will be met out of the existing budget.

Legal Implications and Risk Assessment Statement.

No legal implications have been identified.

Equality Assessment

The decisions recommended through this paper have a remote or low relevance to the substance of the Equality Act. There is no perceived impact on end users.

Net Zero 2030 and Environmental Impact

The Low Emission and Electric Vehicle Strategy supports the Councils Net Zero 2030 work.

Conclusion

The Council has made a Net Zero 2030 commitment and the Low Emission and Electric Vehicle Strategy supports this commitment for the Council emissions as well as emissions across the District

Appendices

Low Emission and Electric Vehicle Strategy 2021

Background Papers

None

Richard Morris

Deputy Chief Executive and Chief Officer - Planning & Regulatory Services

Sevenoaks District Council

Low Emission and Electric Vehicle Strategy

July 2021

Contents

1. Background and Context

1.1 In 2019, transport was the largest carbon emitting sector in the UK, responsible for 27% of the total carbon emissions[1]. The main source of emissions from this sector is the use of petrol and diesel road transport. In Sevenoaks District, transport accounts for 63% of the District's total emissions[2].

1.2 The best way to reduce carbon emissions related to transport, is to look firstly at how to reduce the need to travel. It is then important to promote and improve transport modes that produce zero or little carbon emissions, such as cycling and walking. Finally, where vehicle transport is necessary, low or zero emissions vehicles and infrastructure should be considered. All three of these approaches are needed to significantly reduce the level of carbon emitted from the transport sector.

1.3 Investment and innovation are needed to promote and encourage more walking, cycling and use of public transport. However, 89% of the UK own a private vehicle[3].The car is the dominant mode of transport in England with 61% of trips taken by private vehicle in 2019[4]. For many trips the use of alternative modes of transport are not feasible or appropriate.

1.4 In March 2021 the Government confirmed 2030 as the phase out date for new petrol and diesel cars and vans, with all vehicles being required to have a "significant zero emissions capability" from 2030 and be 100% zero emissions from 2035[5].

1.5 The Transport Secretary Grant Shapps stated that *"The UK is going further and faster than any other major economy to decarbonise transport, harnessing the power of clean, green technology to end the UK's contribution to climate change by 2050."*[6]

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[1] Source: Government - 2019 UK Greenhouse Gas Emissions, Final Figures
[2] Source: Government - UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2018
[3] Source: Government - Vehicle Licensing Statistics
[4] Government- National Travel Survey: England 2019
[5] Source: Government consultation- Outcome and response to the ending the sale of new petrol, diesel and hybrid cars and vans
[6] Source: Government news- Government takes historic step towards net-zero with end of sale of new petrol and diesel cars by 2030

1.6 The number of electric vehicles sold in the UK continues to grow. In 2015 electric vehicles accounted for 1.1% of all new cars registered in the UK compared to the end of December 2020 where they made up 10.7%[7]. It is a growing sector and electric vehicles, as well as the accompanying charging infrastructure, are crucial to reducing carbon emissions and improving air quality.

1.7 Sevenoaks District currently has the highest level of electric vehicle ownership in Kent.

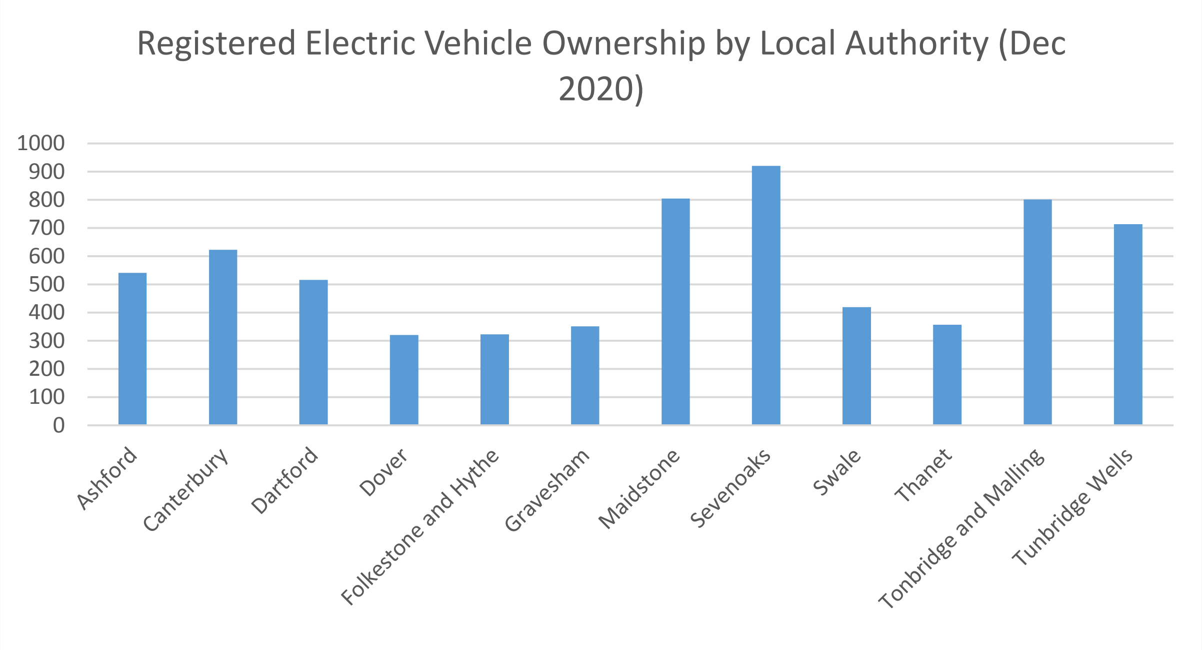

Figure 1: Registered Electric Vehicle Ownership by Local Authority- Dec 2020[8]

1.8 The number of electric vehicles owned within Sevenoaks District has rapidly grown and continues to grow as shown in Figure 2.

[7] Source: Next Green Car Statistics
[8] Source: Government Statistics- VEH0132: Licensed ultra low emission vehicles by local authority: United Kingdom

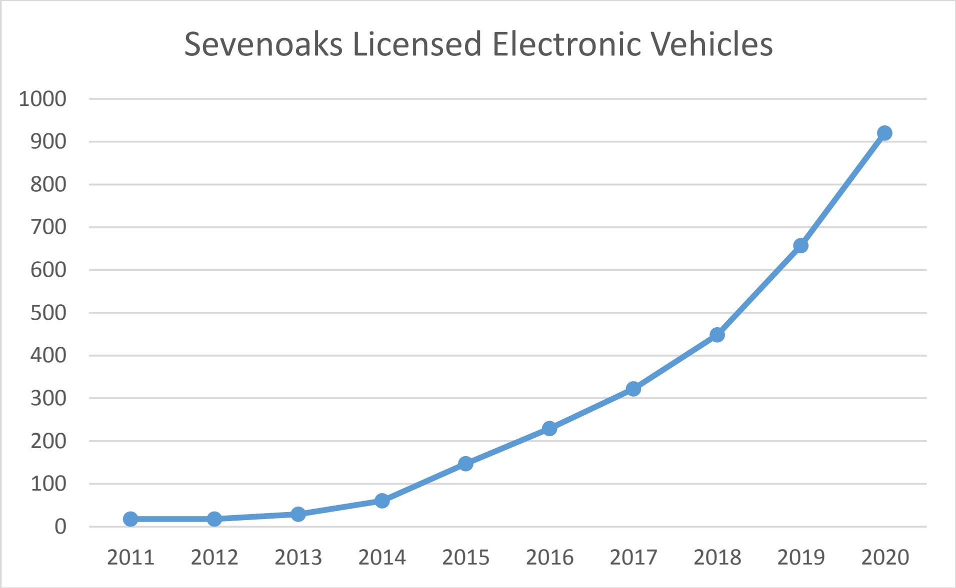

Figure 2: Sevenoaks Licensed Electronic Vehicles- December 2020[9]

1.9 The Kent and Medway Energy and Low Emissions Strategy[10] (ELES) states that:

“Limiting our contribution to global warming, and driving low carbon economic recovery, will undoubtedly be the most urgent issues of this decade.”

1.10 The strategy identifies 10 priority actions for Kent, including a priority related to transport and travel. The ELES acknowledges the role that low emission and electric vehicles play in reducing carbon emissions across the county and commits to working with local authorities to improve the charging infrastructure.

1.11 Sevenoaks District Council (SDC) have committed to becoming Net Zero by 2030, for the council and its assets, whilst also taking a lead in helping residents, businesses and visitors in the District to reduce their own carbon emissions. As part of this SDC have committed to support electric and low emission vehicles, and promote the necessary infrastructure[11].

1.12 The Low Emission and Electric Vehicle Strategy will assist the Council in achieving the following Net Zero 2030 actions:

- Promote low carbon travel
- Improve the electric vehicle charging network across the District
- Continue our transition to a zero-carbon emissions vehicle fleet wherever practicable

[9] Source: Government Statistics- VEH0132: Licensed ultra low emission vehicles by local authority: United Kingdom
[10] Source: KCC - Kent and Medway Energy and Low Emissions Strategy
[11] Source: SDC - Net Zero 2030 - January update

2. Sevenoaks District Council Fleet

2.1 The majority of the Council's carbon emissions arise from the Council's fleet of vehicles accounting for over 70% of the total emissions last year.

2.2 We have already begun reducing the carbon emissions from our existing fleet. The fleet consists of 93 vehicles, 4 of which are fully electric. Of the 89 diesel engines, 29 meet the ULEZ standard, the Euro 6 Standard, according to manufacturer testing. There has been an even stricter stance towards diesel engines, particularly in terms of NOx emissions, forcing down a vehicle's output by 55%. The NOx limit for Euro 5 diesel vehicles was 180mg/km which has been reduced to just 80mg/km for Euro 6 diesels. Further vehicles in the fleet will be replaced by Euro 6 standard vehicles in 2021/2022 and beyond.

Table 1: Sevenoaks District Council Fleet

Vehicle Type	**Engine**	**Number of Vehicles**
Car/Ranger	2x EV; 12x Diesel	14
Small Van	10x Diesel	10
Large Van	17x Diesel	17
LGV	2x Diesel	2
Small HGV	5x Diesel	5
HGV	34x Diesel	34
Other	2x EV; 9x Diesel	11
Total:		**93**

2.3 We are investigating the replacement of the vehicle fleet with low carbon alternatives. We will invest in electric cars and vehicles where feasible and also consider future fuel technologies such as hydrogen.

2.4 We are currently working in partnership with Kent County Council's waste management team to look at our fleet parking and storage options, as part of the new household and recycling centre being developed at Dunbrik in 2023. We are also looking at what infrastructure is required at this new location, and we are working in collaboration with Hitachi to establish the demand an electric fleet of HGVs would require. It is expected that a significant proportion of the electricity will be sourced via renewable energy production.

2.5 It is important to not only replace vehicles with low carbon alternatives but also consider how those vehicles will operate, ensuring that the need and distance to travel is reduced, thereby reducing emissions whilst ensuring an efficient and effective service. As part of this we are currently developing a new waste collection round review, which aims to decrease the mileage we cover in the vehicles by at least 5%, therefore reducing the carbon footprint.

2.6 We will continually review how our vehicles operate and seek to identify future savings. This will need to take account of changing legislation, work practices and technological advancements to ensure we are doing our best to reduce emissions.

3. Electric Vehicle Charging Infrastructure

3.1 There are many different types of electric vehicles with varying range and charging capacity. The average electric vehicle range in the UK is approx. 190 miles (or 170 miles excluding Tesla)[12] compared with the average UK journey of 8 miles[13].

3.2 There are currently 3 main types of electric vehicle chargers. These represent the power outputs, and therefore charging speeds, available to charge an EV:

Table 2: Types of Electric Vehicle Charging Infrastructure

Type of Charger	Connector Power (Approx)	Approx charging time from empty to full*
Slow	3kW	6-12hrs
Fast	7kW (22kW)	4-6hrs (1-2hrs)
Rapid	50kW	30-60mins

* Charging times vary with vehicle battery capacity and type.

3.3 **Slow chargers** are usually rated up to 3kW and can include 3-pin plugs (2.3kW). These are often found at domestic premises where the vehicle will be parked for an extended length of time such as overnight. Charging times vary and, whilst a 3-pin plug can be used, it is recommended that regular charging be undertaken using a dedicated charging unit.

3.4 **Fast Chargers** are typically rated at 7kW, however there are some 22kW chargers available. Fast chargers tend to be found at destinations where the user is likely to be parked for an hour or more such as car parks, supermarkets, commercial premises, or leisure centres. However, many users choose to install 7kW chargers at home to allow for more flexible and quicker charging.

3.5 **Rapid Chargers** are the fastest way to charge an EV. They are often found at motorway service stations, town centres or close to main transport routes. This type of charger is most commonly used by those needing to charge in order to complete a journey.

3.6 **Ultra Rapid Chargers** provide power at 100kW or more and therefore significantly reduce the charge time. These are the next generation of rapid charge point and are not yet commonly found.

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[12] Nimblefins- average electric car range
[13] Nimblefins- average car journey

3.7 The majority of electric vehicles are charged at home via a slow or fast charger, as this is usually the most convenient and cheapest way to charge. However, public fast and rapid chargers are essential for those who do not have access to a home charger or those who need to charge to complete a longer journey.

3.8 It should be noted that not all vehicles will need a full charge for every journey, it may only be necessary for users to "top up" miles to complete a journey. Therefore, a range of charging options, including fast chargers (7-22kW) that are considerably less expensive to install, are essential for a viable and practical charging network.

Sevenoaks Context

3.9 Sevenoaks has a high level of electric car ownership, the highest registered car ownership in Kent[14]. However, the District has a relatively low number of publicly accessible electric vehicle charging points (EVCPs).

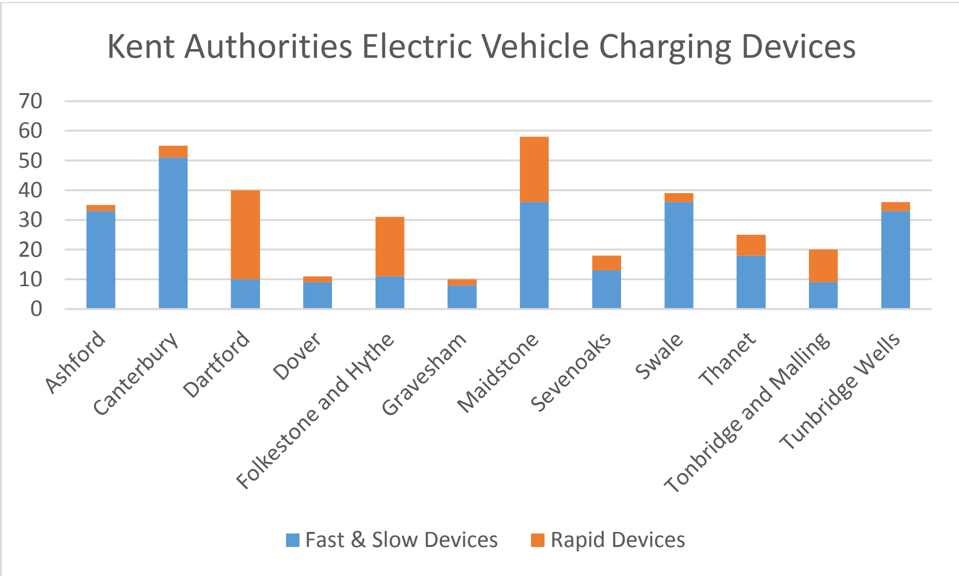

Figure 3: Kent Authorities Electric Vehicle Charging Devices- April 2021[15]

3.10 The above graph shows the charging points registered with the Department for Transport. In reality there are more available charging points across the county that have not been formally registered.

3.11 Figure 4 shows the distribution of charging points across Sevenoaks District.

[14] Source: Government Statistics- VEH0132: Licensed ultra low emission vehicles by local authority: United Kingdom (VEH0132)
[15] Source: Government Statistics - Electric vehicle charging device statistics: April 2021

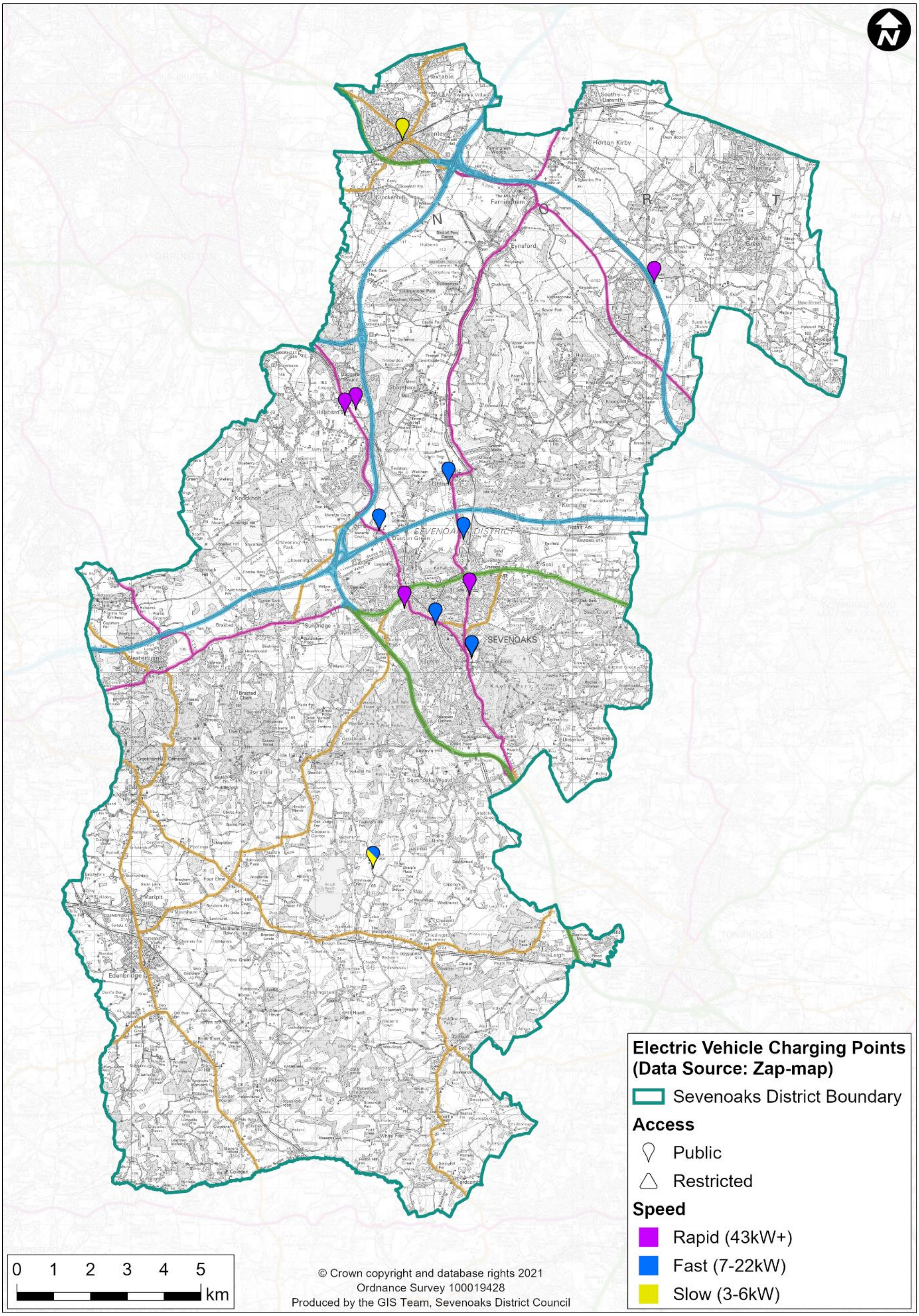

Figure 4: Distribution of Electric Vehicle Charging Points in Sevenoaks District (May 2021)

3.12 Figure 4 shows the limited number, and uneven distribution, of existing charging points in the District, with most in the northern half and particularly around Sevenoaks Urban Area. However, there are no rapid points within Sevenoaks Town centre, no charging points in Edenbridge or Westerham and very limited charging facilities within Swanley.

3.13 The majority of electric vehicle charging occurs privately by owners at home. Within Sevenoaks District it is estimated that 67% of households have access to off-street parking. Therefore, most households are likely to have the capacity to charge safely at home.

3.14 However, of the remaining 33% of households without access to off-street parking, many do not currently have easy access to a public charging point near their home. The exact number and location of these households, as well as the potential solutions, will need further investigation.

3.15 The majority of car journeys are within a single charge for electric vehicles and therefore home charging will remain the preferred options for most users. However, for longer journeys, it may be necessary for drivers to charge en route or at their destination. Well placed publicly accessible charging points are essential for these users. These could be at workplaces, along key transport routes or within Town Centres. Charging points can also have a positive impact on a local economy, by bringing users into an area, as drivers can make use of services and facilities whilst their vehicle charges.

4. Role of SDC in Electric Vehicle Charging

4.1 The Council have committed to improving the electric vehicle charging network within the District.

SDC Owned Car Parks

4.2 Car parks provide convenient and suitable locations for destination and top-up charging and will be prioritised as good locations to support EV demand, as these are locations where vehicles are already left for some time. Medium and large car parks are easier for installing ECVPs as there is less conflict in regard to loss of parking spaces from other road users and the presence of EVCPs raises awareness of the facilities for future EV adopters.

4.3 The Council have committed to installing electric vehicle charging points in SDC owned car parks. This is included as an action for the Net Zero 2030 work. Currently the Council has installed 10 charging points within SDC owned car parks. This is detailed in Table 3.

Table 3: Electric Vehicle Charging Points in SDC Owned Car Parks

Car Park	Location	Capacity	Disabled Bays		Other bays	EVCP
			Dual Use	Single Use		
Sevenoaks Town Car Park	Sevenoaks	449	19	4	0	8 (BP pulse)
Bradbourne Car Park	Sevenoaks	420 + 20 Premium	8	2	0	2 (ChargeMaster)

4.4 We will continue to install accessible charging points across other car parks under SDC control and at the Council depot and offices. In general terms our provision of EVCPs in off-street car parks will be:

Table 4: SDC Provision of EVCP in SDC Car Parks

Off-street capacity (Spaces)	No. of EVCPs
25+	1
50+	2
100+	4

4.5 Our off-street charging network will be varied and include different types of charging infrastructure, operating at different speeds (residential 3kW, trip-destination 7-22kW, and rapid charging 50kW), to provide for a range of needs. We are at a relatively early stage in the adoption of electric vehicles and it is particularly important that a network of public chargers in off-street car parks is introduced to help drive uptake.

4.6 We will also take into account the following:

- Identification of suitable off-street car park locations for the installation of EVCPs
- Minimising the impact on existing parking pressures in the immediate area
- Generate a sufficient level of usage demand to ensure the EVCP will become self-financing, i.e. economically viable
- Are logistically practical for installation, in terms of space, positioning and accessing electricity supply

4.7 A Kent multi-council (including KCC, Sevenoaks, Medway, Tonbridge & Malling, Tunbridge Wells, Dartford, Swale, Maidstone and Thanet) tendering exercise has been undertaken to EV Suppliers on the Framework. The tender is for detailed costings for an Electrical Vehicle Charging Points and Associated Services on the Kent & Medway District EV Charger Network. The results of this tendering exercise are being analysed and will be used to install additional EVCPs.

SDC Strategy and Policy

4.8 This Low Emission and Electric Vehicle Strategy directly relates to the Council's upcoming **Movement Strategy**. The Movement Strategy will set out the key priorities for sustainable travel, transport and movement within the District, bringing together different solutions and making the most of opportunities. The improvement of the electric vehicle charging network will be a key component in encouraging sustainable movement within and through the District.

4.9 **Local Planning Policy** can play an important role in ensuring the provision for electric vehicle charging is included in new developments. The Allocations and Development Management Plan includes an adopted policy on the installation of electric vehicle chargers in new development. The Policy states that:

"For all major non-residential development proposals the applicant should set out within their Transport Assessment a scheme for the inclusion of electric vehicle charging infrastructure.

Within new residential developments all new houses with a garage or vehicular accesses should include an electrical socket with suitable voltage and wiring for the safe charging of electric vehicles. Schemes for new apartments and houses with separate parking areas should include a scheme for at least one communal charging point."

4.10 The emerging Local Plan also includes requirements for all new housing with off street parking to include a plug suitable for charging, and for communal charging points in residential developments with separate parking areas. In addition, all non-residential developments with car parking must also include charging points.

4.11 Sevenoaks District Council is currently developing its new **Air Quality Action Plan**. This strategic document will seek to improve air quality across the District and within our designated Air Quality Management Areas (AQMA), through the implementation of measures and actions which will reduce pollution or human exposure to pollution.

4.12 All of Sevenoaks District Council's 9 AQMAs are declared for potential exceedances of Nitrogen Dioxide (NO_2). 1 AQMA is also declared for an exceedance of small particulates (PM_{10}). Both of these pollutants are associated with emissions from road vehicles.

4.13 In February 2020, the District Council commissioned the specialist company, Bureau Veritas (BV), to undertake a technical review of our AQMA. BV used air quality modelling, validated by our own monitoring data and the latest road traffic data for the district, to predict relevant human exposure within each of our existing AQMA. They were also able to undertake a pollution source apportionment exercise to help us identify the constituent parts of pollution in our AQMA. In effect, they are able to accurately predict the percentage of pollution at any monitored location from each vehicle type.

4.14 These modelling assessments have identified that Diesel Light Goods Vehicles and Diesel Cars are the two principal sources of roadside nitrogen dioxide pollution in all of our AQMAs. In Sevenoaks Town Centre, for example, more than 60% of the measured NO_2 is derived from these sources and in almost all AQMAs they make up more than 50% of the measured NO_2 emission.

4.15 By comparison, within Sevenoaks Town Centre, Heavy Goods Vehicles account for approximately 4.6% of the NO_2 emission and across all AQMAs account for a much smaller percentage of the total emissions.

4.16 As a result of this analysis, it is likely that measures which reduce the use of traditional Internal Combustion Engine vehicles, and which promote alternate green or sustainable forms of travel, will have the greatest impact on improving local air quality and consequently will be a focus of the new Air Quality Action Plan.

4.17 It is clear, therefore, that the current priorities to address poor local air quality align with the District Council's Net Zero Agenda and are supported by this strategy.

4.18 The Council is currently revising the **Staff Travel Plan** to encourage sustainable travel for all staff. Measures within the new Travel Plan will include encouraging the use of technology to reduce mileage, support for cycling and walking and increasing the use of electric vehicles. This includes installing charging points at the Argyle Road offices and Dunbrik depot and increasing the number of electric vehicles within the Council's fleet. We have also recently introduced an Electric Vehicle Benefit Scheme for staff wishing to lease an electric car.

Working with Partners, Communities and Businesses

4.19 We are committed to helping residents and businesses install charging points for themselves. We are currently developing a webpage to provide information and links to assist this, including details of the current government funding available for both business and residents.

4.20 The Government currently offer grants towards the costs of purchasing and installing charging points for homes and work places. These schemes support the uptake of electric vehicles by making it easier for individuals to have the necessary infrastructure in place.

4.21 The Electric Vehicle Homecharge Scheme provides a 75% contribution up to £350 (including VAT) towards the cost of one charge point and its installation. Applicants must own, lease or have ordered an eligible vehicle and have private off-street parking. Further information on the scheme can be found on the Government's website:
Government- Overview of the Electric Vehicle Homecharge Scheme

4.22 The Workplace Charging Scheme offers vouchers that support the up-front costs of the purchase and installation of electric vehicle charge-points, for eligible businesses, charities and public sector organisations. This scheme offers a grant of up to 75% of the purchase and installation costs of EV charge points with a cap of £350 for each socket and maximum of 40 sockets. Further information on the scheme can be found on the Government's website:
Electric Vehicle Homecharge Scheme: guidance for customers

4.23 We continue to look at how we can best identify the level of need, for both residents and visitors, for electric vehicle charging and how we can deliver the appropriate type of chargers, in the most suitable and feasible locations. We will continue to work with the KCC Transport Innovations Team, including the Transport Innovations Programme Manager, to identify opportunities and deliver improvements to the charging network within the District.

4.24 Kent County Council have a Local Electric Vehicle Charge-point scheme for Parish & Town Councils and Village Hall Associations. The aim of the scheme is to provide publicly accessible charge-points in local communities across Kent and to improve the charging network across the county. This is especially important for rural areas or where there is currently very little provision. We have encouraged the Town and Parish Councils within the District to participate in the scheme and a number of charge-points should be installed within 2021-22. More information about the scheme can be found on the Kent Connected website at: Kent Connected - Electric Vehicle Charge-points

4.25 We have recently secured agreement with KCC for a new EVCP on Sevenoaks High Street exclusively for use by taxis. This will encourage the uptake of electric taxis within the District and especially in an area of poorer air quality. We will continue to work with KCC for other similar projects in the future.

5. Ambitions and Actions

5.1 The Council have committed to the following Net Zero 2030 Actions:

- Promote low carbon travel
- Improve the electric vehicle charging network across the District
- Continue our transition to a zero-carbon emissions vehicle fleet wherever practicable

5.2 In order to achieve these actions, the Council will:

- Improve the District's electric vehicle network by increasing the number of charging points within SDC owned car parks and on SDC owned land.
- Support suitable schemes and projects to install charging points throughout the District.
- Ensure new developments make provision for electric vehicle charging through Local Planning Policy.
- Continue to work with Kent County Council, and other partners, to explore new charging options.
- Implement ways to reduce the carbon emissions from the fleet including through reducing fleet mileage and replacing the existing fleet with electric and low carbon alternatives, where feasible and as soon as possible.
- Support residents, businesses and communities to install suitable charging points including through providing information on available grants and funding opportunities.
- Encourage the replacement of traditional combustion engines and low emission vehicles with fully electric vehicles within the District.

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Air Quality- Update on the Development of a new Air Quality Action Plan

Cleaner and Greener Advisory Committee - 29 June 2021

Report of: Chief Officer Planning & Regulatory Services

Status: For Decision

Also considered by:

- Cabinet – 8 July 2021

Key Decision: Yes

Executive Summary:

Air Quality in Sevenoaks District has shown a trend of improvement and as a result the District Council can now consider revoking up to 5 of our 9 existing AQMA.

Whilst these improvements are very encouraging, we recognise that there is no safe exposure level to pollution. The District Council will therefore continue to identify and implement measures to reduce pollution in our remaining AQMA.

The District Council is currently developing its new Air Quality Action Plan. This document provides a commitment to undertaking measures and actions to improve air quality within our designated Air Quality Management Areas (AQMA). Agreement is sought on this process.

This report supports Sevenoaks District Councils own Net Zero 2030 commitment and its wider ambition for the district'

Portfolio Holder: Cllr. McArthur

Contact Officer: Nick Chapman, Ext. 3160

Recommendation to Cleaner and Greener Advisory Committee:

That the recommendations a) to i) below be recommended to Cabinet.

Recommendation to Cabinet:

a) That officers approach DEFRA to request the revocation of the M20 AQMA on the basis of the assessment undertaken by BV

b) That officers approach DEFRA to request the revocation of the M25 AQMA (PM10) on the basis of the assessment undertaken by BV

c) That officers approach DEFRA to request the revocation of the M20 AQMA on the basis of the assessment undertaken by BV

d) That officers approach DEFRA to request the revocation of the M25 AQMA (PM10) on the basis of the assessment undertaken by BV

e) That, subject to additional monitoring demonstrating that NO2 levels do not exceed objective levels at the roundabout at London Road, Westerham and residential properties along the A224 and B221 near to the M25, that officers approach DEFRA to request revocation of the M25 AQMA (NO2)

f) That, subject to additional monitoring demonstrating that NO2 levels do not exceed objective levels at receptors along the A224 London Road flyover, that officers approach DEFRA to request revocation of the M26 AQMA.

g) That, subject to additional monitoring demonstrating that NO2 levels do not exceed objective levels at residential properties at Phillip Avenue/ Ladds Way/ Cyclamen Road, Swanley, that officers approach DEFRA to request revocation of the A20 AQMA.

h) That the Deputy Chief Executive and Chief Officer for Planning and Regulatory Services, following consultation with the Portfolio Holder for Cleaner and Greener, be authorised to constitute a Working Group of up to 15 Members and Officers (with a quorum of 5) to develop a shortlist of workable measures to be tested (scenario testing) to quantify their impact upon Air Quality within the AQMA and to explore possible measures which could be included within the Action Plan. Such a Working Group is to report to the next Cleaner and Greener Advisory Committee.

i) That, the District Council withdraw from the ‘Air Alert’ scheme as provided by Sussex Air and Imperial College and agree that alternate and comparable information/ links are made available via our website.

Current Air Quality Trends

1 The Department of Environment and Rural Affairs (DEFRA) require the District Council to analyse and publish its air quality monitoring data on an annual basis. Each published report details the monitoring results from the preceding year (i.e. the 2020 report contains 2019 data).

2 Before data can be published, it needs to be independently validated (undertaken by the Imperial Environmental Research Group on behalf of the District Council) and then bias adjusted (corrected in accordance with real time monitoring data). The latest full year of data is 2019 although as a

result of the National Lockdowns for Covid-19 it is unlikely that 2020 can be considered a representative year for air quality monitoring.

3 In 2019, only five (5) of our fifty seven (57) diffusion tubes recorded Nitrogen Dioxide (NO_2) levels above the national objective level. Further, once the data from these five diffusion tubes was corrected so that they represented relevant exposure (i.e. the façade of a dwelling) only one location recorded levels above the annual mean objective.

4 We did not monitor any exceedances (at the ir Quality Monitoring Stations), or likely exceedances (via diffusion tubes) of the NO_2 1-hour mean objective in 2019.

5 Levels of small particulates (PM_{10})(monitored only at the Air Quality Monitoring Stations) also remained well below objective levels for the same period.

6 These results continue an overall downwards trend in air pollution which has continued generally since 2013.

7 At present, the District Council is awaiting final analysis of our data from 2020. It is however anticipated that this will show that during the National Lockdowns when there was a significant drop in vehicles on the roads of Sevenoaks, there was a corresponding decrease in local NO_2 emissions.

Review of the existing Air Quality Management Areas

8 In February 2020, the Environmental Protection Team commissioned the specialist company Bureau Veritas (BV) to undertake a technical review of our AQMA. **This work utilised data obtained in 2018** (an outlying year in terms of the ongoing improvement in pollution levels) to remodel and validate the existing declared areas. As a result the results of the modelling can be considered conservative as pollution levels recorded in 2017 and 2019 were lower.

9 BV used air quality modelling, validated by our own monitoring data and the latest road traffic data for the district, to predict relevant human exposure within each of our existing AQMA.

10 BV were unable to undertake validation of the Swanley AQMA as there was insufficient traffic data available to carry out modelling.

11 As a result of this work, BV have made a number of recommendations regarding our existing AQMA which are outlined below;

a. M20 AQMA- can be considered for revocation due to no monitored exceedances at any of the monitoring locations, nor has the model predicted exceedances at any receptor locations within the AQMA. Additional monitoring could be carried out at specific receptor locations to confirm this as there are only 2 monitoring locations currently along the stretch of the AQMA.

b. M25 AQMA (NO_2)- As a consequence of the modelling results, additional monitoring is recommended to be carried out near the residential properties at the roundabout of London Road in

Westerham. Monitoring should also be carried out near to residential properties along the A224 and B2211 near to the M25. If these concentrations are shown to be compliant with the annual mean objective, then the AQMA can be revoked.

c. M26 AQMA- The model predicted concentrations within 10% of the AQS objective at one location. Therefore, monitoring is recommended to be carried out close to this location, along the A224 London Road flyover. If these concentrations are shown to be compliant, then the AQMA can be revoked.

d. A20 AQMA- No exceedances were predicted by the dispersion model within the AQMA. However, as no monitoring locations are present within the AQMA, it is recommended that monitoring be carried out close to residential properties on Phillip Avenue/Ladds Way/Cyclamen Road to confirm the modelled results. If no exceedances are reported, the AQMA should be revoked.

e. A25 AQMA- Should remain in place. However the District Council could consider reducing the size of the AQMA boundary west of Westerham and east of Seal where no exceedances are predicted. Additional monitoring could be carried out to confirm this at residential properties along these stretches.

   Additional monitoring should also be carried out near to the junction of London Road to the A25 Market Square in Westerham, as well as on the north-western side of the southern roundabout in Riverhead in order to determine whether there are any exceedances of the 1-hour NO2 objective.

f. A225 & A224 AQMA- the AQMA should remain in place. Additional monitoring carried out along the narrow section of the High Street near to the Bus Station, as well as at the closest point of relevant exposure to the A224 between the junctions to South Park and Lime Tree Walk. This is to ascertain whether there are any exceedances of the 1-hour NO2 objective.

g. M25 AQMA (PM_{10})- Based upon the modelling results, no exceedances at relevant receptor locations are expected. Therefore, this AQMA can be revoked.

12 All of the additional monitoring recommended by BV has been already been installed. However, due to the suppressed traffic levels as a result of the Covid-19 pandemic, it is not clear when this monitoring will be representative of “normal” conditions. For example; pollution levels fell at the Bat & Ball roadside monitoring station by 22% in 2020 compared to 2019 levels.

13 It is also unclear if pre-Covid-19 levels of traffic will return and what the longer-term impact will be local air quality due to the shift towards home-working.

Source Apportionment

14 BV were able to use traffic data to undertake a pollution source apportionment exercise to help us identify the constituent parts of pollution in our AQMA. In effect, they are able to accurately predict the percentage of pollution at any monitored location from each vehicle type.

15 These modelling assessments have identified that Diesel Light Goods Vehicles and Diesel Cars are the two principle sources of roadside nitrogen dioxide pollution.

16 In Sevenoaks Town Centre, more than 60% of the measured NO_2 is derived from these sources and in almost all AQMA they make up more than 50% of the measured NO_2 emission.

17 Within Sevenoaks Town Centre, Heavy Goods Vehicles account for approximately 4.6% of the NO_2 emission and across all AQMA account for a much smaller percentage of the total emissions.

18 Whilst HGVs are directly responsible for a lower proportion of emissions, it needs to be recognised that the modelling cannot take account of pollution emissions that indirectly result from congestion caused by HGVs.

Air Quality Action Plans

19 A Local Authority has a statutory duty to develop an air quality action plan to identify and implement measures to improve air quality within its AQMA.

20 Our current Action Plan was developed in 2009, and whilst it was recognised at the time as a model document for other authorities to follow, most of the actions it contains have now been completed or are no longer relevant.

21 The District Council is now moving forward to develop a new, up to date and more relevant plan, which will allow us to continue driving improvements in air quality over the next 5-10 years.

22 Although Air Quality within Sevenoaks District is improving, and modelling/ monitoring shows that much of the district is now compliant with UK air quality standards; there is no safe level of exposure to air pollution.

23 It is therefore in the interests of residents that we continue to work to improve local air quality and that we strive to reduce exposure to pollution as far as possible.

24 There is an intrinsic link between measures which seek to improve local air quality and those which can help to mitigate climate change.

Environmental benefits that are achieved through schemes to reduce use of private vehicles and which encourage the use of public transport or active travel help reduce both NO_2 and CO_2 emissions and can therefore have a significant influence on the District Council's work to achieve 'Net Zero'.

25 In order to develop the AQMA, the District Council needs to develop a new schedule of measures which will reduce emissions within our AQMA. These measures will be assessed using computer modelling (scenario testing) to quantify the reductions of pollution levels associated with their implementation.

26 It is proposed that a joint officer and Councillor technical group will be created to develop a short list of potential measures which may be appropriate to reduce pollution within the AQMAs. The potential measures will undergo scenario testing by BV.

27 The group ought to include a member from each of the following wards affected:

- Seal & Weald
- Sevenoaks Eastern
- Sevenoaks Northern
- Dunton Green & Riverhead
- Sevenoaks Town & St Johns
- Brasted, Chevening & Sundridge
- Westerham & Crockham Hill
- Swanley Christchurch & Swanley Village
- Swanley White Oak
- Swanley St Mary's

28 The shortlisted options, together with the results of the scenario testing shall be reported to the Cabinet for consideration and agreement to formally adopt those measures.

29 Following agreement and adoption of the measures, the District Council will publish its new Air Quality Action Plan and will begin implementation or investigation of the identified measures.

Air Alert

30 Councillors may be aware that Sevenoaks District Council is currently a member of the Air Alert scheme operated by Sussex Air in partnership with Imperial College London (formerly Kings College).

31 This system enables members of the public to subscribe to 'free' text message alerts or download a mobile application to receive alerts when Air Quality within Sevenoaks District is expected to be poor.

32 When the District Council joined Air Alert, there were very few systems that predicted pollution in an area. At that time there was a very clear benefit to our residents by providing them with access to the warning system.

33 Unfortunately, despite efforts to encourage residents to subscribe to the service it has always been underutilised and consequently the health benefit from the service has never been quantifiable.

34 There are now several other services (operated by private companies as well as national organisations) which effectively provide the same information as Air Alert. These sources of information have become more accessible in recent years as personal digital technology has improved. For example the Met Office now provides forecasting for each region of the UK and this data is easily available via the government's website (https://uk-air.defra.gov.uk/forecasting/).

35 Residents are able to subscribe on the DEFRA website to an email mailing list or to an "RSS Feed" which provides the following services:

a. **Measurement:** Summary of last 24-hour's or last hour's air quality measurement data.

b. **Forecasts:** Daily updated forecasts of UK air pollution concentrations up to 24-hours ahead.

c. **Alert:** If the Alert Threshold in an Air Quality Daughter Directive is exceeded then an alert is issued.

36 This information replicates and enhances that provided by Air Alert. The District Council can therefore continue to positively influence public health by signposting residents to this service on our website and assisting existing users to switch to the DEFRA service.

Background Information

37 Air Pollution is now widely recognised as a life limiting environmental factor. Not only does it contribute to chronic health conditions, including respiratory disease, heart disease and cancer, but following the verdict and recommendations of the coroner in the case of Ella Kissi-Debrah (April 2021) it has now been shown as a direct cause of premature death.

38 It is estimated that between 28,000 and 36,000 early deaths are attributable to air pollution each year in the UK. Public Health England estimates that by 2035, the cumulative health and social care costs of air pollution in England could reach £5.3 billion.

39 Air pollution particularly impacts upon children, the elderly or those with pre-existing conditions. Asthma UK reports that two thirds of people with asthma believe that poor air quality makes their condition worse. This is because pollution can quickly irritate airways triggering asthma symptoms (Asthma UK, 2021).

40 Sources of air pollution are multiple and context specific. The major outdoor pollution sources include residential energy (for cooking and heating), vehicle emissions, power generation, agriculture/ waste incineration and industry (WHO, 2021). Indoor air pollutants include

residential fuels, aerosols, solvents, cleaning products, Volatile Organic Compounds (VOC's) (emitted by furnishings) and smoking.

41 The Air Quality in any area is affected by two primary components; background and localised pollution sources.

42 Background pollution can be defined as that which is found in an area but cannot easily be attributed to a particular or localised source. Some types of pollution are highly mobile and once in the atmosphere can travel considerable distances. It is therefore entirely possible for the Air Quality in a local authority's area to be influence by transcontinental pollution.

43 Localised sources of air pollution include vehicle emissions (from the combustion of fuels and degradation of tyres and brakes), localised industry, construction, home energy and agriculture.

44 In addition the air quality in an area is heavily influenced by prevailing climatic conditions. Pollution levels are generally worse in still conditions as wind can help disperse particulates and gases. During warmer periods sunlight reacts with primary pollutants such as Nitrogen Dioxide (NO_2) to form secondary pollutants such as Ozone (O_3). O_3 is a cause of urban smogs and occurs when it reacts with particles suspended in the air. In cold weather, temperature inversion can trap emission at ground level.

45 A Local Authority (LA) is required to assess its area for exceedances of specific pollutants as defined in law. Where air quality is found (through monitoring or modelling) to exceed the required legal levels, a LA is then is required to "declare" an Air Quality Management Area (AQMA) for the specific pollutant or pollutants.

46 Normally an AQMA only covers an area where a human is being exposed to poor air quality (in excess of the objective level) although some LAs have declared their entire districts as AQMA.

47 Sevenoaks District Council currently has nine (9) Air Quality Management Areas (AQMA). Each of these was declared between 2002 and 2014 and they are all associated with emissions from traffic on congested or busy roads.

48 Assessments undertaken by the District Council at the time of declaration identified exceedances in these areas of the following National Air Quality Objectives;

a. PM_{10}- These are small particles up to 10 microns in size. There are two appropriate legal standards:

    i. 50ug/m^3 (measured as a 24hr mean)- not to be exceeded more than 35 times per year

    ii. 40ug/m^3 (measured as an annual mean)

b. NO_2- Nitrogen Dioxide. There are two appropriate legal standards

    i. 40ug/m^3 (measured as an annual mean)

    ii. 200ug/m^3 not to be exceeded more than 18 times a year (measured as a 1-hour mean)

49 The AQMA cover the following areas which are declared for NO_2:

a. M20- along the entire length from the boundary with Tonbridge & Malling Borough to Junction 3 of the M25
b. M25- from the county border with Surry to the district boundary with Dartford including junctions 3,4 ,5 and the extension of junction 5 to connect with the A25 at Bessels Green.
c. M26- from junction 5 of the M25 to the district boundary with Tonbridge & Malling Borough
d. A20- the Swanley Bypass from junction 3 of the M25 to the boundary with the London Borough of Bromley.
e. A25- along the entire length from the county border with Surry to the boundary with Tonbridge and Malling Borough.
f. A225 & A224- Sevenoaks town centre encompassing High Street and London Road
g. B2173- Swanley encompassing London Road, High Street, Bartholomew Way and parts of the town centre.
h. B2173- Swanley at the junction of London Road and Birchwood Road

And the following area declared for PM_{10}

i) M25- Junction 5 to the border with Surrey

50 Each of these AQMA extend only a few meters from the associated road and are almost exclusively caused by vehicle emissions.

51 In addition to the pollutants above; concentrations of $PM_{2.5}$ (particles less than 2.5 microns) are of significant concern. These particles can be readily absorbed into the lungs and be transported throughout the body. Whilst $PM_{2.5}$ is emitted by vehicles (12.4% of total in atmosphere) the largest proportion is emitted by residential and small-scale commercial settings (43.1%).

52 $PM_{2.5}$ is not directly monitored by the District Council and we do not have either a legal duty or the equipment to do so. Instead $PM_{2.5}$ concentrations are extrapolated from national monitoring data and are presented in 1km squares. Within the UK (except Scotland) the National Objective is 25ug.m^3 (measured as an annual mean) however the World Health Organisation considers that the acceptable standard should instead be 10ug/m^3.

53 Owing to the methodology used to calculate $PM_{2.5}$, it only takes into account known sources and is unable to take into account of those that may be highly localised and affecting a small geographic area. As a consequence there is little variation in predicted $PM_{2.5}$ concentrations year by year.

54 Unfortunately, a large proportion of the UK fails to comply with the WHO suggested standard of 10ug/m^3 although the UK's standard (25ug/m^3) is achieved nationally.

55 Concentration maps for Sevenoaks District show that the highest levels of $PM_{2.5}$ (between 10-12ug/m^3) are predicted to be found along the length of the M25, M26 and M20. Swanley, Farningham and New Ash Green are also predicted to have similar levels of $PM_{2.5}$. The remainder of Sevenoaks District is predicted to be affected by $PM_{2.5}$ concentrations of between 5-10ug/m^3.

56 $PM_{2.5}$ is a highly mobile pollutant and can travel significant distances within the atmosphere. It is however apparent that the highest levels of $PM_{2.5}$ are associated with more densely populated urban conurbations.

57 Within the Sevenoaks District, the primary source of $PM_{2.5}$ is likely to be domestic combustion particularly that associated with solid fuel appliances (such as wood burners), open fires, uncontrolled fires (such as bonfires), and in some specific areas construction and quarrying.

58 Although Local Authorities are not required to monitor $PM_{2.5}$, we do have a duty to work towards reducing their emissions as part of our overall work to improve air quality.

Air Quality Monitoring within Sevenoaks District

59 The District Council has two Automatic Air Quality Monitoring Stations (AQMS) located at the Bat and Ball junction on the A25 and at Greatness Park.

60 The Bat & Ball AQMS is located adjacent to the road (roadside analyser) and was situated to measure emissions in the vicinity of the busy junction. This analyser is able to measure PM_{10} and NO_2 on a minute by minute basis.

61 The Greatness AQMS is located on the edge of Greatness Park and was situated to measure background concentrations of pollution. This analyser is able to measure PM_{10}, NO_2 and O_3 (Ozone) on a minute by minute basis.

62 All of the air quality monitoring data collected by our AQMS is automatically uploaded to the London Air Quality Network and is available to residents via the following link:
https://www.londonair.org.uk/london/asp/publicdetails.asp

63 In addition to our two AQMS, the District Council maintains a network of 49 diffusion tubes which are sited in areas of predicted poor air quality. These diffusion tubes contain a small metal mesh which is impregnated with a chemical which reacts to NO_2. Each diffusion tube is exposed for one month before being sent for analysis.

64 Each year, we are able to analyse the monthly diffusion tube results to calculate compliance with the National Objective level (40ug/m^3).

Other options Considered and/or rejected

That the District Council continue to maintain all of the AQMA throughout Sevenoaks District.

That Officers identify/ develop a shortlist of actions and measures to improve Air Quality which would be presented to Committee for discussion and selection

That the District Council continues to purchase access to the Air Alert scheme with funding to be derived from existing budgets.

That the District Council consider developing an alternative scheme to 'Air Alert' which would allow officers greater control of its content and messaging. This would allow us to continually improve the service and messaging could be expanded to other areas of public health information, or council messaging.

That officers will, following scenario testing, provided a report on recommended/ proposed Air Quality Actions to Cabinet for consideration and decision.

Key Implications

Financial

Nil- costs of developing the Air Quality Action Plan are already accounted for within service budgets

Legal Implications and Risk Assessment Statement.

The District Council has a legal obligation to develop and deliver an Air Quality Action plan which identifies appropriate measures to improve Air Quality within an AQMA.

Where a proposed development is likely to impact upon air quality within an AQMA, there may be enhanced grounds to require mitigation or health protection measures from the developer.

The District Council cannot revoke an AQMA without agreement from DEFRA.

The District Council also has a legal duty to report air quality monitoring data on an annual basis to DEFRA within an Air Quality Status Report.

The District Council is acting lawfully within the provisions of the relevant legislation.

Equality Assessment

Members are reminded of the requirement, under the Public Sector Equality Duty (section 149 of the Equality Act 2010) to have due regard to (i) eliminate unlawful discrimination, harassment and victimisation and other conduct prohibited by the Equality Act 2010, (ii) advance equality of opportunity between people from different groups, and (iii) foster good relations between people from different groups. The decisions recommended through this paper directly impact on end users. The impact has been analysed and varies between groups of people. The results of this analysis are set out immediately below.

There are 161 users of the Air Alert System text messaging system. Owing to its targeted audience a large proportion of these are likely to be individuals with pre-existing respiratory health conditions (i.e. asthma, COPD etc). The District Council has seen a decline in the number of subscriptions to the service since its inception in 2011 and it is unclear how many of the 161 'users' remain active. Additionally users can download the Air Alert mobile application. The District Council does not have any data to quantify the usage of this application.

There are now multiple sources of information which predict poor air quality within the district including a forecast that is published on the DEFRA website. It is therefore considered that there is unlikely to be a significant impact from the District Council withdrawing from this service and we are able to signpost to alternate sources of the information.

Net Zero

The proposals within this report are likely to have a complimentary effect on the District Council's efforts to achieve Net Zero

Appendices

Appendix A – Report from Bureau Veritas- Sevenoaks District Council Detailed Assessment of Existing AQMA

Appendix B – 2020 Air Quality Annual Status Report

Background Papers

None

Richard Morris

Deputy Chief Executive and Chief Officer – Planning & Regulatory Services

Sevenoaks District Council

Detailed Assessment of Existing AQMAs

September 2020

Move Forward with Confidence

BUREAU VERITAS

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Document Control Sheet

Identification	
Client	Sevenoaks District Council
Document Title	Detailed Assessment of Existing AQMAs
Bureau Veritas Ref No.	AIR6726243

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Approved By	H Smith	Senior Consultant	[redacted]

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Executive Summary

Bureau Veritas have been commissioned by Sevenoaks District Council to complete a review of the Council's existing Air Quality Management Areas (AQMAs) to help inform a new Air Quality Action Plan (AQAP). The Council currently have nine AQMAs, however only seven have been reviewed due to data availability. All of the AQMAs in question have been declared in relation to traffic emissions; six of which have been designated for exceedances of the NO_2 annual mean Air Quality Strategy objective. The remaining AQMA, No.6, along the M25, has been declared due to exceedances of the PM_{10} 24-hour mean AQS objectives.

A dispersion modelling assessment has been completed whereby NO_2 and PM_{10} concentrations have been predicted across all relevant areas within the district at both specific receptor locations, and across a number of gridded areas to allow the production of concentration isopleths. This has been used to supplement local monitoring data to provide a clear picture of the pollutant conditions within the borough.

Following the completion of the analysis of both monitoring data and modelled concentrations across all of the assessed areas a number of recommendations have been made in terms of the AQMAs within Sevenoaks:

- AQMA No.1 M20 – The AQMA can be considered for revocation due to no monitored exceedances at any of the monitoring locations, nor has the model predicted exceedances at any receptor locations within the AQMA. Additional monitoring could be carried out at specific receptor locations to confirm this as there are only 2 monitoring locations currently along the stretch of the AQMA;

- AQMA No.2 M25 – As a consequence of the modelling results, additional monitoring is recommended to be carried out near the residential property at the roundabout of London Road in Westerham. Monitoring should also be carried out near to residential properties along the A224 and B2211 near to the M25. If these concentrations are shown to be compliant with the annual mean objective, then the AQMA can be revoked;

- AQMA No.3 M26 – The model predicted concentrations within 10% of the AQS objective at one location. Therefore, monitoring is recommended to be carried out close to this location (receptor ID 161), along the A224 London Road flyover. If these concentrations are shown to be compliant, then the AQMA can be revoked;

- AQMA No.4 A20T – No exceedances were predicted by the dispersion model within the AQMA. However, as no monitoring locations are present within the AQMA, it is recommended that monitoring be carried out close to residential properties on Phillip Avenue/Ladds Way/Cyclamen Road to confirm the modelled results. If no exceedances are reported, the AQMA should be revoked;

- AQMA No.6 (M25-PM10) – Based upon the modelling results, no exceedances at relevant receptor locations are expected. Therefore, this AQMA can be revoked. No further actions are required;

- AQMA No.10 (Sevenoaks High Street) – The AQMA is to remain in place, with additional monitoring carried out along the narrow section of the High Street near to the Bus Station, as well as at the closest point of relevant exposure to the A224 between the junctions to South Park and Lime Tree Walk. This is to ascertain whether there are any exceedances of the 1-hour NO_2 objective, as well as whether the AQMA should be extended along part of the A224;

- AQMA No.13 (A25) – The AQMA is to remain in place, whilst potentially being reduced in size west of Westerham and east of Seal where no exceedances are predicted. Additional monitoring could be carried out to confirm this at residential properties along these stretches. Monitoring should be carried out out near to the junction of London Road to the A25 Market Square in Westerham, as well as on the north-western side of the southern roundabout in Riverhead in order to determine whether there are any exceedances of the 1-hour NO_2 objective.

The next steps upon completion of this Technical Note are to develop, through consideration of merit, a defined set of achievable measures to be drawn forward into the revised action plan document.

1 Introduction

Bureau Veritas have been commissioned by Sevenoaks District Council (the Council) to complete a detailed assessment in order to review the designation of the Council's existing Air Quality Management Areas (AQMAs), and to help inform a new Air Quality Action Plan (AQAP). The Council's last published AQAP was in 2009, and the details presented within this assessment are to be used to develop an updated AQAP.

The Council currently have nine AQMAs. With the exception of AQMA No.6, these have been designated for exceedances of the NO_2 annual mean Air Quality Strategy (AQS) objective, where AQMA No.6 has been declared only for exceedances of the PM_{10} 24-hour mean AQS objective. AQMA No.8 (Swanley Town Centre) and AQMA No. 14 (Junction of Birchwood and London Roads, Swanley) have not been included in this assessment due to no traffic data being available at the time of the assessment being carried out. Department for Transport (DfT) traffic counts are not available for the roads in these AQMAs, and traffic surveys have not been able to be carried out due to the restrictions as part of Covid-19 pandemic, resulting in decreased levels of traffic which are not likely to be representative of normal conditions.

Details of the AQMAs included within this assessment are as follows, and maps detailing the locations of the AQMAs are presented in Figure 1.1 to Figure 1.6:

- AQMA No.1 M20 – the area following the M20 throughout the borough extending 80m either side of the motorway centreline;
- AQMA No.2 M25 – the area following the M25 throughout the borough extending 200m either side of the motorway centreline between J5 and 6, 80m between J3 and 5, and 140m between J2 and 3;
- AQMA No.3 M26 – the area following the M26 throughout the borough extending 40m either side of the motorway centreline;
- AQMA No.4 A20T – the area following the A20T throughout the borough extending 40m either side of the motorway centreline;
- AQMA No.6 (M25-PM10) – the area encompassing part of the M25 motorway, west of Junction 5;
- AQMA No.10 (Sevenoaks High Street) – the area encompassing Sevenoaks High Street; and
- AQMA No.13 (A25) – the entire length of the A25 from the border with Tonbridge and Malling in the East to the border with Tandridge on the West.

1.1 Scope of Report

The assessment seeks, with reasonably certainty, to predict the magnitude and geographical extent of any exceedances of the AQS objectives, providing the Council with updated modelling data that can be utilised for the development and/or update to AQAP measures.

The areas considered as part of this study are illustrated in the figures shown under each AQMA heading within this report. The following are the main objectives of this report:

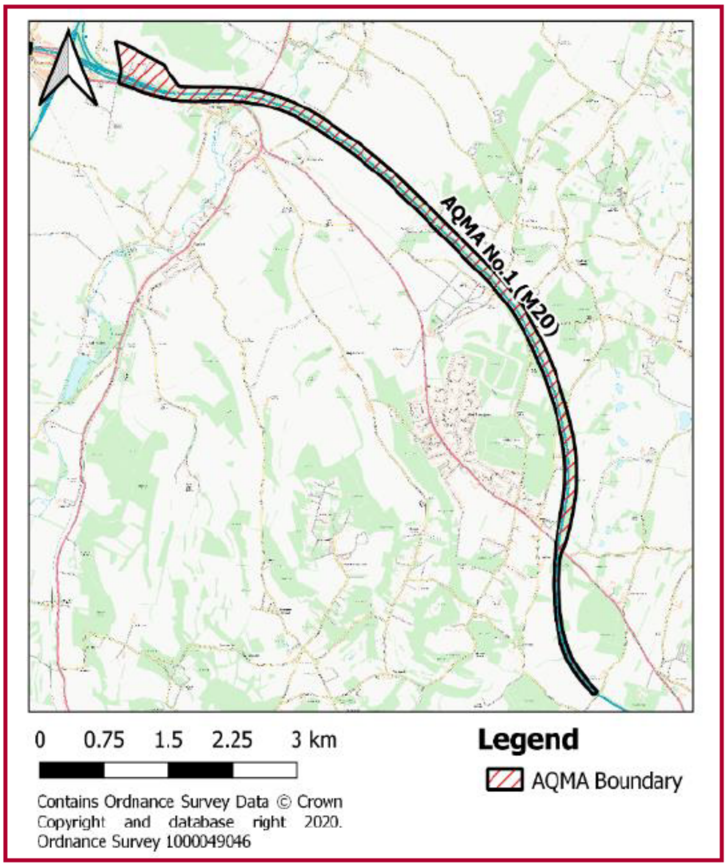
- To assess the air quality at selected locations (receptors) at the façades of locations of relevant exposure, representative of worst-case exposure within, and close to the existing AQMA boundaries, based on modelling of emissions from road traffic on the local road network;
- To determine the geographical extent of any potential exceedance of the annual mean AQS objective for NO_2, and in regards to the AQMA No.6 the 24-hour AQS objective for PM_{10};
- To determine the relative contributions of various source types to the overall pollutant concentrations through the completion of a source apportionment study; and

- To put forward recommendations as to the extent of any changes to the current AQMA boundary and any changes to the declaration of the specific AQMAs.

The approach adopted in this assessment to assess the impact of road traffic emissions on air quality utilised the atmospheric dispersion model ADMS-Roads, focusing on emissions of oxides of nitrogen (NO_x), which comprise of nitric oxide (NO) and NO_2, and also on PM_{10}.

In order to provide consistency with the Council's own work on air quality, the guiding principles for air quality assessments as set out in the latest guidance and tools provided by Defra for air quality assessment (LAQM.TG(16)[1]) have been utilised.

Figure 1.1 – AQMA No.1 (M20)



[1] Local Air Quality Management Technical Guidance LAQM.TG(16), April 2016, published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland

Figure 1.2 – Map of AQMA No.2 (M25)

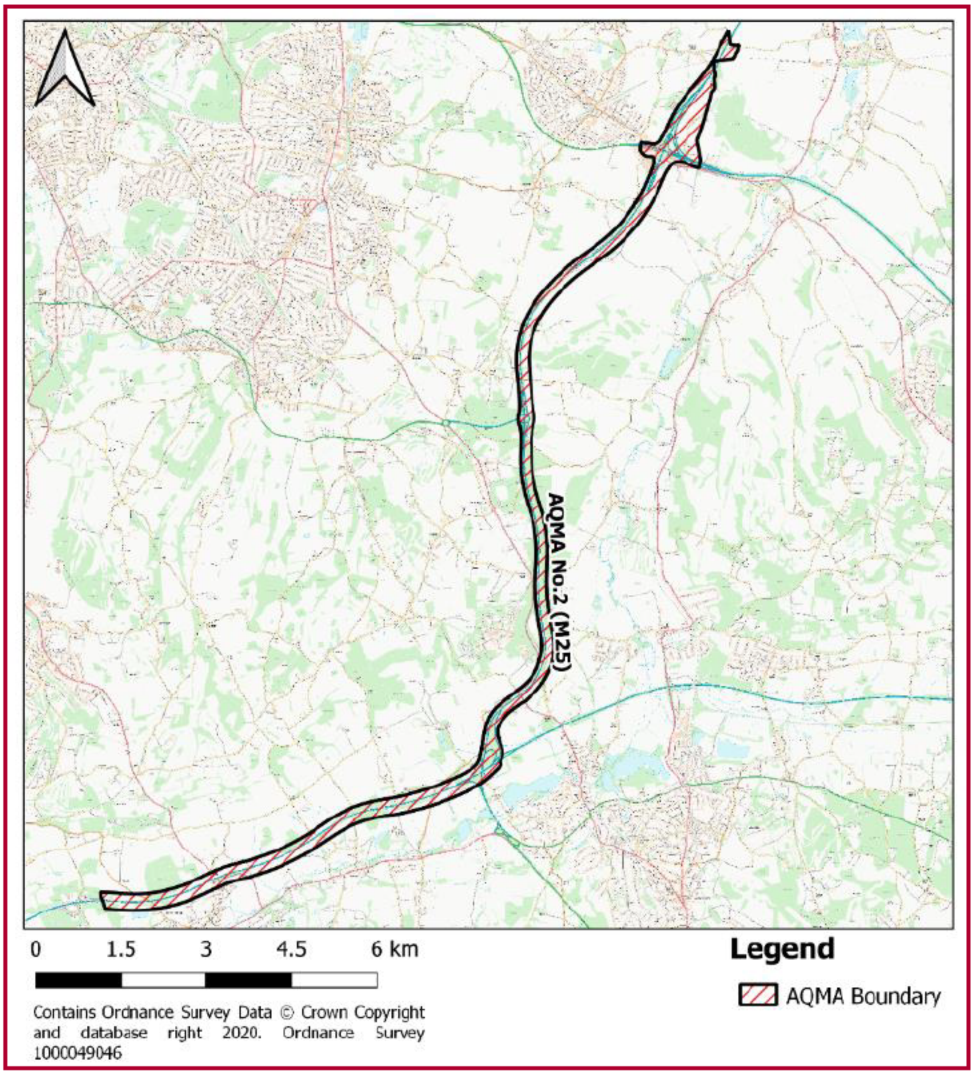


Figure 1.3 – Map of AQMA No.3 (M26) and AQMA No.13 (A25), East of Sevenoaks Bypass

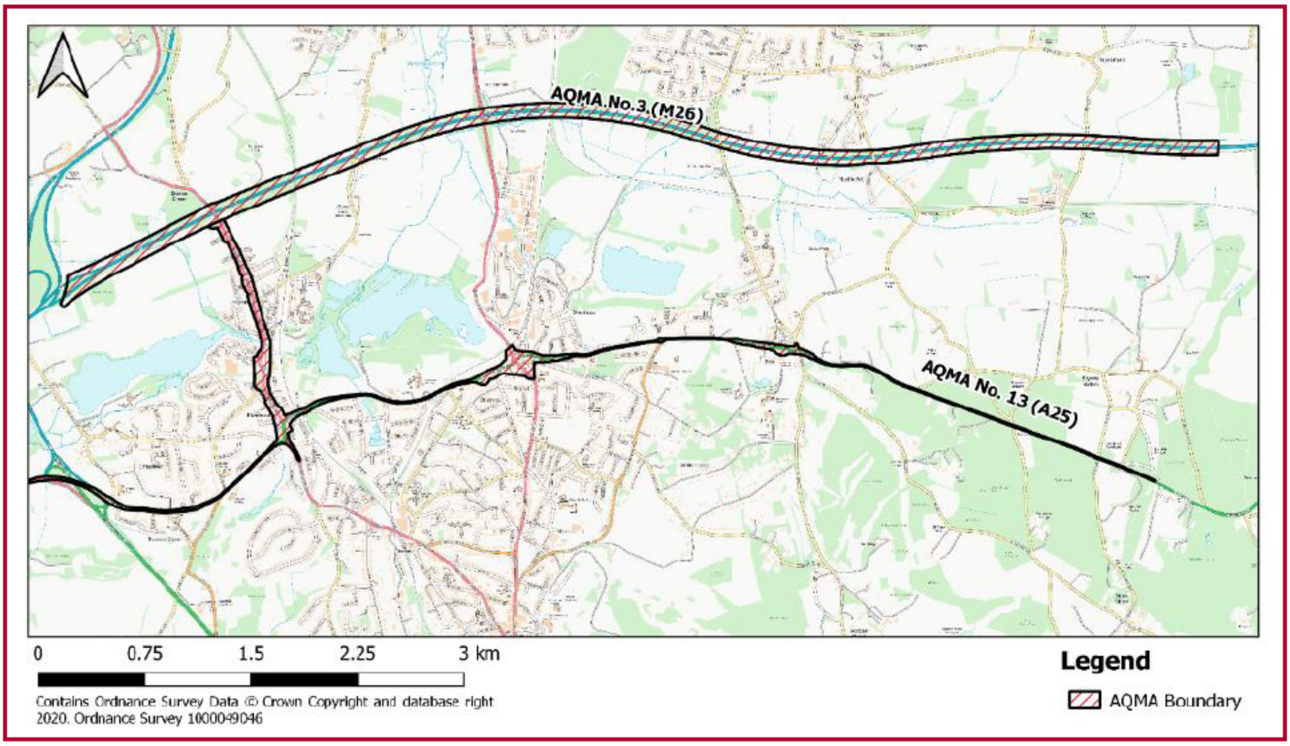


Figure 1.4 – AQMA No.4 (A20(T))

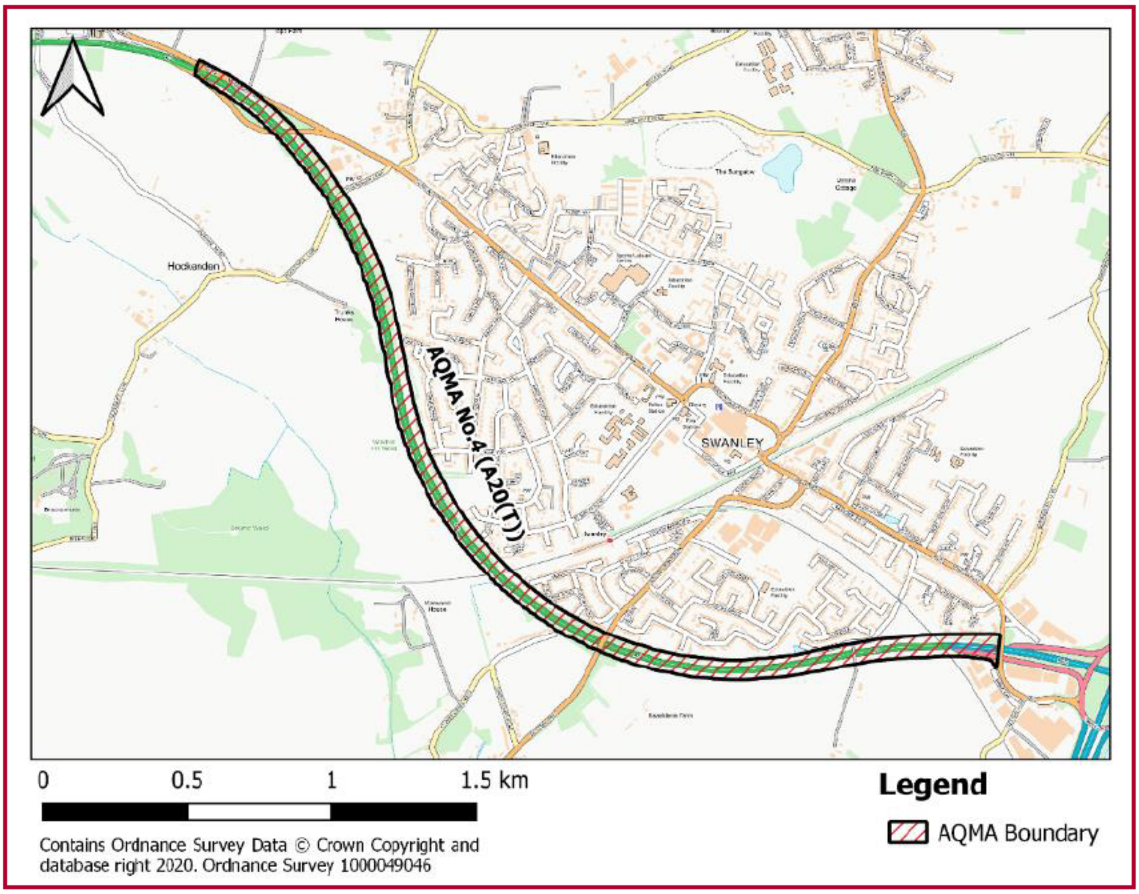


Figure 1.5 – Map of AQMA No.6 (M25-PM10) and AQMA No.13 (A25), West of Sevenoaks Bypass

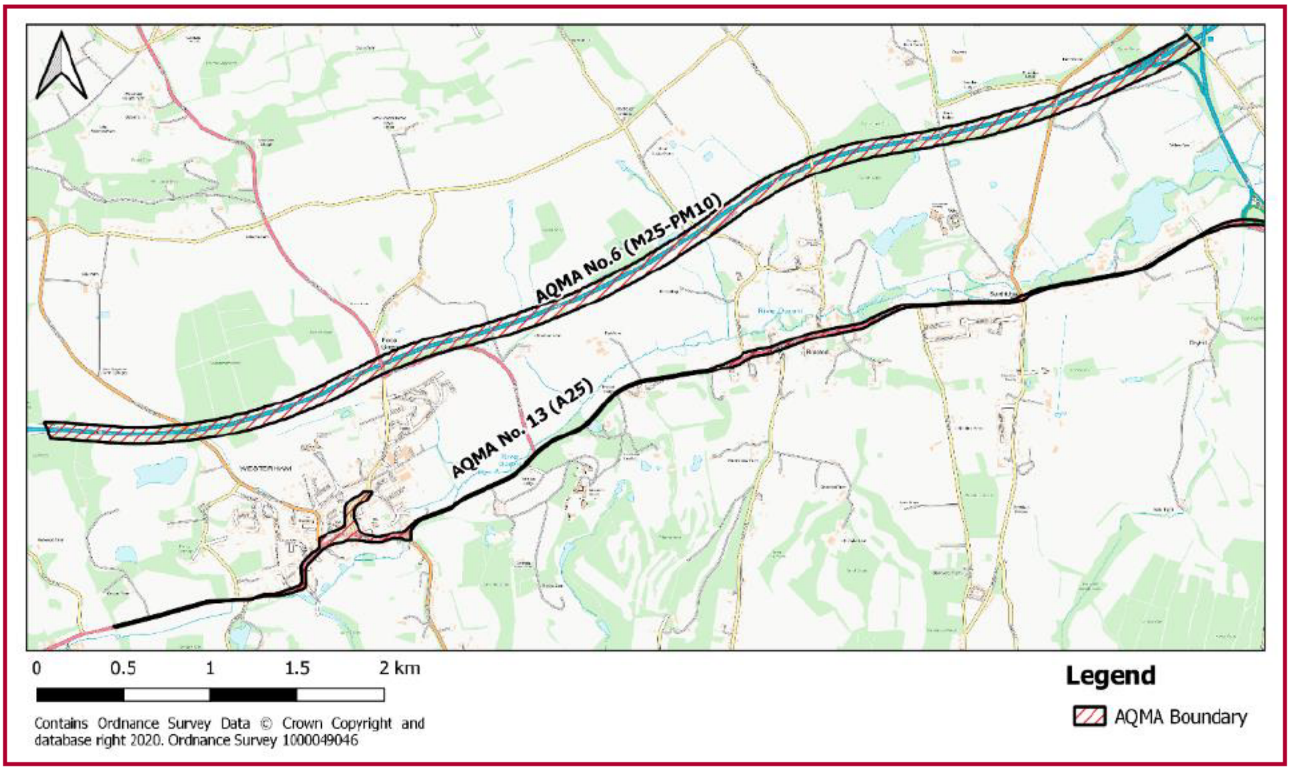
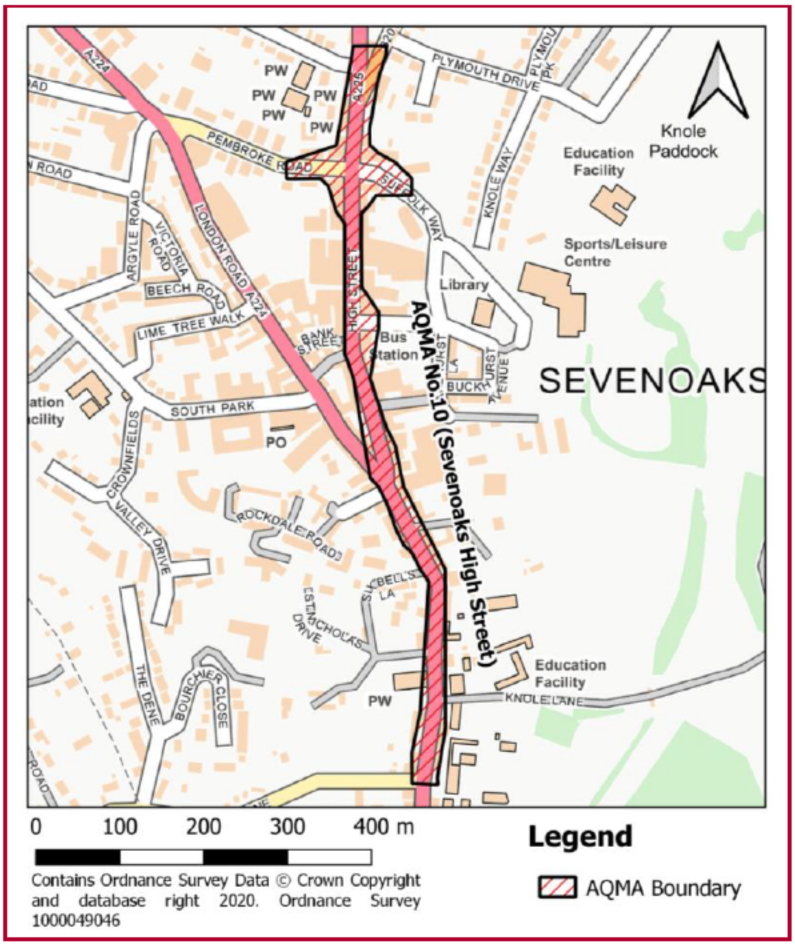


Figure 1.6 – Map of AQMA No.10 (Sevenoaks High Street)



2 Assessment Methodology

Atmospheric modelling to predict the pollutant concentrations emitted from road traffic sources was carried out using ADMS Roads version 5.0.0.1, developed by Cambridge Environmental Research Consultants (CERC). The approach used was based upon the following:

- Prediction of NO_2 and PM_{10} (where relevant) concentrations to which existing receptors may be exposed to, and a comparison with the relevant AQS objectives;
- Quantification of relative NO_2 contribution of sources to overall NO_2 pollutant concentration; and
- Determination of the geographical extent of any potential exceedances in regards to the existing AQMA boundaries and proposed boundary changes stated in the previous assessment.

Pollutant concentrations have been predicted within a base year of 2018, with model inputs relevant to the assessment based upon the same year.

2.1 Traffic Inputs

Traffic flows for the road links included within the model have been sourced from the DfT traffic count online resource[2]. This data source provides an average annual daily traffic (AADT) flow for the relevant road link in terms of a number of vehicle types; cars, LGVs (light goods vehicles), HGVs (heavy goods vehicles), buses and coaches, and motorcycles.

The traffic data utilised within the dispersion modelling, both the location of the DfT count points and the count point specific data are presented in Appendix A.

It is important to note that some of the traffic data used is based on estimates either from nearby links or estimated from the most recent manual counts. Traffic data, which has been estimated from manual counts that were carried out over 3 years ago, have been highlighted in Appendix A. This may lead to some uncertainty in the accuracy of the traffic data. Additionally, traffic surveys were unable to be carried out to provide more accurate traffic data in these areas as a result of the restrictions put in place by the UK Government due to the Covid-19 pandemic. It was deemed that any traffic surveys carried out at this time would be un-representative of normal conditions.

Traffic speeds were modelled at the relevant speed limit for each road. However, in accordance with LAQM.TG(16), where appropriate, traffic speeds have been reduced to simulate queues at junctions, traffic lights and other locations where queues or slower traffic are known to occur.

The Emissions Factors Toolkit (EFT) version 9.0[3] has been used to determine vehicle emission factors for input into the ADMS-Roads model. The emission factors are based upon the traffic data inputs used within the assessment, with total vehicle flows and proportion of vehicle types taken from existing DfT data. The pre-set national values for vehicle fleet in terms of vehicle Euro Class has been utilised in the absence of a vehicle fleet specific information for the Sevenoaks area.

2.2 General Model Inputs

A site surface roughness value of 0.5m was entered into the ADMS-roads model, consistent with the suburban nature of the modelled domain. In accordance with CERC's ADMS Roads user guide[4], a minimum Monin-Obukhov Length of 30m will be used for the ADMS Roads model to reflect the urban topography of the model domain.

[2] Department for Transport, traffic count data for available road links (2020), available at https://www.gov.uk/government/collections/road-traffic-statistics

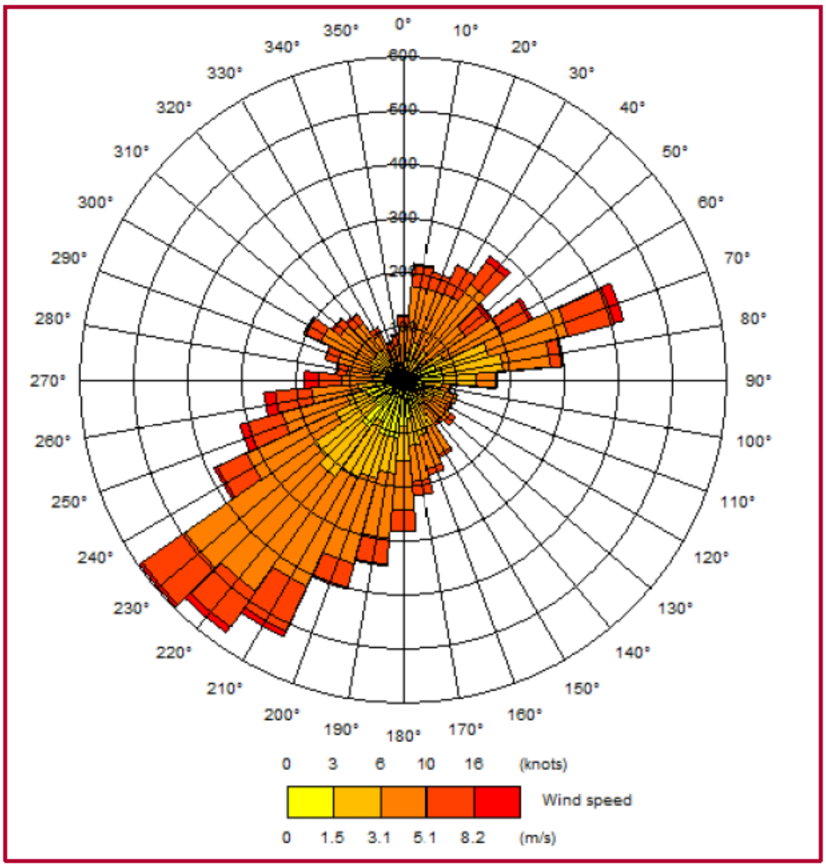
[3] Defra, Emissions Factors Toolkit (2019), available at http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

[4] CERC, ADMS-Roads User Guide Version 5 (2020)

One year of hourly sequential meteorological data from a representative synoptic station is required by the dispersion model. For the completion of the modelling 2018 meteorological data from the Gatwick airport weather station has been utilised within in this assessment. This particular site has been chosen due to it being the nearest site with a complete data set for 2018, and is representative of an inland suburban area alongside being at a similar elevation to the Sevenoaks District Council area.

A wind rose for this site for the year 2018 is presented in Figure 2.1.

Figure 2.1 – Wind Rose for Gatwick Airport 2018 Meteorological Data



2.3 Emission Sources

A total of 253 road sources were included throughout the model domain. No point sources have been included within the model under the assumption that road traffic is the primary source of the NO_2 and PM_{10} emissions. The road links drawn are presented in Figure 2.2. Street canyons were also included along some stretches of road where the roads were surrounded by buildings/walls on both sides. Areas of street canyons are shown in Figure 2.3. No variation in the gradient of the road sources was included, and remained at the default 0%, assuming the area is flat.

The roads were drawn along the primary and main roads throughout Sevenoaks District Council, ensuring to include those running through the AQMAs. These were however restricted due to where available traffic data was located.

Figure 2.2 – Modelled Road Sources

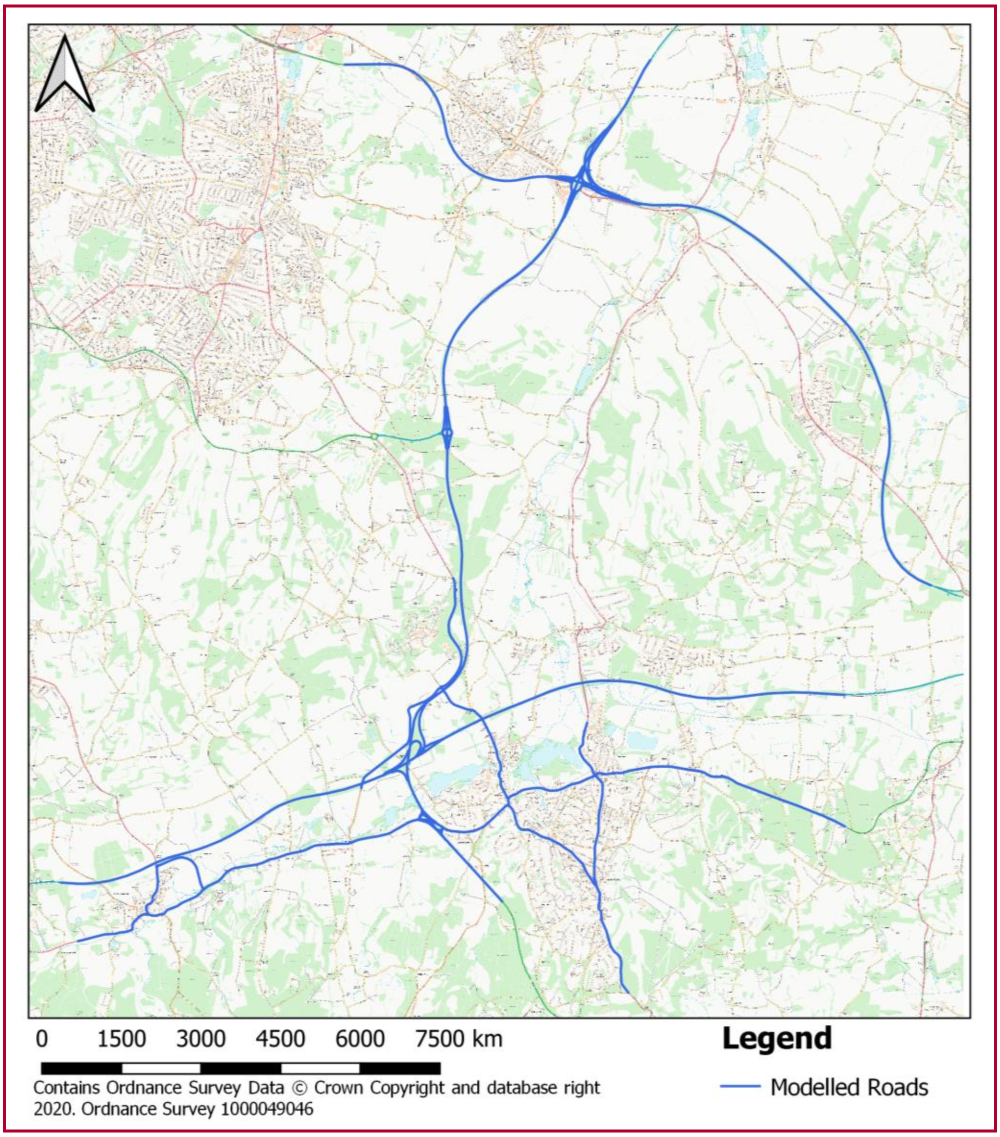
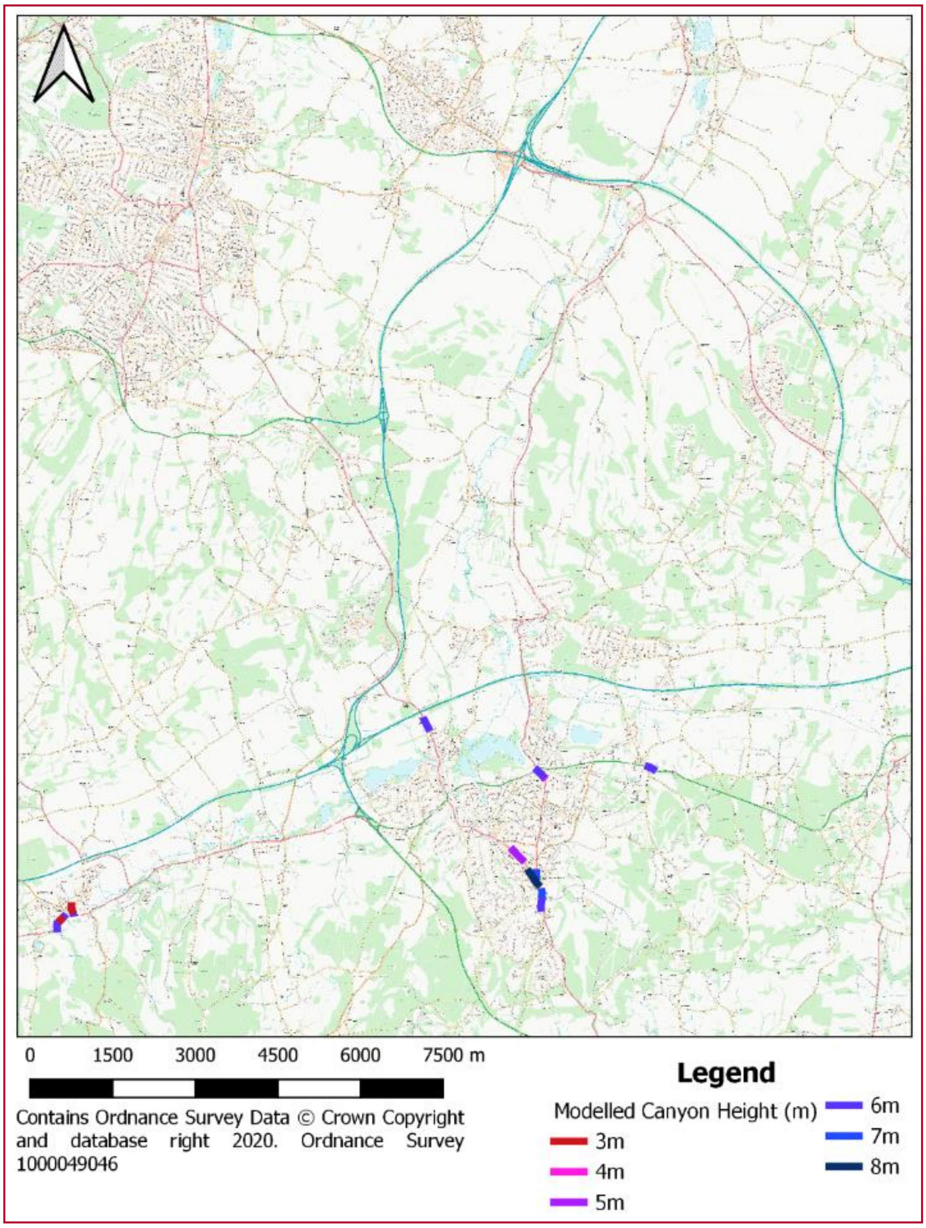


Figure 2.3 – Modelled Canyons and Canyon Height



2.4 Sensitive Receptors

335 discrete receptors were included within the assessment to represent locations of relevant exposure. The locations were identified through the completion of a desktop study. In addition, concentrations were also modelled across regular gridded area's set across the AQMAs, with a spatial resolution between the receptors of between 55m x 30m, and 40m x 110m. A receptor height of 1.5m was used for all gridded receptors modelled. The gridded receptor model was split into 5 separate domains, with the maximum resolution being along the section covering the M25, running between the connecting junctions to the M26 and M20. These were supplemented with additional receptor points added close to the modelled road links, using the intelligent gridding tool in ADMS-Roads.

The majority of the discrete receptors (306) were included at a height of 1.5m to represent ground level exposure, whereas 44 receptors were included at an increased height of between 3m to 8m to represent exposure at buildings with residential usage on the first and second storey levels, as well as elevated properties uphill from the roads.

2.5 Model Outputs

Background pollutant values for 2018 derived from the Defra background maps database[5] have been used in conjunction with the concentrations predicted by the ADMS-Roads model to calculate predicted total annual mean concentrations of NO_x and PM_{10}.

To avoid duplication of the road source contribution from 'Motorway Roads' and 'Trunk A Roads' in the modelling and assessment process, these source sectors have been removed from the overall background concentrations reported. This has been completed using the Defra NO_x Sector Removal Tool[6] v7.0.

Sevenoaks District Council carries out monitoring of NO_2 at a number of background monitoring sites using both an automatic monitor and diffusion tubes. For modelling purposes, the Defra Background maps have been used as opposed to the available background monitoring data due to there not being sufficient monitoring sites to have a representative cover of the modelling domain.

The background concentrations used within this assessment are presented in Appendix C.

For the prediction of annual mean NO_2 concentrations for the modelled scenarios, the output of the ADMS-Roads model for road NO_x contributions has been converted to total NO_2 following the methodology in LAQM.TG(16), using the NO_x to NO_2 conversion tool developed on behalf of Defra. This assessment has utilised the current version of the NO_x to NO_2 conversion tool, version 7.1[7]. The road contribution is then added to the appropriate NO_2 background concentration value to obtain an overall total NO_2 concentration. Annual mean PM_{10} road contributions were also output from the model and processed in a similar manner, i.e. combined with the relevant background annual mean PM_{10} concentrations to obtain an overall total PM_{10} concentration. As per the methodology stated in LAQM.TG(16), the below equation has been used to calculate an estimate of the number of potential exceedances of the PM_{10} 24-hour mean objective from the annual mean concentration.

$$Number\ of\ 24\text{-}hour\ mean\ exceedances = -18.5 + 0.00145 \times annual\ mean^3 + \left(\frac{206}{annual\ mean}\right)$$

2.5.1 Verification

Verification of the model has been carried out using a number of local authority NO_2 passive monitoring locations, in accordance with the methodology detailed within LAQM.TG(16). A total of 49 roadside diffusion tubes and one continuous roadside monitor are located throughout Sevenoaks District Council, however 10 of these (DT29, 39, 40, 41, 83, 93, 94, 95, BC4-6 and CM2) are not located on a modelled road, so therefore have not been included in verification. Details of the remaining 40 tubes are presented in Table B.1. The locations and heights of these tubes have been adjusted and validated where required via a desktop study.

An initial verification was carried out using all 40 sites, with the results being presented in Table B.2. It was identified that using this model wide verification factor resulted in many sites significantly over or under predicting (outside of the ±25% acceptance level). The model could not be adjusted and improved any further and it was therefore determined that this inaccuracy was likely due to the size of the model domain resulting in a verification factor that is attempting to be representative of both motorway and non-motorway environments. Therefore, it was decided that separate verification factors were required to cover different geographical areas throughout the model. Details of these verifications are provided in Appendix B. The final verification factors applied are:

- Motorway Verification – 1.075
- Westerham Verification – 3.742
- Model Wide (ex. Motorway and Westerham) – 3.258

As with the modelled road NO_x emissions, the modelled PM_{10} road emissions have also had a verification factor applied to them. Roadside PM_{10} concentrations are monitored at the Bat & Ball automatic monitoring site, therefore, verification of modelled PM_{10} concentrations has been completed in addition to the NO_x

[5] Defra Background Maps (2020), http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

[6] Defra NO_2 Adjustment for NO_x Sector Removal Tool (2019), available at https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

[7] Defra NO_x to NO_2 Calculator (2019), available at https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

verification. Following the verification of PM_{10} modelled results, all results presented within the assessment for all receptors are those calculated following the process of model verification using the adjustment factor of 1.878. Full details of the model verification completed can be found in Appendix B.

2.5.2 Source Apportionment

To help inform the development of measures as part of the action plan stage of the project, a source apportionment exercise was undertaken for the following vehicle classes.

- Petrol, Diesel and Alternative Fuelled (electric, bioethanol and liquefied petroleum gas) Cars;
- Petrol, Diesel and Alternative Fuelled LGVs;
- HGVs;
- Bus and Coaches; and
- Motorcycles.

This provides vehicle contributions of NO_x as a proportion of the total NO_x concentration, which will allow the Council to develop specific AQAP measures targeting a reduction in emissions from specific vehicle types. As there has been no locally defined fleet information, national averages in terms of euro class proportions of different vehicles has been utilised. The national averages for England are the pre-set values set within the latest version of the EFT that has been used to derive specific emission rates.

It should be noted that emission sources of NO_2 are dominated by a combination of direct NO_2 (f-NO_2) and oxides of nitrogen (NO_x), the latter of which is chemically unstable and rapidly oxidised upon release to form NO_2. Reducing levels of NO_x emissions therefore reduces concentrations of NO_2. As a consequence, the source apportionment study has considered the emissions of NO_x, which are assumed to be representative of the main sources of NO_2.

With regards to the discrete receptor locations, consideration has been given to the following groups of receptors located within, and within 20m of the boundary, of each designated AQMA. Where receptors are located within two separate AQMAs, they have only been included within one AQMA assessment. The source apportionment study has evaluated the following receptor combinations:

- The average NO_x contributions across all modelled locations. This provides useful information when considering possible action measures to test and adopt. It will however understate road NO_x concentrations in problem areas;
- The average NO_x contributions across all locations with modelled NO_2 concentration greater than 40µg/m^3. This provides an indication of source apportionment in problematic areas (i.e. only where the annual mean AQS objective is exceeded). As such, this information should be considered with more scrutiny when testing and adopting action measures; and
- The NO_x contributions at the receptor with the maximum road NO_x and NO_2 contribution. This provides a comparison to the previous two groups, with the identification of the most prominent vehicle source at receptor with the highest predicted NO_2 concentration.

3 Modelling Results

The following section provides a detailed assessment for each AQMA, comparing both the monitoring completed within the AQMA over a five year period with the modelled concentrations of annual mean NO_2. In reference to AQMA No.6, 24-hour PM_{10} concentrations have been evaluated. Details of each monitoring location and the monitoring results have been taken from the 2019 Annual Status Report[8] completed by the Council. For each AQMA, recommendations have been put forward in terms of the current determination of the specific AQMA, in relation to potential changes to the designation or boundary. Furthermore, additional analysis of receptor locations outside the existing AQMAs has been completed to assess if there are any areas outside declared AQMAs where annual mean concentrations of NO_2 are predicted to be in exceedance of the annual mean objective.

In line with the standardised LAQM reporting, the tabulated results present any exceedances of the annual mean AQS objective of 40µg/m^3 in bold, and any predicted concentrations in exceedance of 60µg/m^3 have been underlined. Additionally, annual mean concentrations that are within 10% of the objective have been presented in italics in order to ensure that any uncertainty in relation to the predicted modelling concentrations is taken into consideration for any recommendations made in terms of AQMA designation, amendment or revocation.

Contour results have also been produced for each designation within the AQMAs, with concentration isopleths presented at both 40µg/m^3 and 36µg/m^3 (within 10% of the 40µg/m^3 objective).These have been produced from a gridded results layer covering the model domain. In addition, ADMS-roads automatically places a high number of additional receptors close to each modelled road link to increase the spatial resolution of the receptors.

In addition, the NO_x source apportionment results for each AQMA which have been split across the vehicle classifications detailed in Section 2.5, are presented in both tabulated and pie charts formats. This allows a cross comparison between the main vehicular sources to be completed across each AQMA, and will aid the development of measures specific to each AQMA.

3.1 AQMA No.1 M20

3.1.1 Council Monitoring Data

AQMA 1 is currently designated for exceedances of the annual mean NO_2 AQS objective. The current boundary incorporates the eastern stretch of the M20 within the Council's boundary, from the junction of London Road to Button Street. Currently there are two diffusion tubes monitoring annual mean NO_2 concentrations located within, and near to, the current AQMA boundary. These are presented in Figure 3.2, and the monitoring results from the previous five years are shown in Table 3.1.

DT81 is located within boundary of AQMA No.1, and it can be seen that there have consistently been no exceedances of the annual mean NO_2 objective over the last five years. DT26 however has reported an exceedance for the last five years, but is located just outside of the AQMA boundary on the A20. DT26 has also consistently reported the highest concentration out of the two monitoring locations for the past five years; however, this is likely to be due to influences of emissions from both the A20 and the M20.

Following the application of distance correction to predict annual mean NO_2 concentrations at the closest point of relevant exposure for sites that are exceeding or within 10% of the AQS objective, as detailed within Table 3.2, DT26 was well below the annual mean NO_2 objective value in 2018.

[8] Seveonaks District Council (2019), 2019 Air Quality Annual Status Report

Table 3.1 – Current NO_2 Monitoring Within, or in Close Proximity to AQMA No.1

Site	Site Type	OS Grid Ref X	OS Grid Ref Y	Distance to Relevant Exposure (m)	Height (m)	Annual Mean NO_2 Concentration (µg/m³)[1]				
						2014	2015	2016	2017	2018
DT81	R	553416	167615	0.6	2.5	32	32.2	32.9	30.9	28.6
DT26	R	554217	167252	18.4	2	**42.3**	**41.7**	**45.8**	**41.8**	**42.7**

In **bold**, exceedance of the annual mean NO_2 AQS objective of 40µg/m³.
When **underlined**, NO_2 annual mean exceeds 60µg/m³, indicating a potential exceedance of the NO_2 1-hour mean objective
R= Roadside

Table 3.2 – Current NO_2 Monitoring Within AQMA 1, Distance Corrected

Site	Site Type	Distance to Kerbside (m)	Distance from Kerbside to Relevant Exposure (m)	Monitored Concentration 2018 (µg/m³)	Distance Corrected Concentration (µg/m³)
DT26	R	5	23.4	**42.7**	31.5

In **bold**, exceedance of the annual mean NO_2 AQS objective of 40µg/m³.
When **underlined**, NO_2 annual mean exceeds 60µg/m³, indicating a potential exceedance of the NO_2 1-hour mean objective
R= Roadside

3.1.2 Modelled Receptors, Annual Mean NO_2

Table 3.3 provides the modelled annual mean NO_2 concentrations predicted at existing residential receptor locations in 2018. 5 discrete receptor locations are positioned within the boundary of AQMA No.1, with 7 being located in close proximity. None of these locations have predicted exceedances of the annual mean NO_2 objective, and they all have a concentration predicted to be below 10% of the AQS objective.

Figure 3.3 presents the modelled receptor locations alongside their predicted annual mean NO_2 concentrations. From this, it can be seen that all receptors have a predicted concentration of less than 36µg/m³. The maximum reported concentration out of these receptors is at receptor ID 342, with a predicted concentration of 24.9µg/m³. The nearest diffusion tube monitoring location to this is DT81, which reported an annual mean NO_2 concentration in 2018 of 28.5µg/m³. The model is under predicting concentrations at this location by 14.8%, and additionally it should be noted that there are no monitoring locations located further west along the M20. It is therefore difficult to verify the concentrations at these modelled receptors, and the results should be considered with a degree of caution.

From the annual mean NO_2 concentration contour plots presented in Figure 3.4, it can be seen that the extent of the predicted exceedances of the annual mean objective are much more constrained to the M20 when compared to the existing AQMA boundary. The contour lines follow the geometry of the road, with the exceedance limit not coming into range of any residential properties in the nearby vicinity to the M20. The wind direction originating from the South West, as presented in Figure 2.1, causes the exceedance contour line to be located close to the northbound carriageway, and further from the southbound carriageway.

Table 3.3 – AQMA No.1, Summary of Modelled Receptor Results (NO_2)

Receptor ID	OS Grid X	OS Grid Y	Height (m)	In AQMA?	AQS objective (µg/m³)	2018 Annual Mean NO_2 (µg/m³)	% of AQS objective
283	554296	167239	1.5	N	40	19.1	48

Receptor ID	OS Grid X	OS Grid Y	Height (m)	In AQMA?	AQS objective ($\mu g/m^3$)	2018 Annual Mean NO_2 ($\mu g/m^3$)	% of AQS objective
284	554837	167393	1.5	Y	40	24.0	60
342	553677	167511	1.5	Y	40	24.9	62
345	553851	167557	1.5	Y	40	20.6	52
347	557014	165831	1.5	Y	40	18.4	46
348	558198	164809	1.5	N	40	16.6	41
349	558163	164727	1.5	Y	40	19.9	50
350	558194	164200	1.5	N	40	15.4	39
351	558508	163136	1.5	N	40	16.2	41
356	558428	162388	1.5	N	40	16.2	40
345a	553499	167589	1.5	Y	40	24.0	60

3.1.3 AQMA No.1 Source Apportionment

The source apportionment completed for the modelled receptors within the boundary of AQMA No.1 incorporates the 6 receptors as detailed within Table 3.3 above. Apportionment for NO_x concentrations have been completed for the three separate groups in terms of the receptors as detailed in Section 2.5, with the results presented in Table 3.4 and Figure 3.1.

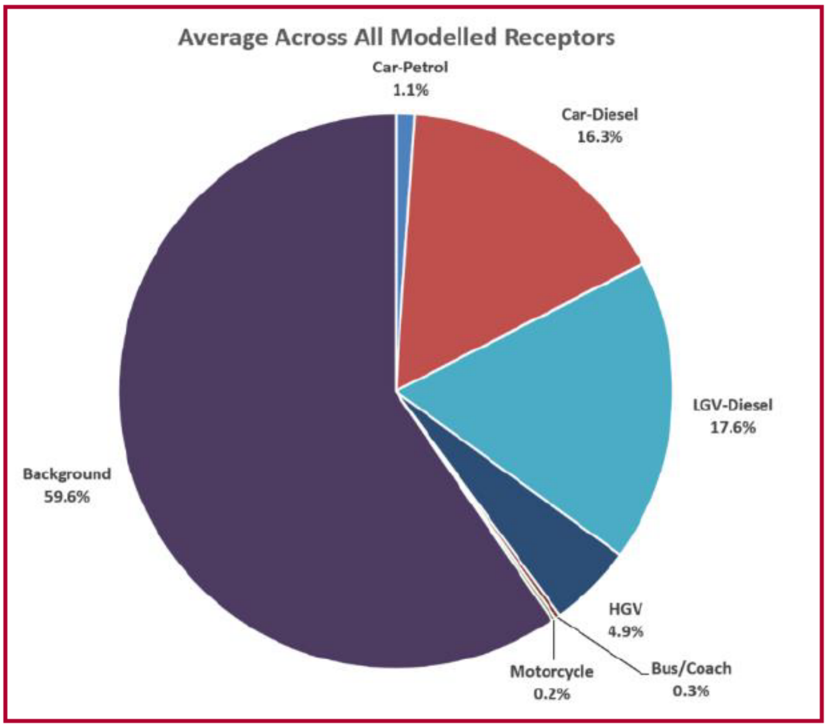
When considering the average NO_x concentration across all modelled receptors, road traffic accounts for 14.0$\mu g/m^3$ (40.4%) of total NO_x concentration (34.7$\mu g/m^3$). Of the 14.0$\mu g/m^3$ total road NO_x, Diesel LGVs account for the greatest contribution (17.6%) of any of the vehicle types, followed by Diesel Cars (16.3%) and HGVs (4.9%). The remaining vehicle source groups (Petrol and Alternative Fuel Cars and LGVs, Bus and Coach, and Motorcycles) contribute less than 1.5% each.

The receptor with the maximum road NO_x concentration is receptor ID 342, whereby the total road NO_x was predicted to be 40.0$\mu g/m^3$. At receptor, ID 342 road traffic accounts for 42.8% of total NO_x concentration (17.1$\mu g/m^3$). Of the 17.1$\mu g/m^3$ total road NO_x, the separate vehicle apportionment remains similar to the previous assessment but with a slightly increased apportionment to Diesel LGVs and Cars, and a slightly decreased apportionment to HGVs; Diesel LGVs (18.6%), Diesel Cars (17.6%) and HGVs (4.7%), with the remaining vehicle source groups contributing less than 1.5% each.

Table 3.4 – NO_x Source Apportionment Results: AQMA No.1

Results	All Vehicles	Car			LGV			HGV	Bus and Coach	Motorcycle	Background
		Petrol	Diesel	EV/LPG	Petrol	Diesel	EV/LPG				
Average across all modelled receptors											
NO_x Concentration ($\mu g/m^3$)	14.0	0.4	5.7	0.0	0.0	6.1	0.0	1.7	0.1	0.1	20.7
Percentage of Total NO_x	40.4%	1.1%	16.3%	0.0%	0.0%	17.6%	0.0%	4.9%	0.3%	0.2%	59.6%
Percentage Contribution to Road NO_x	100.0%	2.7%	40.4%	0.0%	0.1%	43.4%	0.0%	12.2%	0.7%	0.5%	-
At The Receptor With the Maximum Road NO_x Concentration (ID 342)											
NO_x Concentration ($\mu g/m^3$)	17.1	0.5	7.0	0.0	0.0	7.4	0.0	1.9	0.1	0.1	22.9
Percentage of Total NO_x	42.8%	1.3%	17.6%	0.0%	0.0%	18.6%	0.0%	4.7%	0.3%	0.2%	57.2%
Percentage Contribution to Road NO_x	100.0%	3.0%	41.0%	0.0%	0.1%	43.4%	0.0%	11.0%	0.8%	0.6%	-

Figure 3.1 – NO_x Source Apportionment Results: AQMA No.1



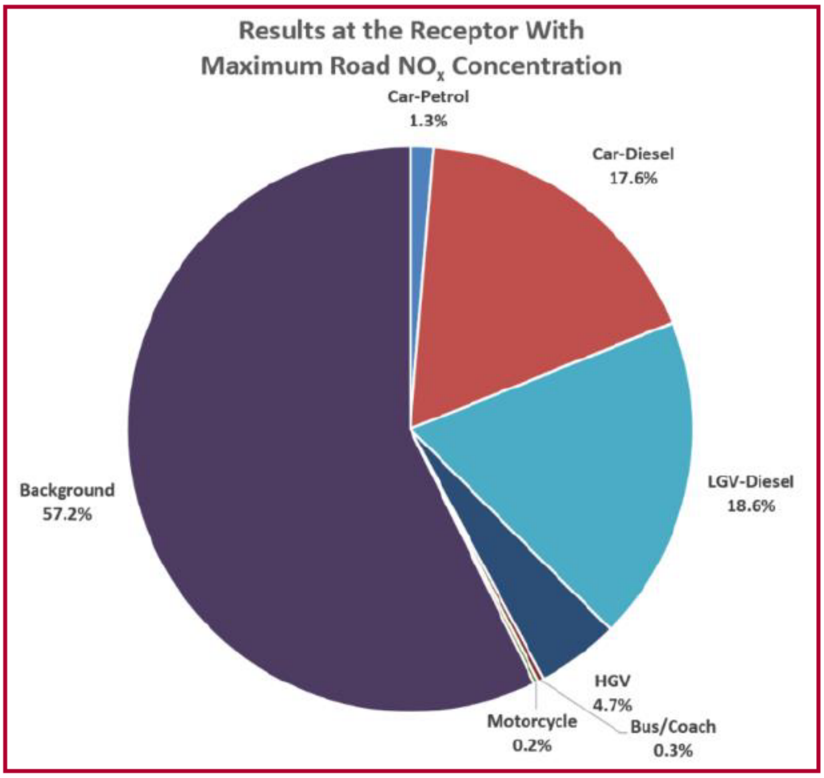


Figure 3.2 – AQMA No.1, Modelled Roads and Monitoring Locations

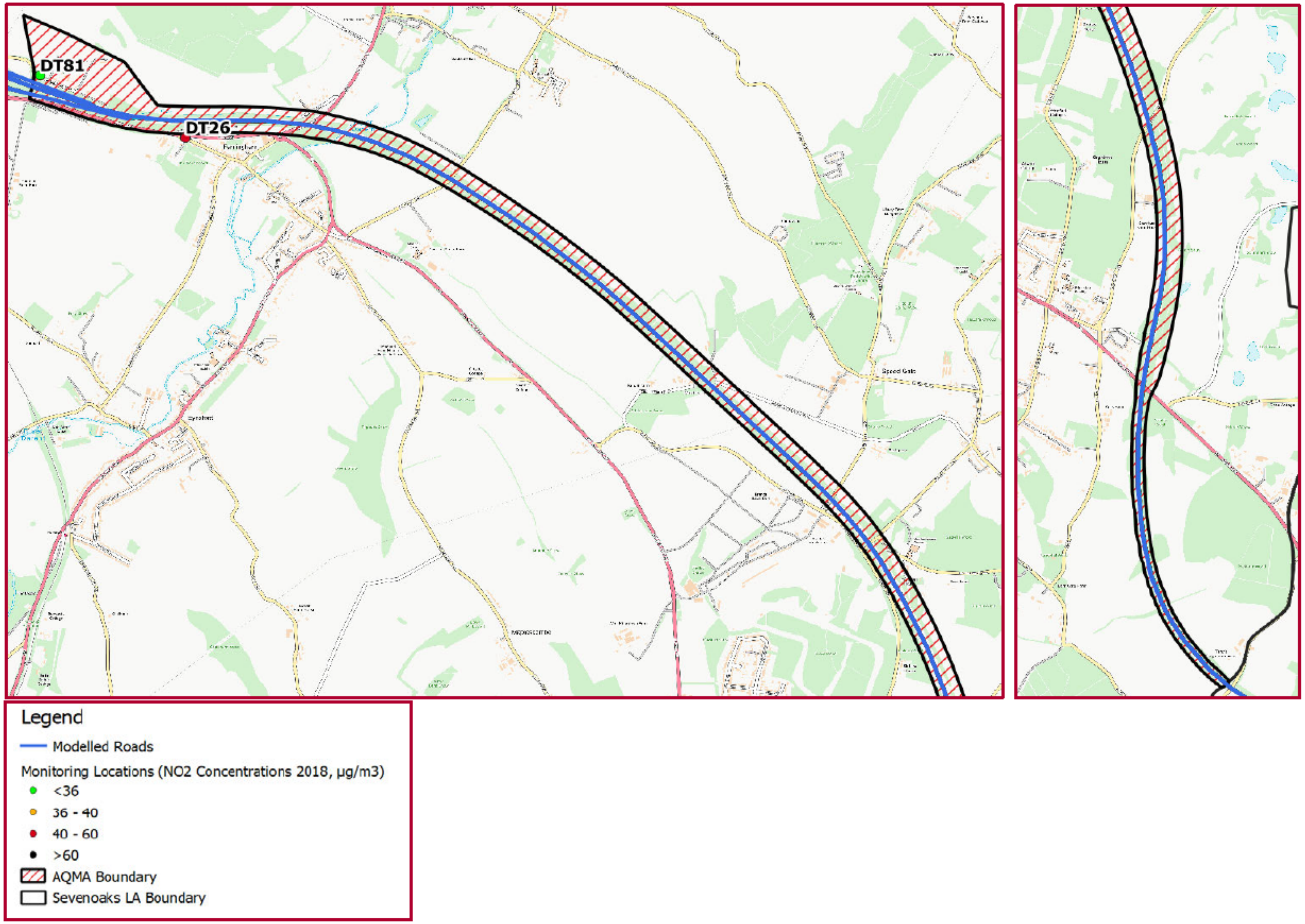


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Figure 3.3 – AQMA No.1, Modelled Receptor NO_2 Concentrations

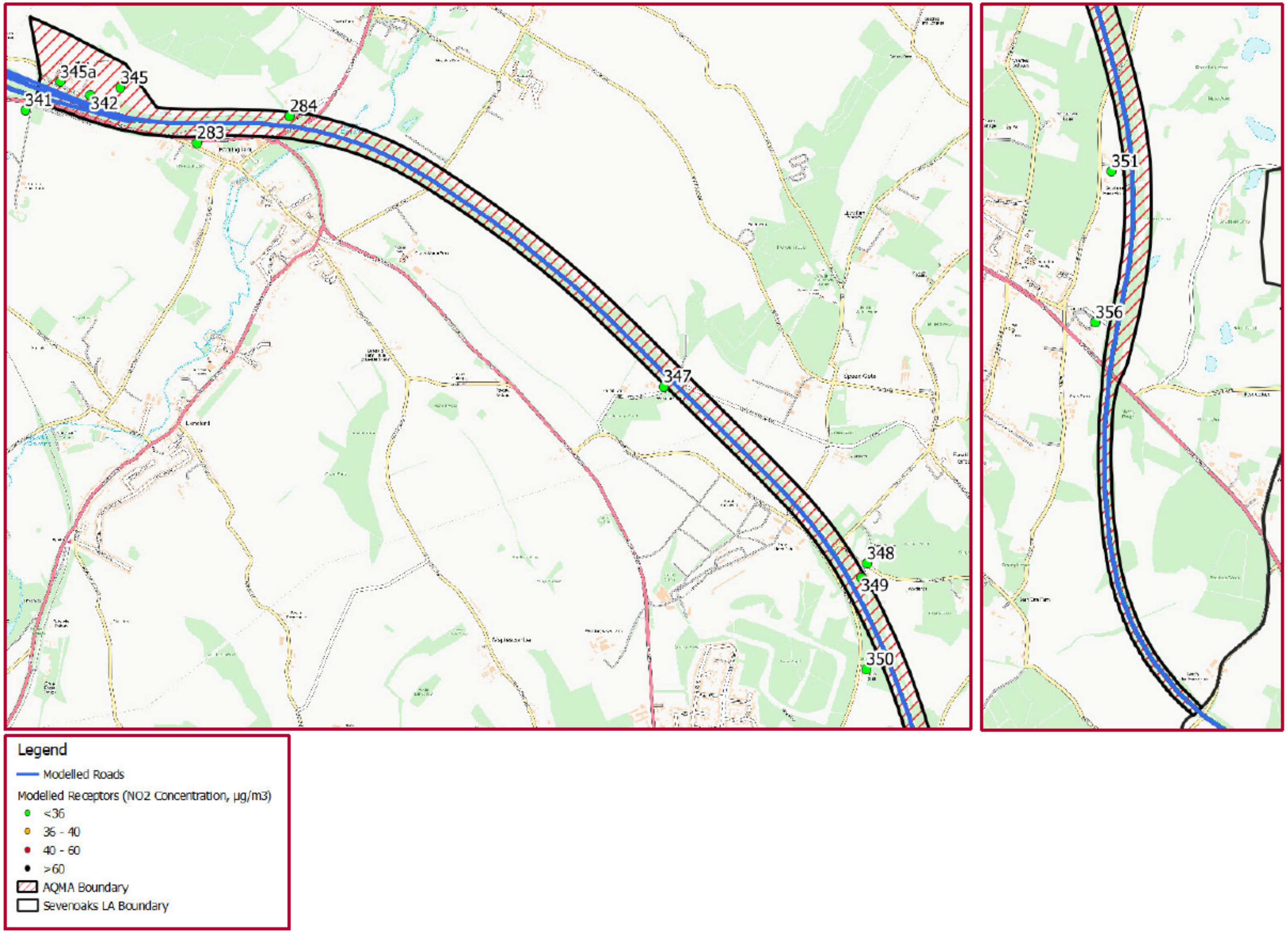
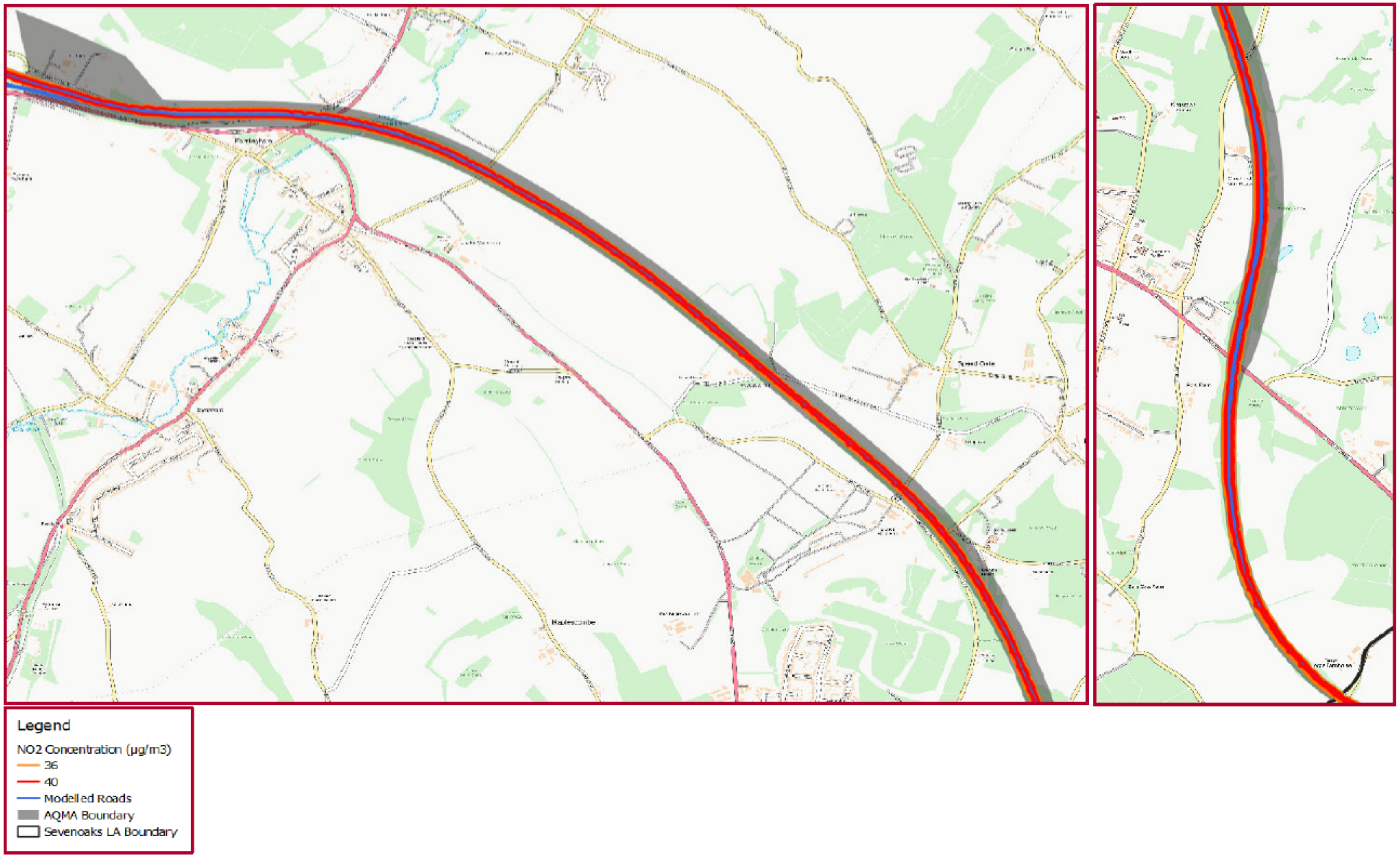


Figure 3.4 – AQMA No.1, Modelled NO_2 Concentration Isopleths



3.2 AQMA No.2 M25

3.2.1 Council Monitoring Data

AQMA No.2 is currently designated for exceedances of the annual mean NO_2 AQS objective with the current boundary incorporating all of the M25, located within Sevenoaks, but additionally the adjoining roads from the M20 and the first section of London Road leaving the junction eastwards. Currently there are three diffusion tubes monitoring annual mean NO_2 located within the current AQMA boundary, DT13 and DT14 located in the northern part of the AQMA on the B2173 and Button Street respectively. DT12 is located in the southern section of the AQMA, off Station Road and near to the M25. There is no monitoring throughout the central section of this AQMA. The current diffusion tube monitoring sites located within the AQMA are presented in Figure 3.6, and results for the previous five years are detailed in Table 3.5.

DT12, DT13 and DT14 are all located within the boundary of AQMA No.2 and it can be seen that there have consistently been no reported exceedances at DT13 and DT14 for the past five years. DT12 on the other hand has reported concentrations in exceedances of the AQS annual mean NO_2 objective for four years, with 2018 being the first year it reported just below but still within 10% of the objective value.

Following the application of distance correction to predict annual mean NO_2 concentrations at the closest point of relevant exposure at sites which are either exceeding or within 10% of the AQS objective, as detailed within Table 3.6, DT12 shows a predicted concentration well below the annual mean NO_2 objective in 2018.

Table 3.5 – Current NO_2 Monitoring Within, or in Close Proximity to AQMA No.2

Site	Site Type	OS Grid Ref X	OS Grid Ref Y	Distance to Relevant Exposure (m)	Height (m)	Annual Mean NO_2 Concentration (µg/m³)[1]				
						2014	2015	2016	2017	2018
DT12	R	546816	155851	31	2	**43.3**	**46.5**	**43.1**	**40**	*39.8*
DT13	R	552504	167700	14.8	2.5	*37.1*	31.4	36.5	30.5	32.9
DT14	R	553107	167868	15	2.5	35.4	32.4	32.6	30.1	27.6

In **bold**, exceedance of the annual mean NO_2 AQS objective of 40µg/m³.
When **underlined**, NO_2 annual mean exceeds 60µg/m³, indicating a potential exceedance of the NO_2 1-hour mean objective
R= Roadside

Table 3.6 – Current NO_2 Monitoring Within AQMA No.2, Distance Corrected

Site	Site Type	Distance to Kerbside (m)	Distance from Kerbside to Relevant Exposure (m)	Monitored Concentration 2018 (µg/m³)	Distance Corrected Concentration (µg/m³)
DT12	R	19	50	*39.8*	30.2

In **bold**, exceedance of the annual mean NO_2 AQS objective of 40µg/m³.
When **underlined**, NO_2 annual mean exceeds 60µg/m³, indicating a potential exceedance of the NO_2 1-hour mean objective
R= Roadside

3.2.2 Modelled Receptors, Annual Mean NO_2

Table 3.7 provides the modelled annual mean NO_2 concentrations predicted at existing residential receptor locations in 2018, as well as sensitive receptors of nearby schools (Parkwood Hall Co-operative Academy and Churchill Church of England Primary School). 11 discrete receptor locations are positioned within the boundary of AQMA No.2, with a further 17 being located in close proximity to the boundary. Only one of these receptor locations has a predicted exceedance of the annual mean NO_2 objective, receptor ID 301, with a concentration of 41.3µg/m³. All other receptor locations are predicted to be well below the objective limit value.

Figure 3.7 presents the modelled receptor locations alongside their predicted annual mean NO_2 concentrations. From this, it can be seen that all receptors have a predicted concentration of less than 36µg/m³, with the exception of receptor ID 301. All receptors located at the schools are also reported to be below 36µg/m³. Receptor ID 301 is located near to a roundabout of the A223/London Road, where emissions from both the M25 and from vehicles accelerating and slowing down are likely to converge. This receptor has been verified using the Westerham verification factor due to it being exposed to road traffic sources other than the M25. The Westerham verification factor is greater than the Motorway factor, and therefore also results in a more conservative value. It is also important to note that the M25 is cut down into the ground, with receptor ID 301 being modelled at a height of 1.5m from modelled sources. Therefore, the model may be over predicting the concentration at receptor ID 301, as in reality the receptor is located at a greater height and distance relative to the M25.

From the annual mean NO_2 concentration contour plots presented in Figure 3.8, it can be seen that the extent of the predicted exceedances of the annual mean objective are much more constrained to the M25 when compared to the existing AQMA boundary. The contour lines follow the geometry of the road, with the exceedance limit not coming into range of any residential properties in the nearby vicinity to the M25, except for some residential properties located near to the flyover of Brastead Hill Road. Similarly to receptor ID 301, the gridded receptors have only been modelled at 1.5m heights from the modelled sources, therefore the model may have over predicted concentrations here.

Table 3.7 – AQMA No.2, Summary of Modelled Receptor Results (NO_2)

Receptor ID	OS Grid X	OS Grid Y	Height (m)	Inside AQMA?	AQS objective (µg/m³)	2018 Annual Mean NO_2 (µg/m³)	% of AQS objective
275	549594	156681	1.5	N	40	23.8	59
279	552516	167687	1.5	Y	40	24.0	60
292	547967	156407	1.5	Y	40	23.4	58
294	548596	156618	1.5	N	40	21.7	54
301	544793	154872	1.5	N	40	**41.3**	**103**
305	544411	154566	1.5	N	40	17.2	43
306	549917	158087	1.5	Y	40	32.2	81
307	549925	158165	1.5	N	40	22.6	57
308	549865	157795	1.5	Y	40	20.4	51
309	549989	157818	1.5	N	40	18.5	46
310	549532	157848	1.5	N	40	19.1	48
311	549255	156998	1.5	N	40	20.4	51
312	549348	157035	1.5	N	40	20.7	52
315	550548	158987	1.5	N	40	24.5	61
316	550539	158992	1.5	N	40	24.3	61
317	550473	159111	1.5	N	40	20.4	51
318	547257	156078	1.5	Y	40	27.9	70
319	549350	157012	1.5	N	40	21.0	53
320	548833	156714	1.5	N	40	22.9	57
321	550451	160984	1.5	N	40	20.8	52
322	550228	161900	1.5	N	40	19.8	50
323	550375	164658	1.5	Y	40	25.6	64
324	550453	164684	1.5	Y	40	20.3	51
333	553049	168270	1.5	Y	40	27.4	68
334	552941	168583	1.5	N	40	24.2	60
335	552988	168603	1.5	N	40	25.6	64
336	553410	168383	1.5	Y	40	20.2	51
338	553721	169596	1.5	Y	40	25.4	63

3.2.3 AQMA No.2 Source Apportionment

The source apportionment completed for the modelled receptors within the boundary of AQMA No.2 incorporates the 10 receptors as detailed within Table 3.7 above. Apportionment for NO_x concentrations have been completed for the three separate groups in terms of the receptors as detailed in Section 2.5, with the results presented in Table 3.8 and Figure 3.5.

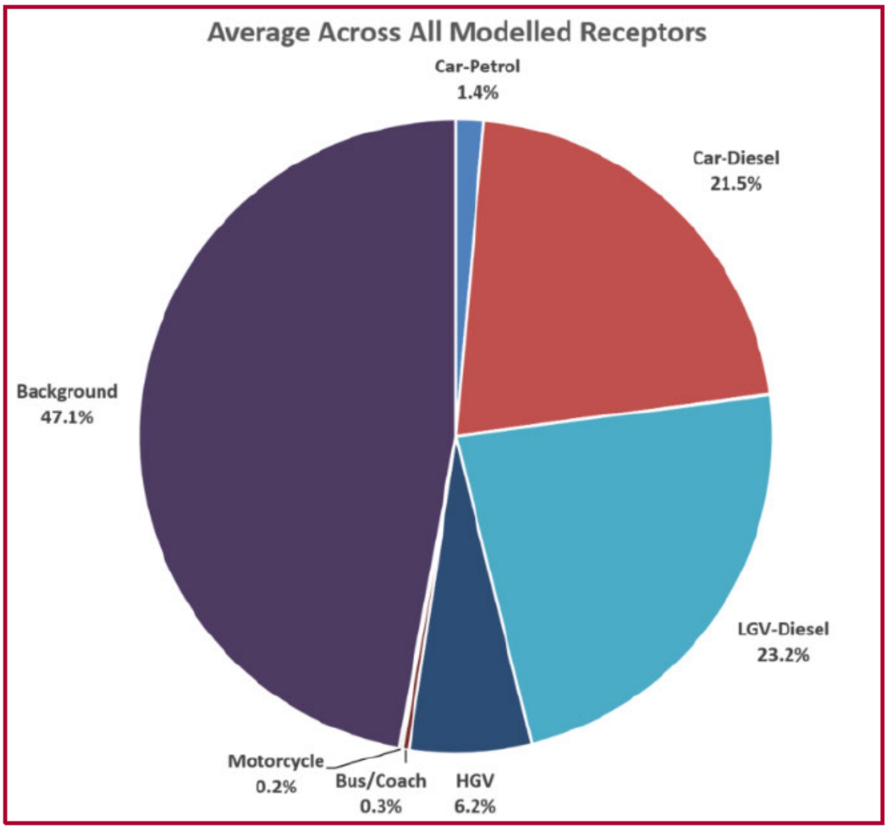
When considering the average NO_x concentration across all modelled receptors, road traffic accounts for 21.4µg/m³ (52.9%) of total NO_x concentration (40.4µg/m³). Of the 21.4µg/m³ total road NO_x, Diesel LGVs account for the greatest contribution (23.2%) of any of the vehicle types, followed by Diesel Cars (21.5%) and HGVs (6.2%). The remaining vehicle source groups (Petrol and Alternative Fuel Cars and LGVs, Bus and Coach, and Motorcycles) contribute less than 1.5% each.

The receptor with the maximum road NO_x concentration is receptor ID 306, whereby the total road NO_x was predicted to be 58.0µg/m³. At receptor ID 306 road traffic accounts for 70.9% of total NO_x concentration (41.1µg/m³). Of the 41.1µg/m³ total road NO_x the separate vehicle apportionment remains similar to the previous assessment but with an increased apportionment to Diesel LGVs; Diesel LGVs (31.5%), Diesel Cars (29.4%) and HGVs (7.3%), with the remaining vehicle source groups contributing less than 2.0% each.

Table 3.8 – NO_x Source Apportionment Results: AQMA No.2

Results	All Vehicles	Car			LGV			HGV	Bus and Coach	Motorcycle	Background
		Petrol	Diesel	EV/LPG	Petrol	Diesel	EV/LPG				
Average across all modelled receptors											
NO_x Concentration (µg/m³)	21.4	0.6	8.7	0.0	0.0	9.4	0.0	2.5	0.1	0.1	19.1
Percentage of Total NO_x	52.9%	1.4%	21.5%	0.0%	0.0%	23.2%	0.0%	6.2%	0.3%	0.2%	47.1%
Percentage Contribution to Road NO_x	100.0%	2.7%	40.6%	0.0%	0.1%	44.0%	0.0%	11.8%	0.6%	0.3%	-
At The Receptor With the Maximum Road NO_x Concentration (ID 306)											
NO_x Concentration (µg/m³)	41.1	1.2	17.1	0.0	0.0	18.3	0.0	4.2	0.3	0.1	16.9
Percentage of Total NO_x	70.9%	2.0%	29.4%	0.0%	0.1%	31.5%	0.0%	7.3%	0.4%	0.2%	29.1%
Percentage Contribution to Road NO_x	100.0%	2.9%	41.5%	0.0%	0.1%	44.4%	0.0%	10.2%	0.6%	0.3%	-

Figure 3.5 – NO_x Source Apportionment Results: AQMA No.2



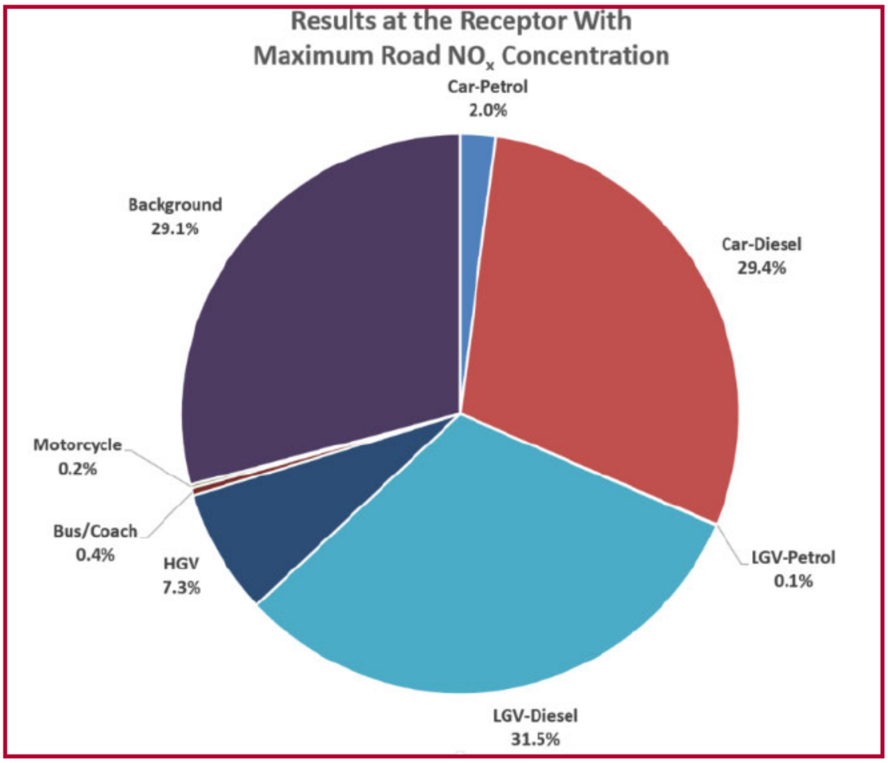


Figure 3.6 – AQMA No.2, Modelled Roads and Monitoring Locations

Figure 3.7 – AQMA No.2, Modelled Receptor Locations

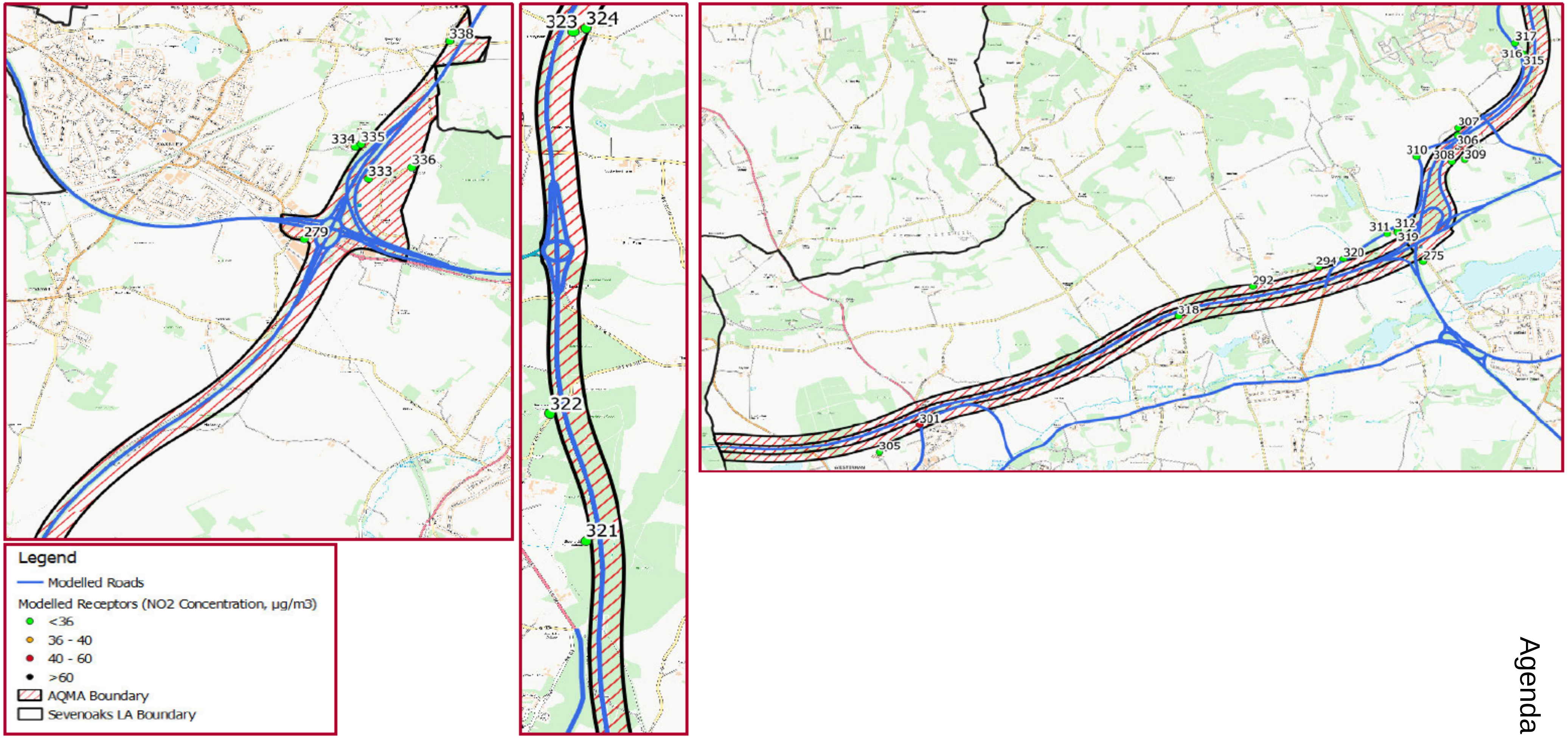
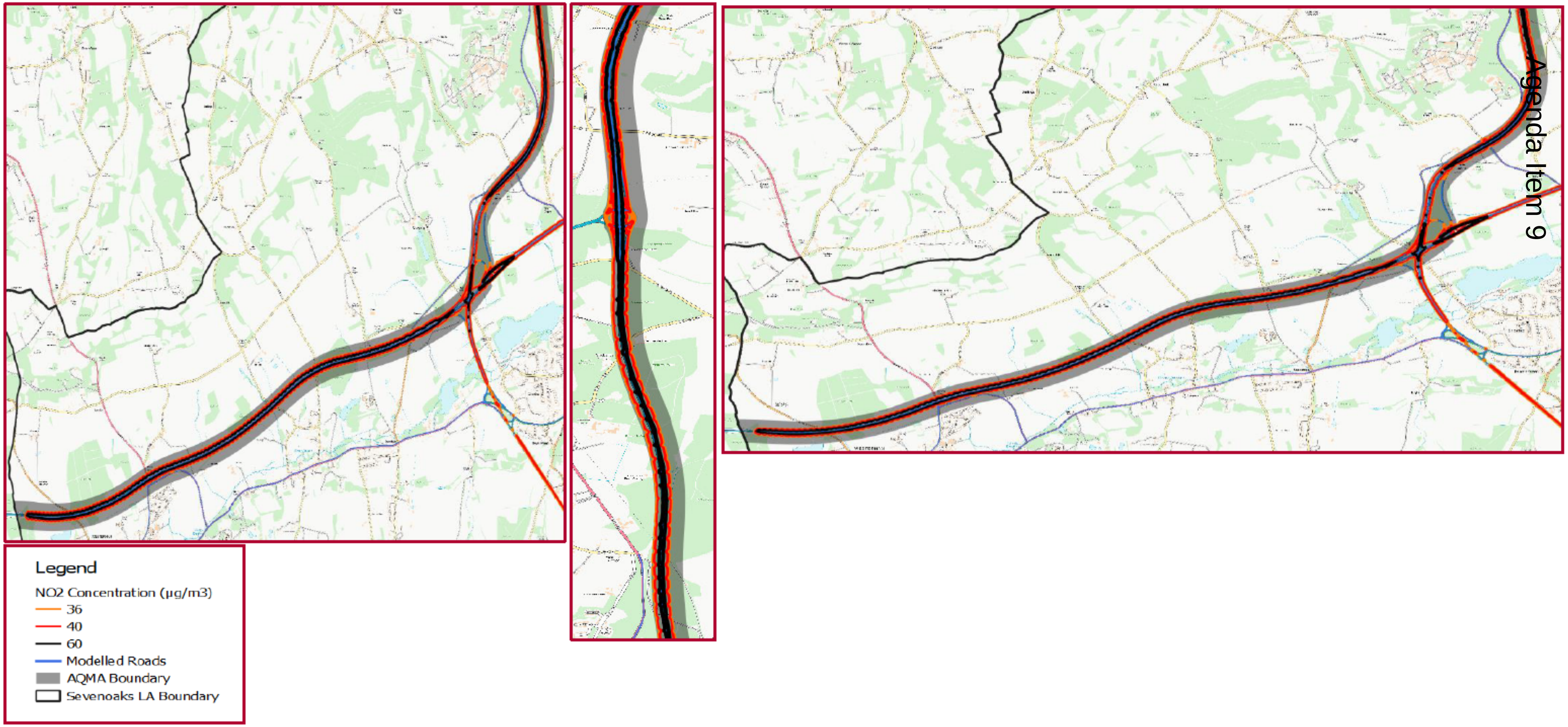


Figure 3.8 – AQMA No.2 Modelled NO_2 Concentration Isopleths



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3.3 AQMA No.3 M26

3.3.1 Council Monitoring Data

AQMA No.3 is currently designated for exceedances of the annual mean NO_2 AQS objective with the current boundary incorporating all of the M26 located within Sevenoaks. Currently there are no monitoring sites measuring annual mean NO_2 concentrations within or near to the current AQMA boundary.

3.3.2 Modelled Receptors, Annual Mean NO_2

Table 3.9 provides the modelled annual mean NO_2 concentrations predicted at existing residential receptor locations in 2018. 5 discrete receptor locations are positioned within the boundary of AQMA No.3, with a further 6 being located in close proximity to the boundary. None of these receptor locations has a predicted exceedance of the annual mean NO_2 objective, however receptor ID 161 has a predicted concentration of 37.9µg/m^3, within 10% of the objective. It should be noted that receptor ID 161, 159 and 158 have been verified using the Model Wide (ex. Motorway and Westerham) verification factor, as these receptor locations will also be influenced by the emissions of the A224 London Road. All other receptor locations are predicted to be well below the objective limit value.

It is important to note that due to no monitoring data being collected in this AQMA it is not possible to verify the model performance in this area with absolute certainty. The concentrations in this AQMA have been verified using the Motorway verification factor (with the exception of receptor IDs 161, 159 and 158), however the nearest monitoring location use for this verification is DT12, approximately 3km away.

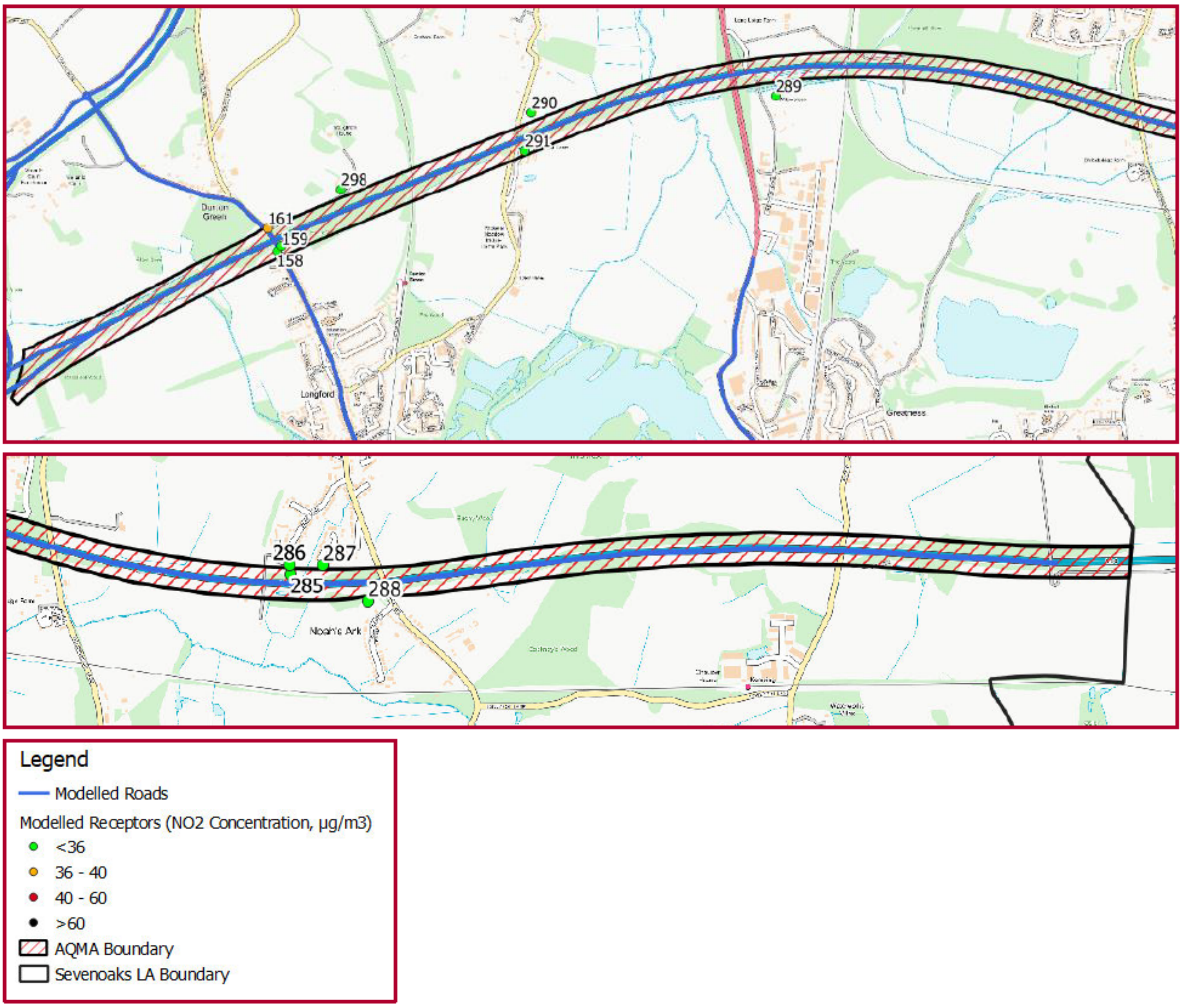
Figure 3.9 presents the modelled receptor locations alongside their predicted annual mean NO_2 concentrations. From this, it can be seen that all receptors have a predicted concentration of less than 36µg/m^3, with the exception of receptor ID 161.

From the annual mean NO_2 concentration contour plots presented in Figure 3.11, it can be seen that the extent of the predicted exceedances of the annual mean objective are much more constrained to the majority of the M26 when compared to the existing AQMA boundary. Where the M26 joins the M25, junction 5, the contours are much closer to the northern edge of the AQMA boundary, and do slightly cross over. The contour lines follow the geometry of the road, with the exceedance limit not coming into range of any residential properties near to the M26.

Table 3.9 – AQMA No.3, Summary of Modelled Receptor Results (NO_2)

Receptor ID	OS Grid X	OS Grid Y	Height (m)	In AQMA?	AQS objective (µg/m^3)	2018 Annual Mean NO_2 (µg/m^3)	% of AQS objective
158	550948	157650	7.5	Y	40	32.2	80
159	550969	157672	7.5	Y	40	34.2	85
161	550910	157746	7.5	Y	40	*37.8*	*94*
285	555276	158115	1.5	Y	40	24.5	61
286	555273	158144	1.5	N	40	19.5	49
287	555383	158142	1.5	N	40	19.6	49
288	555529	158026	1.5	N	40	16.8	42
289	553003	158290	1.5	N	40	15.8	40
290	551997	158222	1.5	N	40	20.2	50
291	551971	158064	1.5	Y	40	20.3	51
298	551213	157906	1.5	N	40	20.2	51

Figure 3.9 – AQMA No.3, Modelled Roads and Receptor Locations



3.3.3 AQMA No.3 Source Apportionment

The source apportionment completed for the modelled receptors within the boundary of AQMA No.3 incorporates the 5 receptors as detailed within Table 3.9 above. Apportionment for NO_x concentrations have been completed for the three separate groups in terms of the receptors as detailed in Section 2.5, with the results presented in Table 3.10 and Figure 3.10.

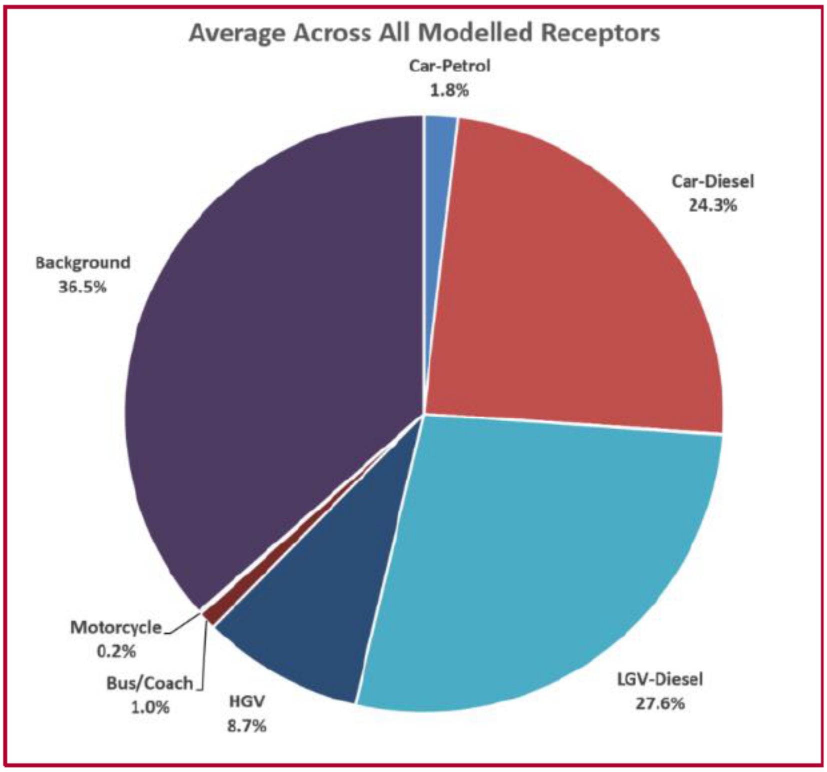
When considering the average NO_x concentration across all modelled receptors, road traffic accounts for 32.7µg/m^3 (63.5%) of total NO_x concentration (51.5µg/m^3). Of the 32.7µg/m^3 total road NO_x, Diesel LGVs account for the greatest contribution (27.6%) of any of the vehicle types, followed by Diesel Cars (24.3%) and HGVs (8.7%). The remaining vehicle source groups (Petrol and Alternative Fuel Cars and LGVs, Bus and Coach, and Motorcycles) contribute less than 2.0% each.

The receptor with the maximum road NO_x concentration is receptor ID 161, whereby the total road NO_x was predicted to be 69.7µg/m^3. At receptor ID 161 road traffic accounts for 72.1% of total NO_x concentration (50.3µg/m^3). Of the 50.3µg/m^3 total road NO_x the separate vehicle apportionment remains similar to the previous assessment but with an increased apportionment to Diesel LGVs and Cars, and a slight increased apportionment to HGVs and Petrol Cars; Diesel LGVs (30.9%), Diesel Cars (27.8%) and HGVs (9.9%), with the remaining vehicle source groups contributing less than 2.2% each.

Table 3.10 – NO_x Source Apportionment Results: AQMA No.3

Results	All Vehicles	Car			LGV			HGV	Bus and Coach	Motorcycle	Background
		Petrol	Diesel	EV/LPG	Petrol	Diesel	EV/LPG				
Average across all modelled receptors											
NO_x Concentration (µg/m³)	32.7	0.9	12.5	0.0	0.0	14.2	0.0	4.5	0.5	0.1	18.8
Percentage of Total NO_x	63.5%	1.8%	24.3%	0.0%	0.0%	27.6%	0.0%	8.7%	1.0%	0.2%	36.5%
Percentage Contribution to Road NO_x	100.0%	2.9%	38.2%	0.0%	0.1%	43.4%	0.0%	13.7%	1.5%	0.2%	-
At The Receptor With the Maximum Road NO_x Concentration (ID 161)											
NO_x Concentration (µg/m³)	50.3	1.5	19.4	0.0	0.0	21.5	0.0	6.9	0.8	0.1	19.4
Percentage of Total NO_x	72.1%	2.2%	27.8%	0.0%	0.1%	30.9%	0.0%	9.9%	1.1%	0.2%	27.9%
Percentage Contribution to Road NO_x	100.0%	3.0%	38.6%	0.0%	0.1%	42.8%	0.0%	13.7%	1.6%	0.2%	-

Figure 3.10 – NO_x Source Apportionment Results: AQMA No.3



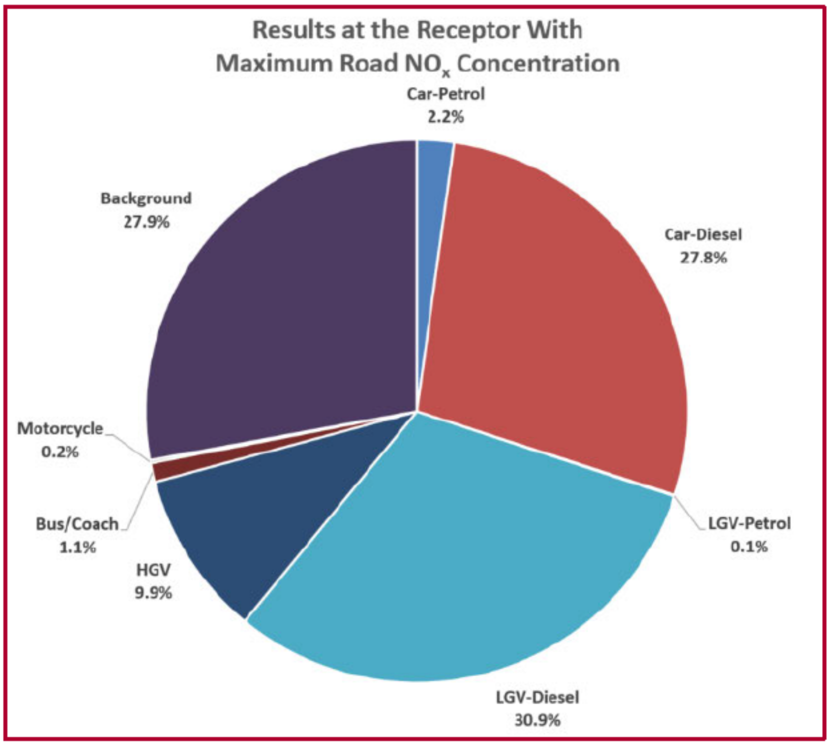
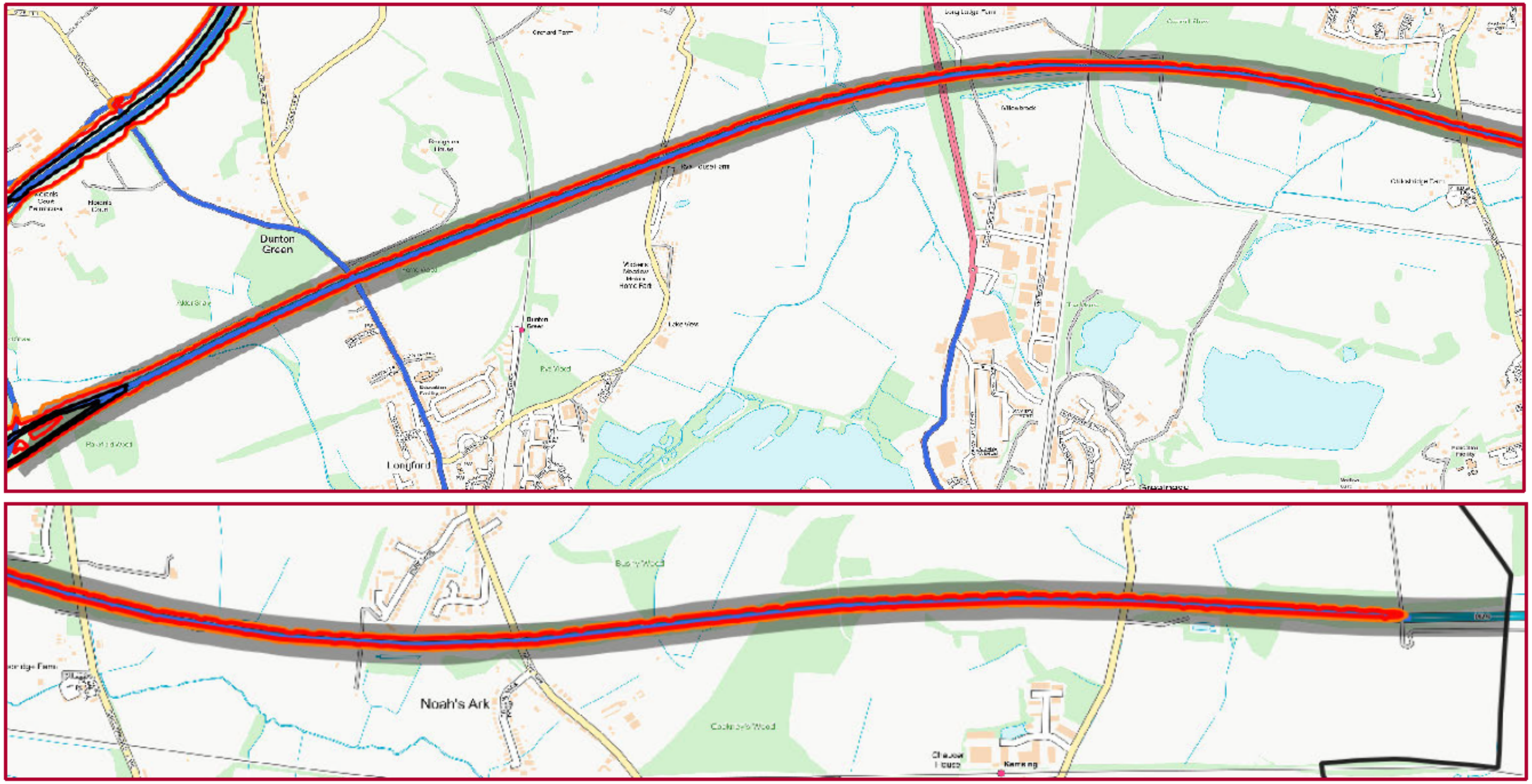


Figure 3.11 – AQMA No.3 Modelled NO_2 Concentration Isopleths



Legend

NO2 Concentration (µg/m3)
- 36
- 40
- 60
- Modelled Roads
- AQMA Boundary
- Sevenoaks LA Boundary

3.4 AQMA No.4 A20(T)

3.4.1 Council Monitoring Data

AQMA No.4 is currently designated for exceedances of the annual mean NO_2 AQS objective with the current boundary incorporating all of the A20 located within Sevenoaks. Currently there are no monitoring sites measuring annual mean NO_2 concentrations within or near to the current AQMA boundary.

3.4.2 Modelled Receptors, Annual Mean NO_2

Table 3.11 provides the modelled annual mean NO_2 concentrations predicted at existing residential receptor locations in 2018. 7 discrete receptor locations are positioned within the boundary of AQMA No.4, with a further 4 being located in close proximity to the boundary. None of these receptor locations have a predicted concentration in exceedance of the annual mean NO_2 objective, nor are there any within 10% of the objective.

It is important to note that due to no monitoring data being collected in this AQMA it is not possible to verify the model performance in this area with absolute accuracy. The concentrations in this AQMA have been verified using the Motorway verification factor, and the nearest monitoring location is DT14, located approximately 780m away.

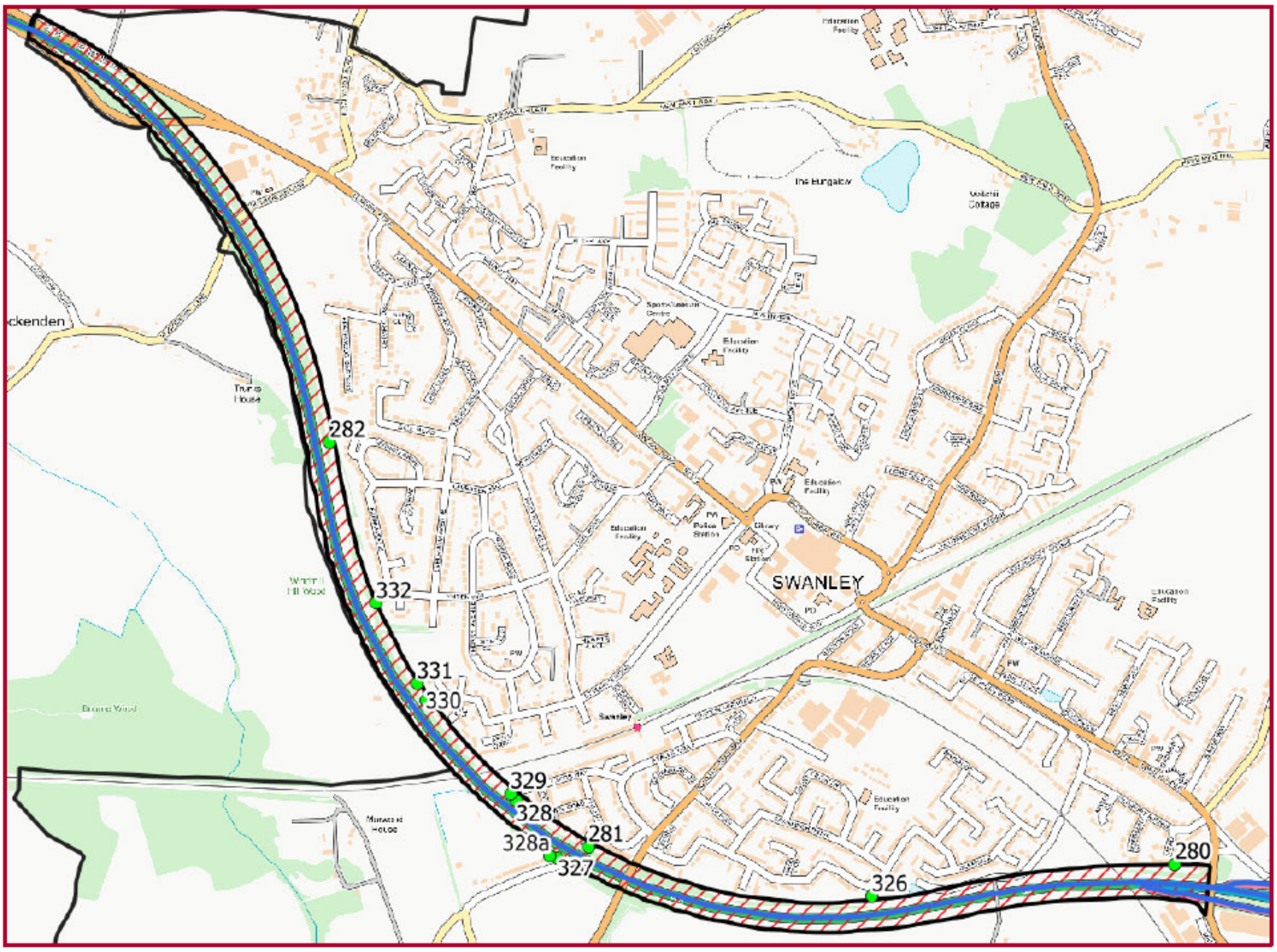
Figure 3.12 presents the modelled receptor locations alongside their predicted annual mean NO_2 concentrations. From this, it can be seen that all receptors have a predicted concentration of less than 36µg/m^3.

From the annual mean NO_2 concentration contour plots presented in Figure 3.14, it can be seen that the extent of the predicted exceedances of the annual mean objective are slightly more constrained to the A20 when compared to the existing AQMA boundary, however for the most part it remains in-line with the boundary. The contour lines follow the geometry of the road, with the exceedance limit coming in close range to residential properties located near to the A20, in particular those near Cyclamen Road/Ladds Way. No properties come into contact with the exceedance limit contour; however, they do come into contact with the 36µg/m^3 contour.

Table 3.11 – AQMA No.4, Summary of Modelled Receptor Results (NO_2)

Receptor ID	OS Grid X	OS Grid Y	Height (m)	Inside AQMA?	AQS objective (µg/m^3)	2018 Annual Mean NO_2 (µg/m^3)	% of AQS objective
280	552249	167935	1.5	Y	40	26.2	65
281	550864	167976	1.5	Y	40	29.1	73
282	550254	168930	1.5	Y	40	26.8	67
326	551533	167859	1.5	N	40	26.4	66
327	550792	167949	1.5	Y	40	24.0	60
328	550694	168086	1.5	Y	40	31.7	79
329	550681	168101	1.5	Y	40	29.8	75
330	550480	168321	1.5	Y	40	28.5	71
331	550460	168361	1.5	Y	40	26.5	66
332	550363	168550	1.5	Y	40	25.1	63
328a	550774	167954	1.5	N	40	22.9	57

Figure 3.12 – AQMA No.4, Modelled Roads and Receptor Locations



Legend
Modelled Roads
Modelled Receptors (NO2 Concentration, µg/m3)
<36
36 - 40
40 - 60
>60
AQMA Boundary
Sevenoaks LA Boundary

3.4.3 AQMA No.4 Source Apportionment

The source apportionment completed for the modelled receptors within the boundary of AQMA No.4 incorporates the 9 receptors as detailed within Table 3.11 above. Apportionment for NO_x concentrations have been completed for the three separate groups in terms of the receptors as detailed in Section 2.5, with the results presented in Table 3.12 and Figure 3.13.

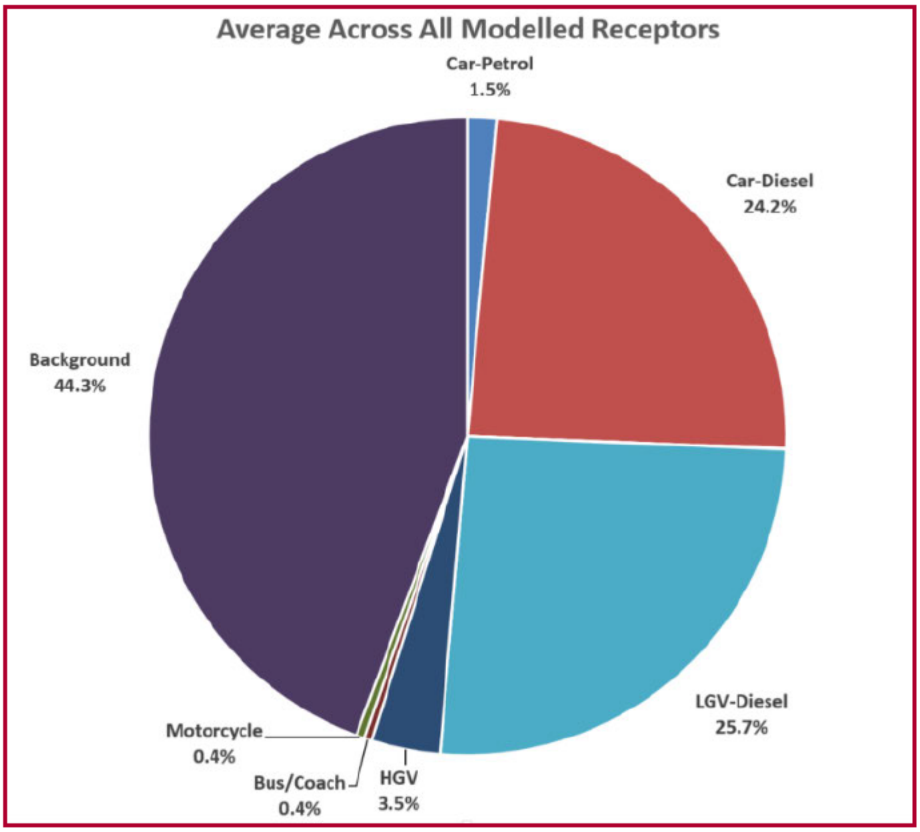
When considering the average NO_x concentration across all modelled receptors, road traffic accounts for 25.8µg/m^3 (55.7%) of total NO_x concentration (46.4µg/m^3). Of the 25.8µg/m^3 total road NO_x, Diesel LGVs account for the greatest contribution (25.7%) of any of the vehicle types, followed by Diesel Cars (24.2%) and HGVs (3.5%). The remaining vehicle source groups (Petrol and Alternative Fuel Cars and LGVs, Bus and Coach, and Motorcycles) contribute less than 2.0% each.

The receptor with the maximum road NO_x concentration is receptor ID 328, whereby the total road NO_x was predicted to be 55.3µg/m^3. At receptor ID 328 road traffic accounts for 62.3% of total NO_x concentration (34.4µg/m^3). Of the 34.4µg/m^3 total road NO_x the separate vehicle apportionment remains similar to the previous assessment but with an increased apportionment to Diesel LGVs and Cars; Diesel LGVs (28.9%), Diesel Cars (27.1%) and HGVs (3.7%), with the remaining vehicle source groups contributing less than 1.6% each.

Table 3.12 – NO_x Source Apportionment Results: AQMA No.4

Results	All Vehicles	Car			LGV			HGV	Bus and Coach	Motorcycle	Background
		Petrol	Diesel	EV/LPG	Petrol	Diesel	EV/LPG				
Average across all modelled receptors											
NO_x Concentration (µg/m³)	25.8	0.7	11.2	0.0	0.0	11.9	0.0	1.6	0.2	0.2	20.6
Percentage of Total NO_x	55.7%	1.5%	24.2%	0.0%	0.0%	25.7%	0.0%	3.5%	0.4%	0.4%	44.3%
Percentage Contribution to Road NO_x	100.0%	2.7%	43.4%	0.0%	0.1%	46.2%	0.0%	6.2%	0.7%	0.8%	-
At The Receptor With the Maximum Road NO_x Concentration (ID 328)											
NO_x Concentration (µg/m³)	34.4	0.9	15.0	0.0	0.0	16.0	0.0	2.0	0.2	0.3	20.9
Percentage of Total NO_x	62.3%	1.6%	27.1%	0.0%	0.0%	28.9%	0.0%	3.7%	0.4%	0.5%	37.7%
Percentage Contribution to Road NO_x	100.0%	2.6%	43.6%	0.0%	0.1%	46.4%	0.0%	5.9%	0.7%	0.8%	-

Figure 3.13 – NO_x Source Apportionment Results: AQMA No.4



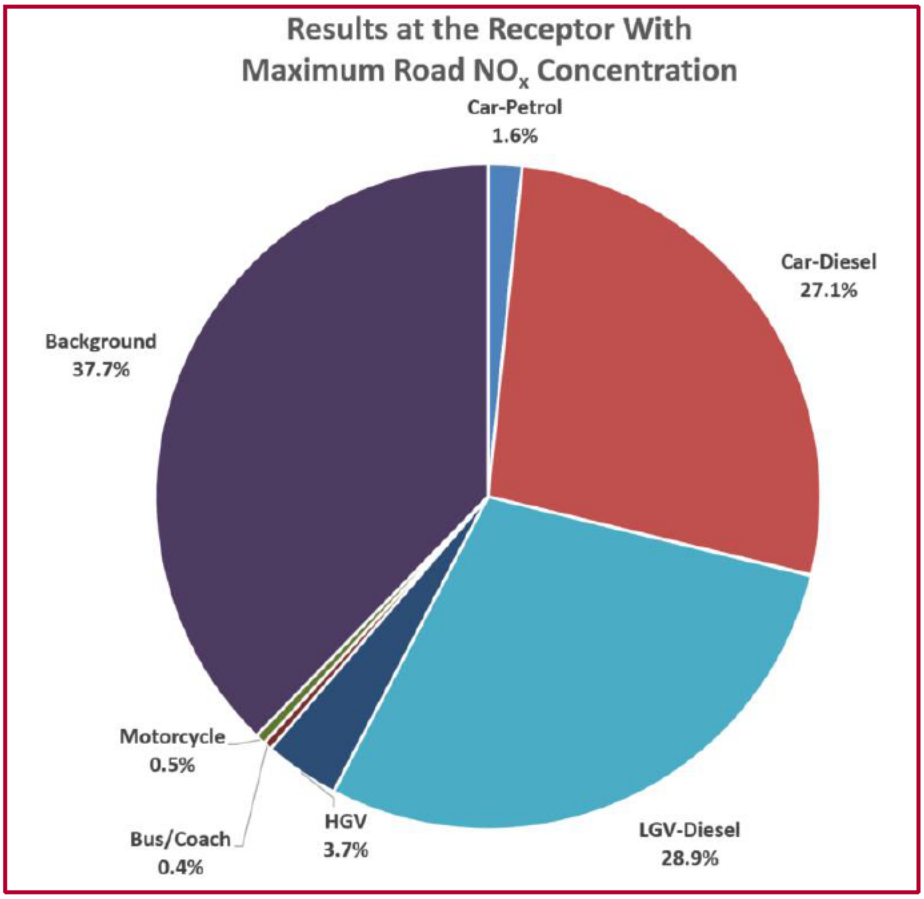
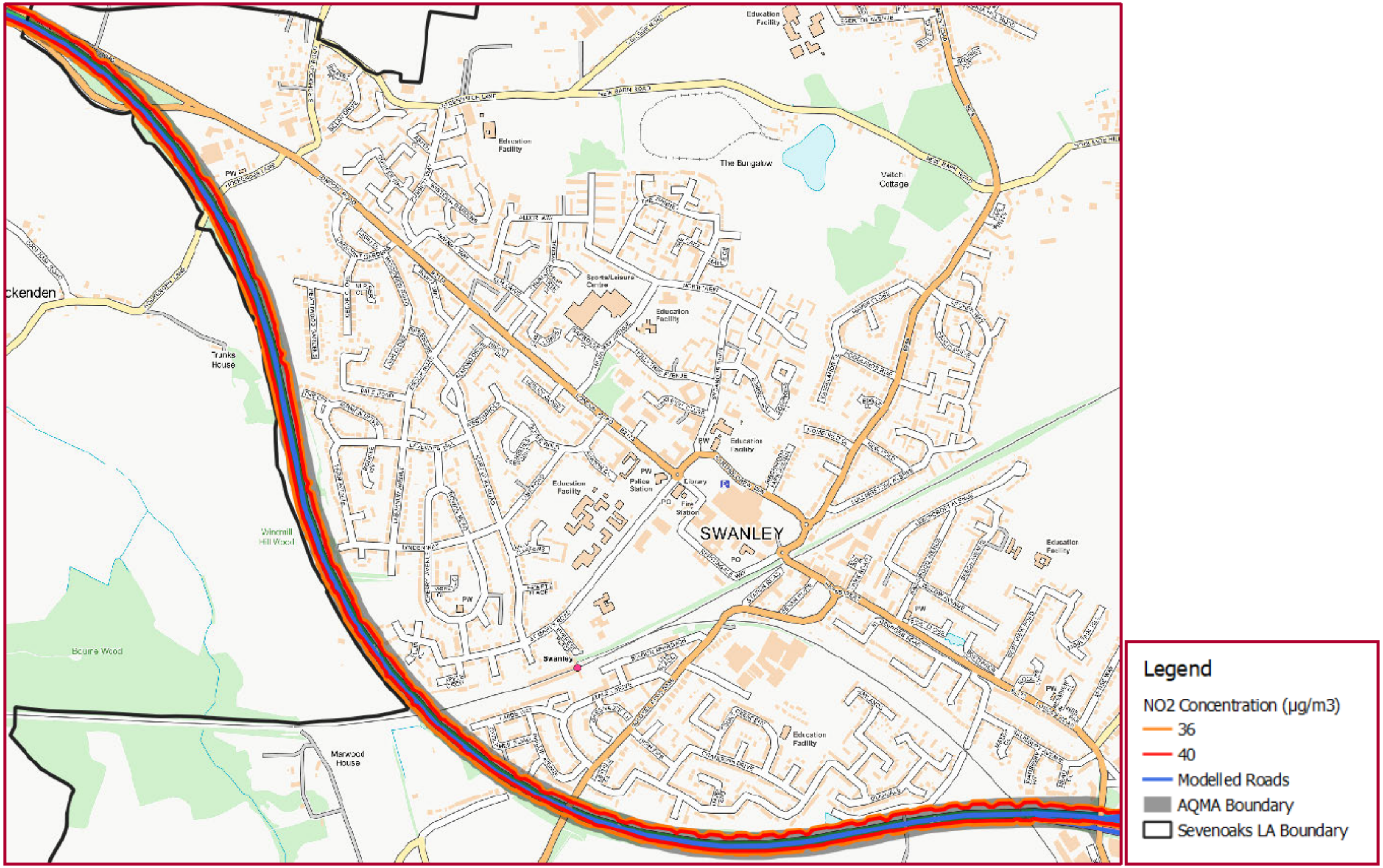


Figure 3.14 – AQMA No.4 Modelled NO_2 Concentration Isopleths



3.5 AQMA No.6 M25-PM_{10}

3.5.1 Council Monitoring Data

AQMA No.6 is currently designated for exceedances of the 24-hour mean PM_{10} AQS Objective with the current boundary incorporating eastern section of the M25 from junction 5 located within Sevenoaks. Currently there are no monitoring sites measuring either the annual or 24-hour mean PM_{10} concentrations within or near to the current AQMA boundary.

3.5.2 Modelled Receptors, 24-Hour Mean PM_{10}

Table 3.13 provides the number of estimated 24-hour mean PM_{10} concentrations exceeding 50µg/m^3 predicted at existing residential receptor locations in 2018. One discrete receptor location is positioned within the boundary of AQMA No.6, with a further 5 being located in close proximity to the boundary, inclusive of a receptor located at the Churchill Church of England Primary School. None of these receptor locations exceed the allowable 35 exceedances of the 24-hour mean PM_{10} objective, nor are there any within 10% of the objective (31 exceedances). This is also shown in Figure 3.15, which presents the modelled roads and the locations of the discrete receptors with regards to the estimated number of exceedances. The maximum estimated number of exceedances is 4, at receptor ID 318.

Additionally, Table 3.13 also shows the annual mean concentrations predicted at each receptor, in which the number of 24-hour mean exceedances have been calculated from. It can be seen that none of the receptors have a predicted annual mean PM_{10} concentration in exceedance of the AQS 40µg/m^3 objective.

It is important to note that due to no monitoring data being collected in this AQMA it is not possible to accurately verify the model performance in this area. The PM_{10} concentrations have been verified using the PM_{10} verification factor, utilising the concentrations measured at the continuous monitor CM2, located ~3.5km from the AQMA boundary. This monitor is not representative of the conditions at the motorway, however is the only roadside monitor for PM_{10} operated by the Council. As a result, there is a degree of uncertainty surrounding the modelled PM_{10} concentrations.

From the number of exceeding 24-hour mean PM_{10} concentration contour plots presented in Figure 3.16, it can be seen that areas where there is an estimated number of exceedances greater than 35 in a year are restricted to being inside the road, and well within the constraints of the AQMA. Additionally, the contour for 10% of the objective (31 exceedances) also remains well constrained within the present AQMA boundary.

Table 3.13 – AQMA No.6, Summary of Modelled Receptor Results (PM_{10})

Receptor ID	OS Grid X	OS Grid Y	Height (m)	In AQMA ?	AQS objective (Number of 24-Hour Mean PM_{10} Exceedances > 50µg/m^3)	2018 Estimated Number of 24-Hour Mean PM_{10} Exceedances > 50µg/m^3	2018 Annual Mean PM_{10} (µg/m^3)
292	547967	156407	1.5	N	35	3	19.6
294	548596	156618	1.5	N	35	3	19.4
301	544793	154872	1.5	N	35	3	19.6
305	544411	154566	1.5	N	35	2	18.4
318	547257	156078	1.5	Y	35	4	20.4
320	548833	156714	1.5	N	35	3	19.8

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Figure 3.15 – AQMA No.6, Modelled Roads and Receptor Locations

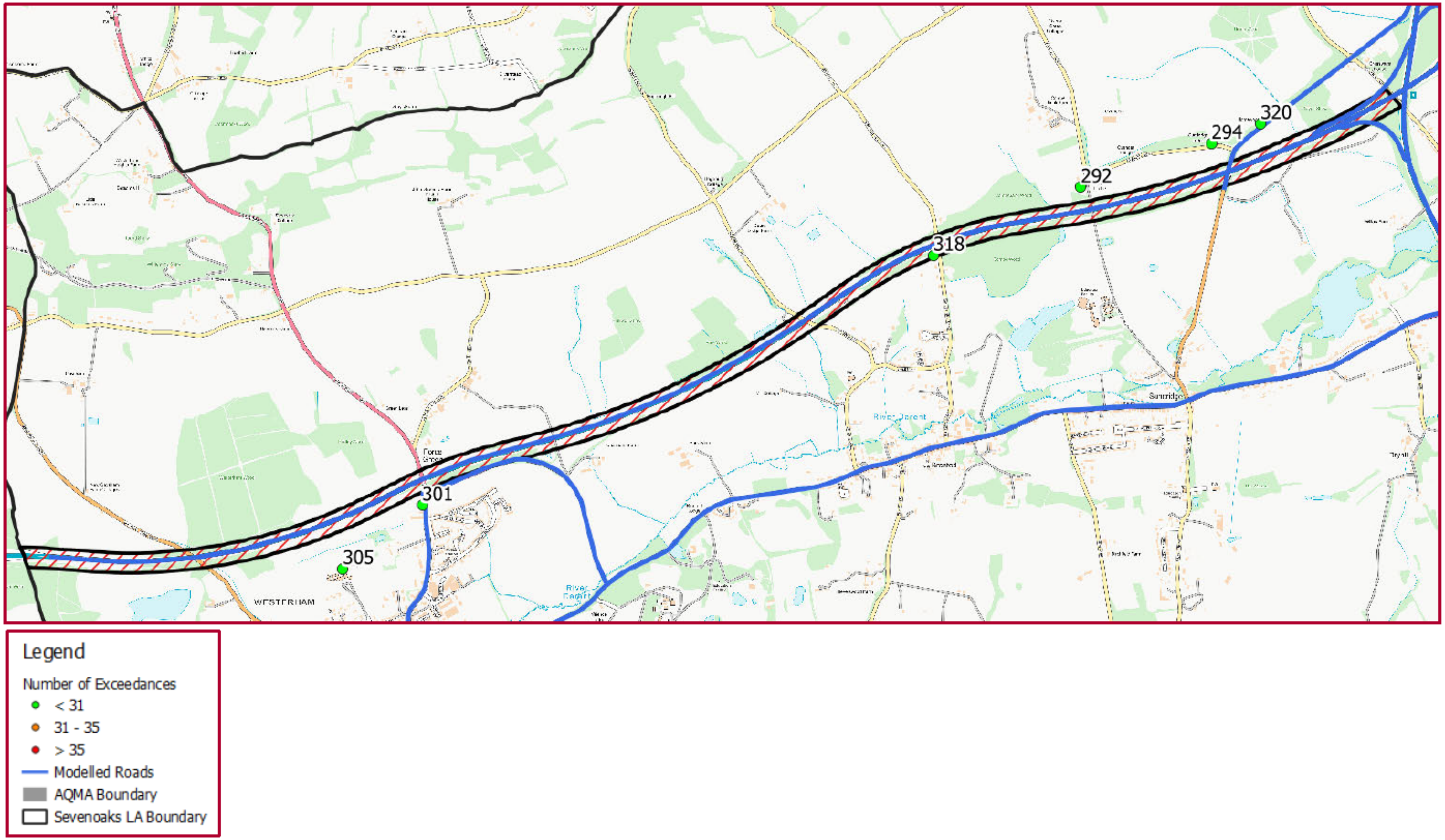
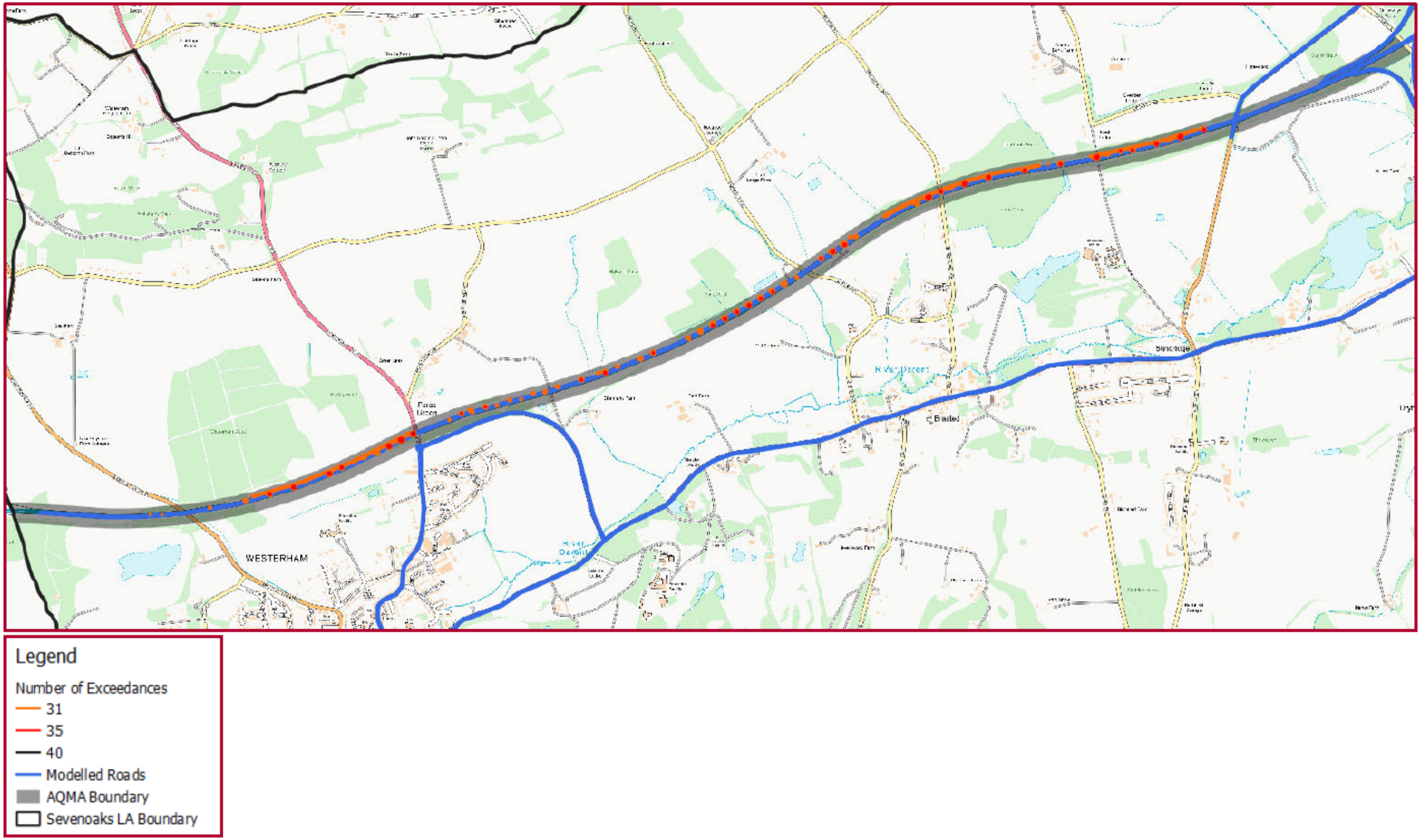


Figure 3.16 – AQMA No.6, Modelled PM_{10} Number of Exceeding 24-Hour Concentration Isopleths



3.6 AQMA No.10 Sevenoaks High Street

3.6.1 Council Monitoring Data

AQMA No.10 is currently designated for exceedances of the annual mean NO_2 AQS objective with the current boundary being located along Sevenoaks High Street, from the junction of the A225 to Oak Lane until where the A225 splits off to the B2019. It also incorporates parts of Pembroke Road and Suffolk Way at the crossroads from the A225. Currently there are four monitoring sites measuring annual mean NO_2 concentrations within the current AQMA boundary. These are presented in Figure 3.17, and the monitoring results from the previous five years are shown in Table 3.14.

DT2 is located within the boundary of AQMA No.10, and has been recording exceedances of the annual mean NO_2 objective for the past 5 years. This site is not located at relevant exposure, however following distance correction calculations it continues to exceed with a 2018 concentration predicted to be 46.2µg/m^3. DT28 had reported exceedances for 3 years, and since 2016 has reported below the AQS objective, but still within 10%. Similarly, with DT27, although this site has no reported exceedances within the past 5 years, it has consistently remained within the 10%. DT29 on the other hand has reported much lower than 36µg/m^3 for the past 5 years. Once distance corrected, both DT27 and DT28 have predicted concentrations below 10% of the AQS objective in 2018.

Table 3.14 – Current NO_2 Monitoring Within, or in Close Proximity to AQMA No.10

Site	Site Type	OS Grid Ref X	OS Grid Ref Y	Distance to Relevant Exposure (m)	Height (m)	Annual Mean NO_2 Concentration (µg/m^3)[1]				
						2014	2015	2016	2017	2018
DT2	R	553157	154415	0.9	2.0	**56.7**	**53.6**	**54.7**	**48.1**	**49.9**
DT27	R	553139	154259	2.5	2.5	*39.4*	*37.2*	*39.8*	*38.2*	*37.7*
DT28	K	553043	154890	0.8	2.5	**46**	**42.4**	**44.1**	*36.7*	*36.8*
DT29	R	553073	155026	4.4	2.5	30	27.8	31.5	28	28.2

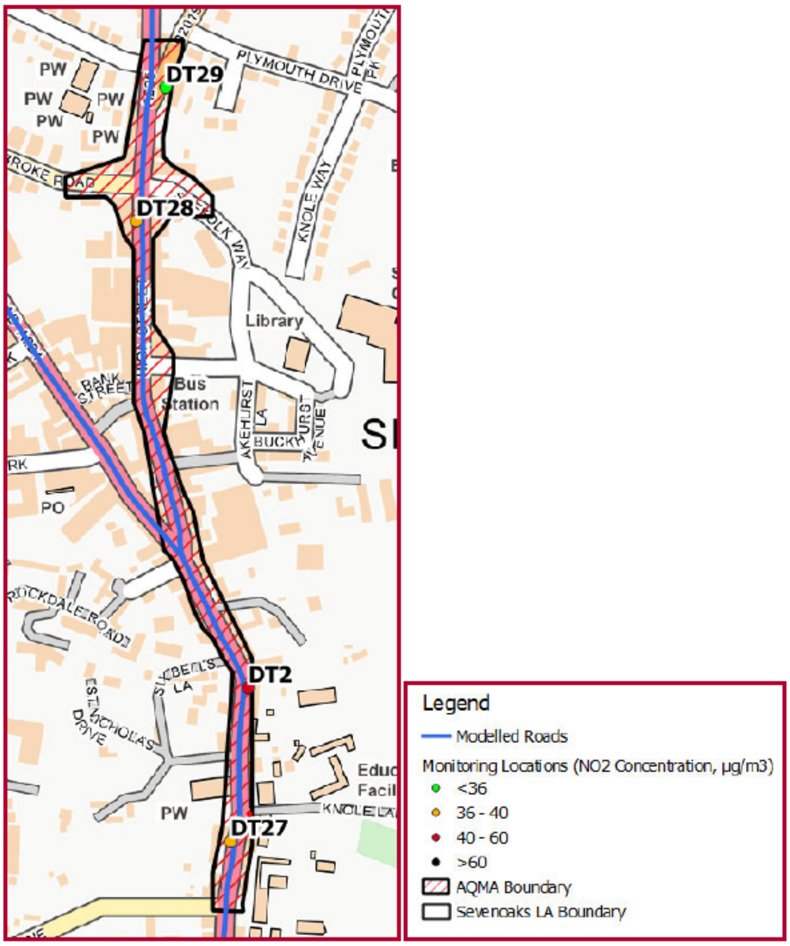
In **bold**, exceedance of the annual mean NO_2 AQS objective of 40µg/m^3.
When **underlined**, NO_2 annual mean exceeds 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective
R= Roadside
K = Kerbside

Table 3.15 – Current NO_2 Monitoring Within AQMA No.10, Distance Corrected

Site	Site Type	Distance to Kerbside (m)	Distance from Kerbside to Relevant Exposure (m)	Monitored Concentration 2018 (µg/m^3)	Distance Corrected Concentration (µg/m^3)
DT2	R	1.6	2.5	**49.9**	**46.2**
DT27*	R	1.4	3.9	*37.7*	32.0
DT28	K	2.7	3.5	*36.8*	35.2

In **bold**, exceedance of the annual mean NO_2 AQS objective of 40µg/m^3.
When **underlined**, NO_2 annual mean exceeds 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective
R= Roadside
K= Kerbside
* = Distance to kerbside and distance corrected concentration have been adjusted from that presented in the 2018 ASR as it is believed these values are incorrect.

Figure 3.17 – AQMA No.10, Modelled Roads and Monitoring Locations



3.6.2 Modelled Receptors, Annual Mean NO_2

Table 3.16 provides the modelled annual mean NO_2 concentrations predicted at existing residential receptor locations in 2018. 29 discrete receptor locations are positioned within the boundary of AQMA No.10, with a further 4 being located in close proximity to the boundary, inclusive of receptors located at Sevenoaks School. 12 of these receptor locations have a predicted concentration in exceedance of the annual mean NO_2 objective, one of which being predicted to be greater than 60µg/m^3, and a further 6 being within 10% of the AQS objective. Neither of the receptors located at Sevenoaks School are predicted to have concentrations greater than 40µg/m^3. None of the receptors located outside of the AQMA boundary reported a concentration greater than 36µg/m^3.

Figure 3.18 presents the modelled receptor locations alongside their predicted annual mean NO_2 concentrations. From this, it can be seen that there are 2 sections of the AQMA where there are predicted to be exceedances. One of these is a narrow street canyon where the road bends near Six Bells Lane, and the other is a street canyon further up the road, along the High Street from where the A224 splits off up until the junction to Pembroke Road/Suffolk Way. Although along this second section many of the buildings are commercial, receptors have been placed at a height of 4m to represent the first floor assumed residential living space. The nearest diffusion tube monitoring locations to these sections are DT2 and DT28, which were included as part of the Model Wide (ex. Motorway and Westerham) verification factor. DT2 has a measured exceedance, whereas DT28 does not, but is within 10% of the annual mean NO_2 objective.

From the annual mean NO_2 concentration contour plots presented in Figure 3.19 it can be seen that the extent of the predicted exceedances of the annual mean objective are slightly more constrained at the ends of the AQMA. However, throughout most of the AQMA the exceedance contour line is in line with the current AQMA boundary where there are street canyons or junctions. It should be noted that the contour lines have not been drawn for the road leading towards the Bus Station, or along Suffolk Way and Pembroke Road, as these roads have not been modelled. There are residential properties located along the bend in the A225 near Six Bells Lane which come into contact with the 40µg/m^3 contour. It should also be noted that at locations where discrete receptors have been modelled at the first floor level, the contour plot will over predict the concentration as the contour is at a height of 1.5m.

The 60µg/m^3 contour is located in a very narrow section of the high street, and a NO_2 concentration of 60µg/m^3 or above suggests that there is likely to be an exceedance of the hourly objective. Additionally, receptor ID 32 is located in this area, and reports a modelled concentration of 62.3µg/m^3 when modelled at a 4m height. This area is located through a potentially busy section of the high street, therefore there is likely to be relevant exposure of the hourly objective in this area.

Table 3.16 – AQMA No.10, Summary of Modelled Receptor Results (NO_2)

Receptor ID	OS Grid X	OS Grid Y	Height (m)	Inside AQMA?	AQS objective (µg/m^3)	2018 Annual Mean NO_2 (µg/m^3)	% of AQS objective
12	553128	154207	1.5	Y	40	34.2	85
13	553146	154235	1.5	Y	40	*37.3*	*93*
14	553138	154264	1.5	Y	40	*38.5*	96
15	553168	154264	1.5	N	40	19.5	49
16	553168	154299	1.5	N	40	20.5	51
17	553153	154335	1.5	Y	40	29.7	74
18	553146	154391	1.5	Y	40	**52.6**	**132**
19	553154	154384	1.5	Y	40	**51.1**	**128**
20	553140	154392	1.5	Y	40	23.6	59
21	553148	154412	4	Y	40	20.4	51
22	553143	154430	1.5	Y	40	**45.8**	**115**
23	553156	154426	1.5	Y	40	32.0	80
24	553146	154450	1.5	Y	40	**44.2**	**110**
25	553128	154482	1.5	Y	40	**45.1**	**113**
26	553115	154486	1.5	Y	40	**45.8**	**115**
27	553126	154511	1.5	Y	40	22.7	57
28	553089	154525	4	N	40	18.6	46
29	553107	154537	4	Y	40	20.7	52
30	553054	154730	4	Y	40	**46.3**	**116**
31	553074	154653	4	Y	40	**41.4**	**104**
32	553051	154691	4	Y	40	**62.3**	**156**
33	553055	154707	4	Y	40	**46.6**	**117**
34	553044	154755	4	Y	40	*39.0*	*98*
35	553057	154764	4	Y	40	33.4	83
36	553056	154801	4	Y	40	*36.7*	*92*
37	553041	154808	4	Y	40	*36.1*	*90*
38	553057	154882	4	Y	40	*37.1*	*93*
39	553090	154590	4	Y	40	**42.2**	**106**
40	553041	154910	4	Y	40	**41.6**	**104**
41	553061	154957	1.5	Y	40	28.9	72
42	553041	154944	5	Y	40	20.0	50
43	553043	154999	1.5	Y	40	25.7	64
44	553051	155080	1.5	N	40	27.4	69

Figure 3.18 – AQMA No.10, Modelled Receptor Locations

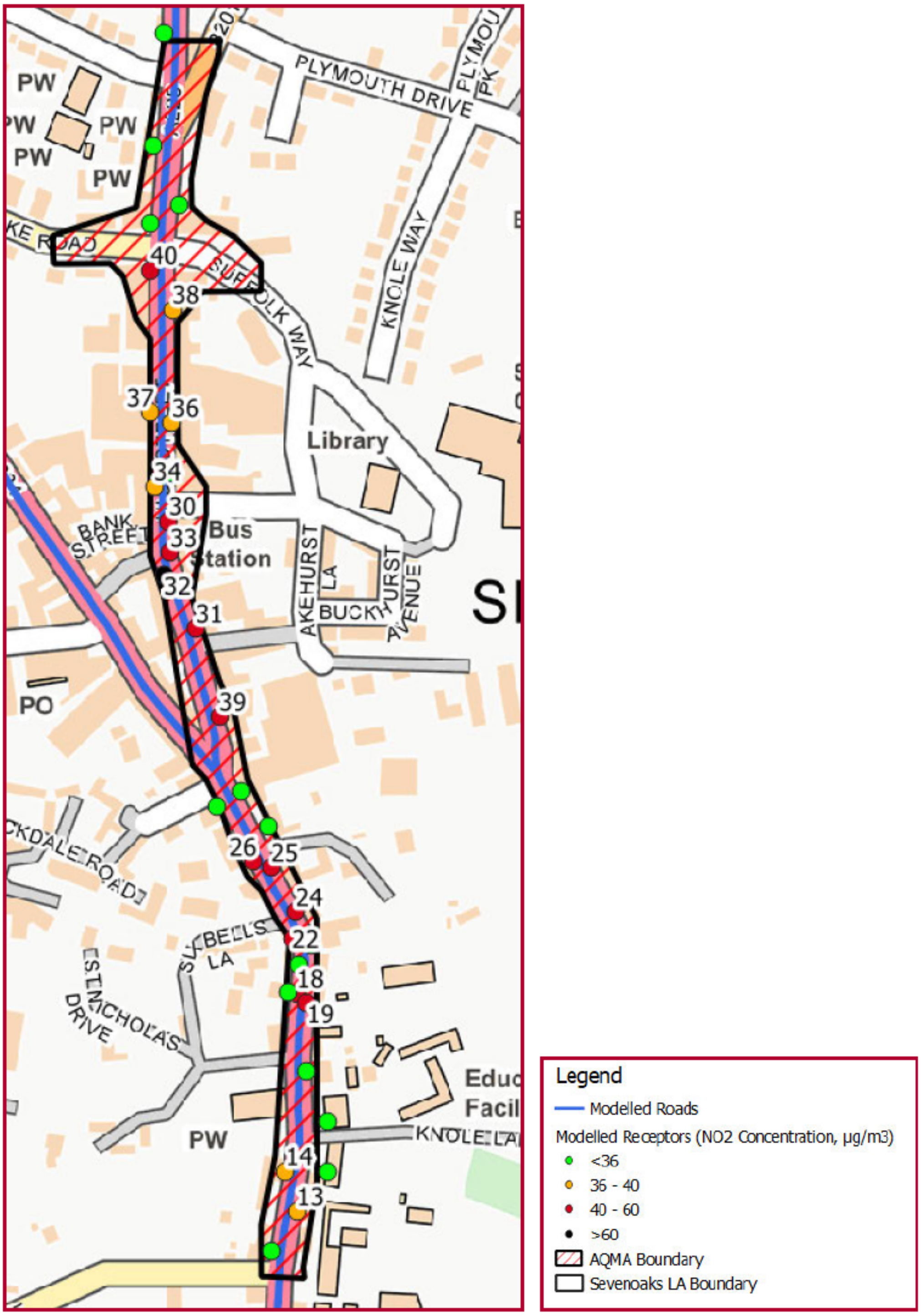
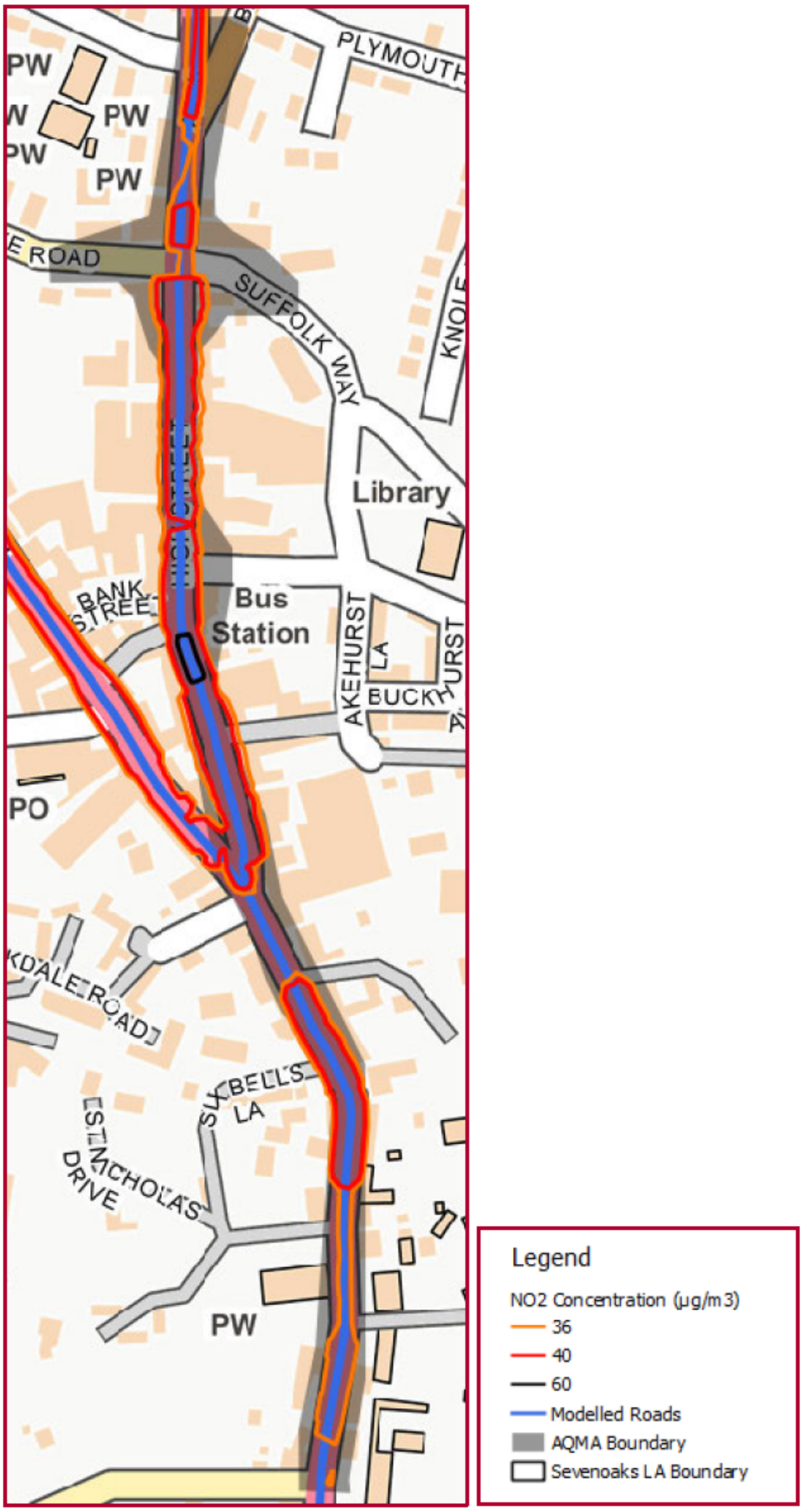


Figure 3.19 – AQMA No.10 Modelled NO_2 Concentration Isopleths



3.6.3 AQMA No.10 Source Apportionment

The source apportionment completed for the modelled receptors within the boundary of AQMA No.4 incorporates the 9 receptors as detailed within Table 3.16 above. Apportionment for NO_x concentrations have been completed for the three separate groups in terms of the receptors as detailed in Section 2.5, with the results presented in Table 3.7 and Figure 3.20

When considering the average NO_x concentration across all modelled receptors, road traffic accounts for 54.6µg/m³ (76.6%) of total NO_x concentration (71.3µg/m³). Of the 54.6µg/m³ total road NO_x, Diesel Cars account for the greatest contribution (42.5%) of any of the vehicle types, followed by Diesel LGVs (18.9%) and Petrol Cars (6.1%). The remaining vehicle source groups (Petrol LGVs, Alternative Fuel Cars and LGVs, HGVs, Bus and Coach, and Motorcycles) contribute less than 5.0% each.

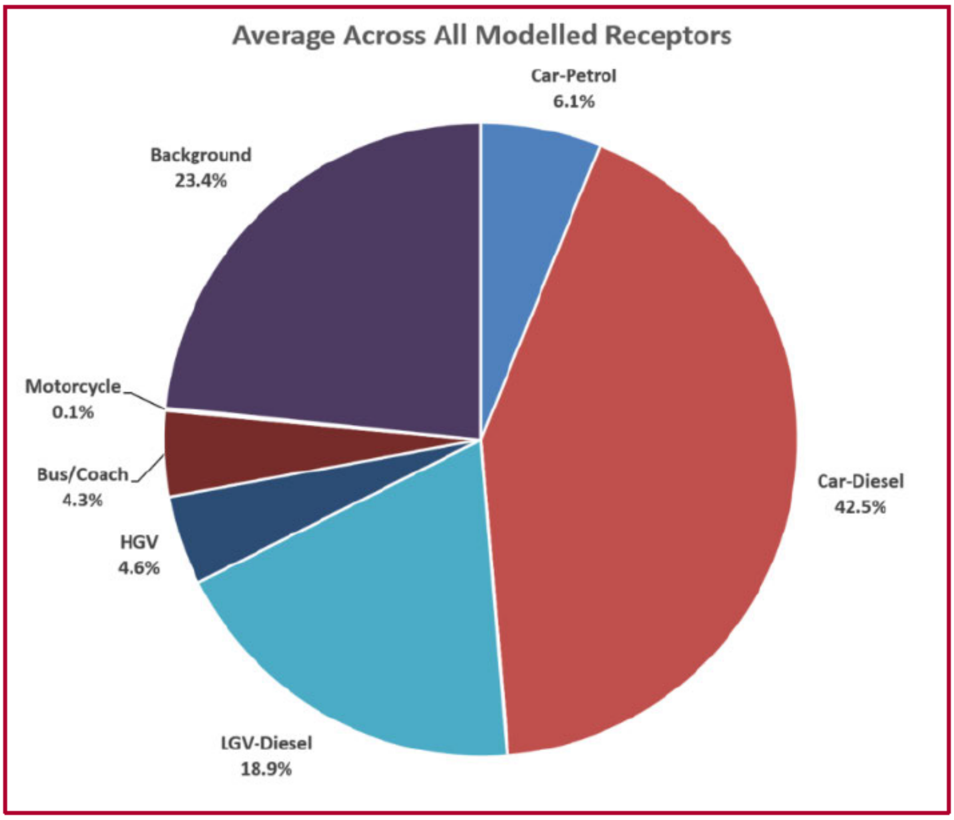
In terms of the average NO_x concentration at receptors with NO_2 concentration greater than 40µg/m³, for the assessment of AQMA No.10 this removes 17 receptors from the analysis therefore the results are not affected significantly. Road traffic accounts for 78.6µg/m³ (82.5%) of total NO_x concentration (95.3µg/m³). Of the 78.6µg/m³ total road NO_x the separate vehicle apportionment remain very similar, Diesel Cars (45.9%), Diesel LGVs (20.2%) and Petrol Cars (6.6%) with again the remaining vehicle source groups contributing less than 5.0% each.

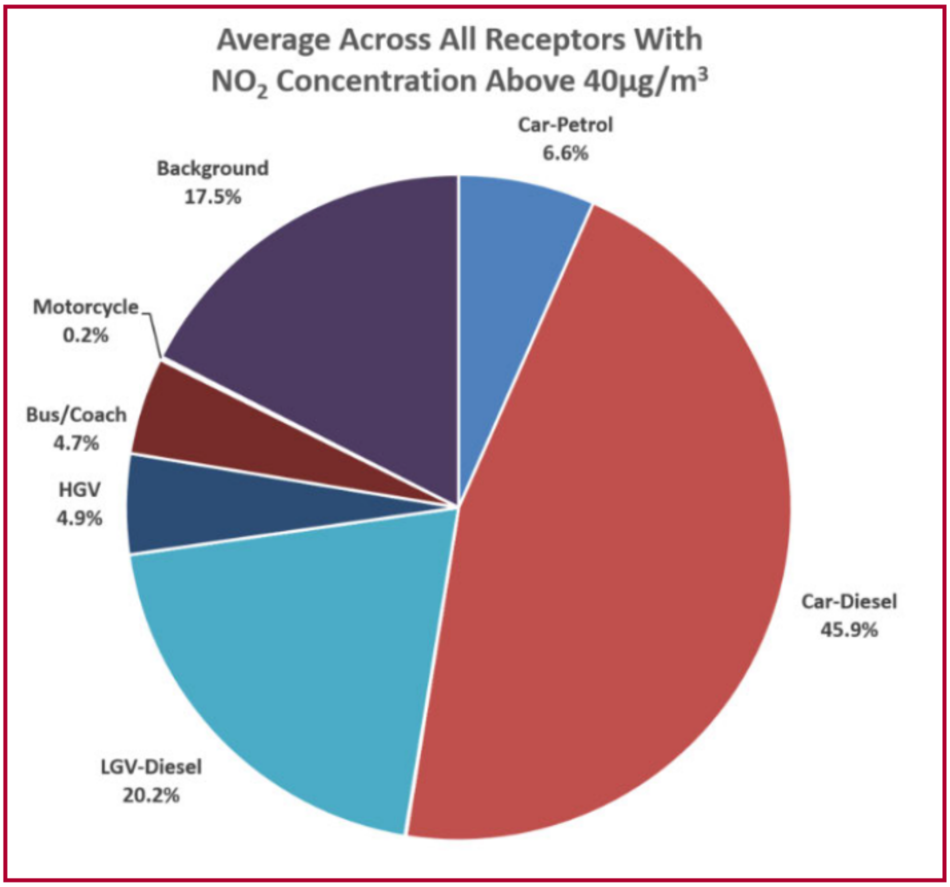
The receptor with the maximum road NO_x concentration is receptor ID 32, whereby the total road NO_x was predicted to be 138.6µg/m³. At receptor ID 32 road traffic accounts for 88% of total NO_x concentration (121.9µg/m³). Of the 121.9µg/m³ total road NO_x the separate vehicle apportionment remains similar to the previous assessment but with an increased apportionment to Diesel Cars; Diesel Cars (51.3%), Diesel LGVs (19.2%) and Petrol Cars (7.63%). The apportionment to Bus/Coaches also increased to 5.7%, with the remaining vehicle source groups contributing less than 5.0% each.

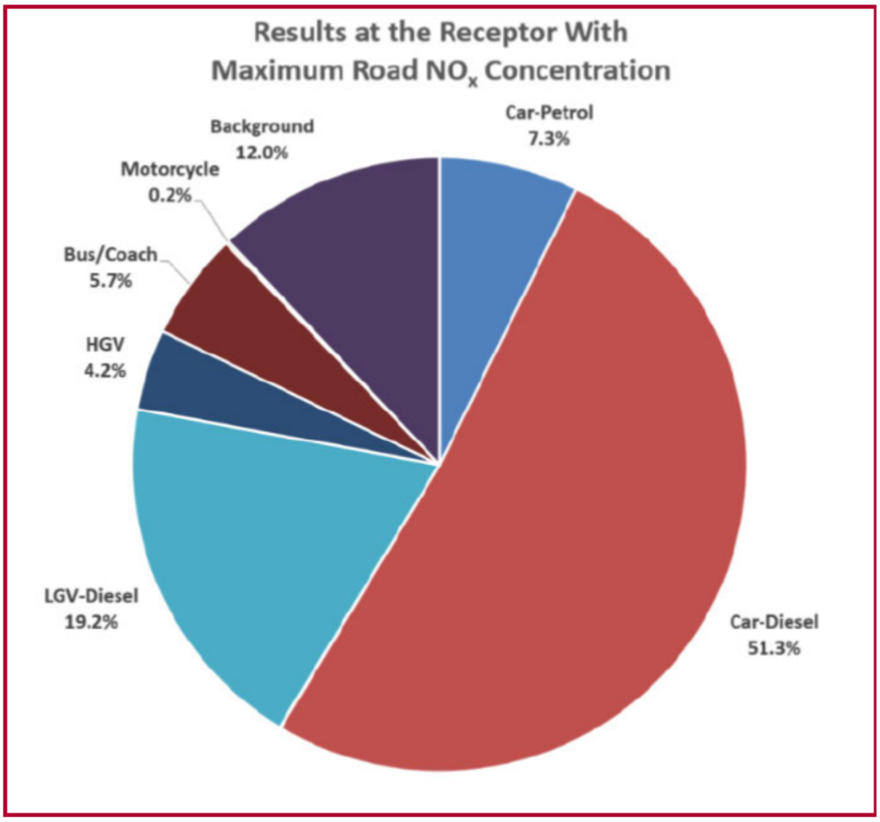
Table 3.17 – NO_x Source Apportionment Results: AQMA No.10

Results	All Vehicles	Car			LGV			HGV	Bus and Coach	Motorcycle	Background
		Petrol	Diesel	EV/LPG	Petrol	Diesel	EV/LPG				
Average across all modelled receptors											
NO_x Concentration (µg/m³)	54.6	4.4	30.3	0.0	0.0	13.4	0.0	3.2	3.1	0.1	16.7
Percentage of Total NO_x	76.6%	6.1%	42.5%	0.0%	0.0%	18.9%	0.0%	4.6%	4.3%	0.1%	23.4%
Percentage Contribution to Road NO_x	100.0%	8.0%	55.5%	0.0%	0.1%	24.6%	0.0%	5.9%	5.7%	0.2%	-
Average Across All Receptors With NO_2 Concentration exceeding the AQS Annual Mean Objective											
NO_x Concentration (µg/m³)	78.6	6.3	43.8	0.0	0.0	19.2	0.0	4.6	4.5	0.1	16.7
Percentage of Total NO_x	82.5%	6.6%	45.9%	0.0%	0.0%	20.2%	0.0%	4.9%	4.7%	0.2%	17.5%
Percentage Contribution to Road NO_x	100.0%	8.0%	55.7%	0.0%	0.1%	24.4%	0.0%	5.9%	5.7%	0.2%	-
At The Receptor With the Maximum Road NOx Concentration (ID 32)											
NO_x Concentration (µg/m³)	121.9	10.2	71.1	0.0	0.1	26.6	0.0	5.9	7.8	0.2	16.7
Percentage of Total NO_x	88.0%	7.3%	51.3%	0.0%	0.0%	19.2%	0.0%	4.2%	5.7%	0.2%	12.0%
Percentage Contribution to Road NO_x	100.0%	8.3%	58.4%	0.0%	0.0%	21.8%	0.0%	4.8%	6.4%	0.2%	-

Figure 3.20 – NO_x Source Apportionment Results: AQMA No.10






Results at the Receptor With
Maximum Road NO_x Concentration
Car-Petrol
7.3%
Car-Diesel
51.3%
LGV-Diesel
19.2%
HGV
4.2%
Bus/Coach
5.7%
Motorcycle
0.2%
Background
12.0%

3.7 AQMA No.13 A25

3.7.1 Council Monitoring Data

AQMA No.13 is currently designated for exceedances of the annual mean NO_2 AQS objective, with the current boundary being located along the entire stretch of the A25, from the boarder of Tonbridge and Malling in the East to the border with Tandridge on the West. The boundary includes the A224 London Road heading northwards from Riverhead until it meets the M26, a section of the A224 Amherst Hill heading south from Riverhead until the junction to Montreal Road, and a section of London Road heading northwards from Market Square in Westerham until it reaches the junction to Quebec Avenue. Currently there are 26 monitoring sites measuring annual mean NO_2 concentrations within or in close proximity to the current AQMA boundary. These are presented in Figure 3.22 (the numbers on each section indicates their relative location on Figure 3.23 which shows the full extent of the AQMA), and the monitoring results from the previous five years are shown in Table 3.18. Distance corrected values for sites with reported 2018 concentrations in exceedance, or within 10% of the AQS objective are presented in Table 3.19.

DT6, DT7, DT31, DT32, DT33, DT85 and DT87 are all located within the boundary of AQMA No.13 and have all reported exceedances of the annual mean NO_2 objective for the past 5 years. DT7 and DT33 are located in a street canyon along the A25 High Street in Seal, with DT33 being located directly opposite a junction. DT7 is located at a site close to relevant exposure, however following distance correction both sites report concentrations below, but within 10% of the AQS objective (DT7 – 39.7µg/m³, DT33 – 38.2µg/m³). DT31 and DT32 are located at the junction of the A25 Seal Road to the A225, with DT31 being sited on the eastern arm and DT32 being on the southern arm. Significant congestion occurs in these areas, with the southern stretch of the A225 at the junction being a street canyon. DT32 is located at a site of relevant exposure, however DT31 is located 4.4m from the nearest relevant exposure. Following distance correction calculations however, the concentration predicted at the nearest relevant receptor is still in exceedance in 2018, with a concentration of 41.2µg/m³.

DT87 and DT6 are located near the junction of the A25 and A224 in Riverhead. DT87 is located further from the junction along Maidstone Road/Bradbourne Vale Road, where significant congestion occurs tailing back from the junction, whereas DT6 is located in the centre stretch between two mini-roundabouts. Neither sites are located directly at relevant exposure, following distance correction calculations they report concentrations below the AQS objective, 39.5µg/m³ and 32.1µg/m³ respectively, with DT87 remaining within 10% of the objective. Additionally in this area, DT5 and DT77 are located nearer to relevant exposure, DT77 in particular, and have reported concentrations exceeding 40µg/m³ in previous years, but continue to report concentrations within 10% in 2018.

DT85 is located in Brasted along the A25 High Street, directly opposite the junction to Chart Lane, and is near to a site of relevant exposure. Following distance correction, there is a predicted concentration of 43.0µg/m³ at the exposure location, therefore still in exceedance of the AQS objective. DT36 is located on the A25 Market Square running through Westerham, and has reported exceedances for 4 years, with the concentration in 2017 being slightly lower but within 10% of the AQS objective. It is positioned behind a bus stop, and opposite to a large parking area. Following distance correction to the nearest relevant exposure, it is predicted that there would be a concentration of 32.7µg/m³, well below the AQS objective.

Table 3.18 – Current NO_2 Monitoring Within, or in Close Proximity to AQMA No.13

Site	Site Type	OS Grid Ref X	OS Grid Ref Y	Distance to Relevant Exposure (m)	Height (m)	Annual Mean NO_2 Concentration (µg/m³)[1]				
						2014	2015	2016	2017	2018
DT5	K	551414	156197	1.5	2.5	**48.2**	**42.8**	**47.0**	**42.7**	*39.3*
DT6	R	551440	156165	7.8	2.5	**47.1**	**44.1**	**47.1**	**40.2**	**41.7**
DT7	R	555092	156694	0.2	2.5	**49.5**	**44.3**	**46.8**	**42.7**	**41.3**
DT8	R	554991	156726	3.7	2.5	31.6	31.1	35.2	26.9	28.3
DT23	R	553059	156624	14.4	2.5	*38.8*	35.6	**40.5**	34.3	*39.2*
DT24	R	544415	153914	5.8	2.5	35.0	32.7	35.3	30.4	35.8

Site	Site Type	OS Grid Ref X	OS Grid Ref Y	Distance to Relevant Exposure (m)	Height (m)	Annual Mean NO_2 Concentration ($\mu g/m^3$)[1]				
						2014	2015	2016	2017	2018
DT25	R	544770	154000	6.3	2.5	30.1	28.3	29.8	25.9	26.1
DT31	R	553165	156685	4.4	2.5	**52.0**	**46.9**	**57.9**	**51.2**	**51.1**
DT32	R	553151	156558	0.2	2.5	**55.3**	**49.9**	**56.3**	**47.6**	**51.9**
DT33	R	555068	156711	0.9	2	**46.7**	**42.5**	**48.1**	**40.5**	**40.5**
DT34	R	549427	155691	17.3	2.5	35.3	30.9	31.7	27.5	26.1
DT35	R	554093	156798	20.3	2.5	**40.5**	*36.3*	*39.6*	32.5	33.7
DT36	K	544594	154025	4.0	2.5	**51.7**	**44.6**	**45.1**	*39.6*	**40.1**
DT42	R	551318	156373	1.9	2.5	**44.4**	*37.1*	*39.3*	35.5	34.5
DT43	R	551281	156860	3.5	2.5	33.9	28.0	34.1	29.5	28.5
DT54	R	551216	157007	9.1	2.5	*38.1*	35.6	*36.0*	33.8	32.7
DT71	R	548239	155353	7.3	2.5	32.4	29.8	33.5	30.0	31.3
DT74	R	550768	155584	16.8	2.5	*39.7*	35.5	*37.1*	35.4	35.9
DT76	R	551026	155710	40.7	2.5	*36.2*	35.6	**40.0**	33.9	*37.9*
DT77	R	551529	155967	0.3	2.5	**42.8**	**40.7**	**40.0**	*38.8*	*38.7*
DT84	R	546802	155000	5.9	2.5	34.9	32.8	35.4	31.2	32.5
DT85	R	547097	155099	0.2	2.5	**48.3**	**45.0**	**51.1**	**43.9**	**43.7**
DT86	R	550308	155593	8.8	2	*39.4*	*36.7*	**40.8**	*36.0*	34.7
DT87	R	551640	156335	3.3	2.5	**53.8**	**48.1**	**51.7**	**45.7**	**47.0**
DT88	R	552963	156583	10.8	2.5	35.1	29.1	32.9	28.7	30.3
BC4-6	R	553044	156690	30	2	N/A	N/A	N/A	28.5	26.9
CM2	R	553044	156690	30	1.8	29.0	31.8	31.0	28.0	25.0

In **bold**, exceedance of the annual mean NO_2 AQS objective of 40µg/m^3.
When underlined, NO_2 annual mean exceeds 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective
R= Roadside
K= Kerbside

Table 3.19 – Distance Corrected NO_2 Concentrations in AQMA No.13

Site	Site Type	Distance to Kerb (m)	Distance from Kerb to Relevant Exposure (m)	Monitored Concentration 2018 ($\mu g/m^3$)	Distance Corrected Concentration ($\mu g/m^3$)
DT5	K	0.6	2.1	*39.3*	33.6
DT6	R	2.5	10.3	**41.7**	32.1
DT7	R	0.6	0.8	**41.3**	*39.7*
DT23	R	5.7	20.1	*39.2*	29.3
DT31	R	2.1	6.5	**51.1**	**41.2**
DT32	R	1.3	1.5	**51.9**	**50.8**
DT33	R	2.3	3.2	**40.5**	*38.2*
DT36	K	0.7	4.7	**40.1**	32.7
DT76	R	1.3	42	*37.9*	19.7
DT77	R	1.7	2.0	*38.7*	*37.8*
DT85	R	1.8	2.0	**43.7**	**43.0**
DT87	R	2.1	5.4	**47.0**	*39.6*

Site	Site Type	Distance to Kerb (m)	Distance from Kerb to Relevant Exposure (m)	Monitored Concentration 2018 (µg/m^3)	Distance Corrected Concentration (µg/m^3)
In **bold**, exceedance of the annual mean NO_2 AQS objective of 40µg/m^3. When **underlined**, NO_2 annual mean exceeds 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective R= Roadside K= Kerbside					

3.7.2 Modelled Receptors, Annual Mean NO_2

Table 3.16 provides the modelled annual mean NO_2 concentrations predicted at existing residential receptor locations in 2018 for receptors that are exceeding. The full list of modelled receptors around this AQMA is shown in Table D.1. 119 discrete receptor locations are positioned within the boundary of AQMA No.10, with a further 60 being located in close proximity to the boundary, inclusive of receptors located at Top Banana Pre-school in Seal, Sevenoaks Hospital, Knole Academy Secondary School, Dunton Green Primary School, Amherst School, Riverhead Infants' School, Rivermere Care Home, and Westerham Place Care Home. 23 of these receptor locations have a predicted concentration in exceedance of the annual mean NO_2 objective, and a further 18 being within 10% of the AQS objective. None of the receptors located at any of the sensitive receptors listed above are predicted to have concentrations greater than 36µg/m^3. One receptor located outside of the AQMA boundary, ID 196, reported a concentration greater than 40µg/m^3, however all others located outside of the AQAM boundary have predicted concentrations below 36µg/m^3.

Figure 3.24 presents the modelled receptor locations alongside their predicted annual mean NO_2 concentrations. From this, it can be seen that there are 5 overall areas of the AQMA where there are predicted to be exceedances. One of these is Westerham, both along the A25 between the junction to the B2024 and Mill Lane, as well as where London Road joins the A25. Both of these sections of roads are narrow street canyons, where pollution is able to build up and become trapped. The maximum concentration predicted by the model here is 59.4µg/m^3 at receptor ID 268 located on London Road. Another area of exceedances is in Brasted along the High Street, in particular near to junctions to Church Road and Chart Lane, however neither of these roads have been modelled. An additional exceedance is predicted eastwards of the junction to Rectory Lane. The maximum concentration predicted in this area is at receptor ID 238 (45.2µg/m^3).

There are also a number of exceedances predicted around the junctions of the A25 and A224 in Riverhead. One exceedance on the western stretch of the A25 at receptor ID 196 is located just outside of the AQMA boundary, with a predicted NO_2 annual mean concentration of 41.9µg/m^3. Another exceedance is predicted at receptor ID 165 (42.9µg/m^3) located in the central stretch of the A25 between the two mini roundabouts, however the majority of exceeding receptors are predicted to be along the eastern stretch of the A25. The maximum of these, 44.9µg/m^3, is predicted to be at receptor ID 128. The junctions all throughout this area along the A25 are heavily congested. Similarly, there are exceedances predicted at the junction between the A225 and A25 in Bat & Ball, in particular the southern and eastern stretches. The maximum predicted concentration is at receptor ID 80 (50.8µg/m^3). Both of these areas in Riverhead and Bat & Ball experience heavy congestion resulting in a change in vehicle strain when accelerating and decelerating.

There are also 3 exceeding receptors located on the eastern section of the A25 leaving Seal. These are located in a street canyon whereby emissions are likely to be contained. The maximum concentration here is at receptor ID 107 (57.8µg/m^3). The model is over predicting at both DT7 and DT34, by at least 25.3%, likely resulting from inaccuracies in the traffic data, or due to un-modelled influences. Therefore, the results of this area are likely over predicting and caution should be taken when considering these results.

From the annual mean NO_2 concentration contour plots presented in Figure 3.25 (with the letter code for each section referring to Figure 3.22), it can be seen that the extent of the predicted exceedances of the annual mean objective are largely constrained to the A25, in line with the current AQMA boundary. However, in some areas, particularly around junctions in Westerham, Riverhead and Bat & Ball the contours are much more constrained to the modelled road links. The exceedance contours do expand beyond the current boundary in a number of locations, including: the A25 Brasted Road (near Brasted Lodge), the A25 Main Road (west of Sundridge), the A25 Westerham Road/Worships Hill, the A25 Bardbourne Vale Road, North and South stretches of the A225 from the Bat & Ball junctions, and along London Road/the A233 in Westerham. There are 60µg/m³ contours located throughout the AQMA, however these largely lie within the centre of roads, especially at junctions. An exception to this is at the southern roundabout in Riverhead, where the contours are shown to stretch northwards away from the road. This, and where contours are off-set from the roads, is likely in part due to meteorological conditions with the dominant wind direction originating in the south-west. Additionally, there is an area of 60µg/m³ contours along London Road from the junction to the A25 Market Square in Westerham.

Table 3.20 – AQMA No.13, Summary of Exceeding Modelled Receptor Results (NO_2)

Receptor ID	OS Grid X	OS Grid Y	Height (m)	In AQMA?	AQS objective (µg/m³)	2018 Annual Mean NO_2 (µg/m³)	% of AQS objective
64	553159	156547	1.5	Y	40	**41.6**	**104**
73	553113	156595	1.5	Y	40	**43.5**	**109**
74	553111	156583	4	Y	40	**48.4**	**121**
79	553105	156679	1.5	Y	40	**49.2**	**123**
80	553082	156667	1.5	Y	40	**50.8**	**127**
81	553168	156689	1.5	Y	40	**40.6**	**102**
82	553131	156686	1.5	Y	40	**49.8**	**125**
107	555105	156698	1.5	Y	40	**57.8**	**145**
108	555113	156686	1.5	Y	40	**53.5**	**134**
109	555141	156682	1.5	Y	40	**49.3**	**123**
128	551573	156296	1.5	Y	40	**44.9**	**112**
129	551547	156286	1.5	Y	40	**43.9**	**110**
130	551427	156222	3	Y	40	**42.3**	**106**
165	551413	156184	1.5	Y	40	**42.9**	**107**
196	551326	156019	1.5	N	40	**41.9**	**105**
229	547513	155213	1.5	Y	40	**41.5**	**104**
235	547131	155113	1.5	Y	40	**41.6**	**104**
238	546881	155035	1.5	Y	40	**45.2**	**113**
253	544424	153924	1.5	Y	40	**58.3**	**146**
256	544379	153879	1.5	Y	40	**47.5**	**119**
257	544349	153855	1.5	Y	40	**48.8**	**122**
263	544612	154118	1.5	Y	40	**40.7**	**102**
268	544629	154066	1.5	Y	40	**59.4**	**149**

3.7.3 AQMA 13 Source Apportionment

The source apportionment completed for the modelled receptors within the boundary of AQMA No.13 incorporates the 119 receptors as detailed within Table D.1. Apportionment for NO_x concentrations have been completed for the three separate groups in terms of the receptors as detailed in Section 2.5, with the results presented in Table 3.21 and Figure 3.21.

When considering the average NO_x concentration across all modelled receptors, road traffic accounts for 42.3µg/m³ (69.6%) of total NO_x concentration (60.8µg/m³). Of the 42.3µg/m³ total road NO_x, Diesel Cars account for the greatest contribution (32.6%) of any of the vehicle types, followed by Diesel LGVs (21.4%) and HGVs (8.8%). The remaining vehicle source groups (Petrol LGVs, Alternative Fuel Cars and LGVs, HGVs, Bus and Coach, and Motorcycles) contribute less than 5.0% each.

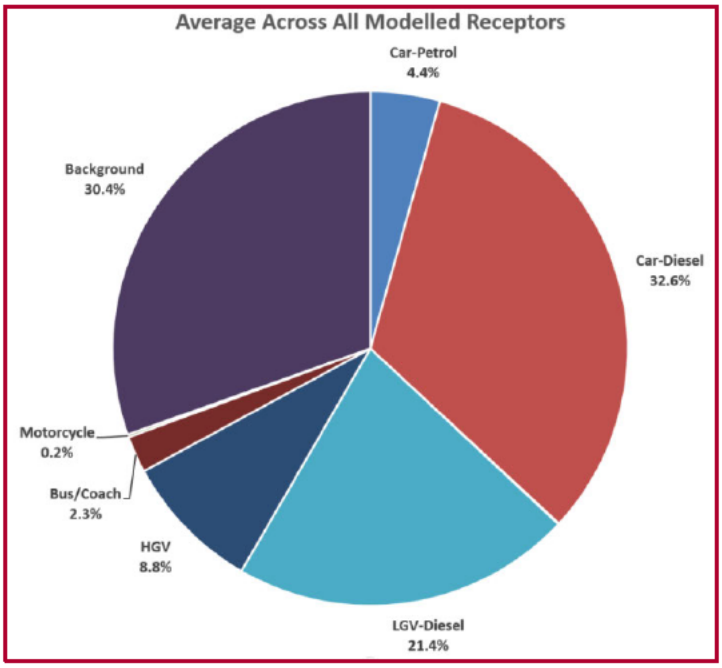
In terms of the average NO_x concentration at receptors with NO_2 concentration greater than 40µg/m³, for the assessment of AQMA No.10 this removes 96 receptors from the analysis therefore the results are not affected significantly. Road traffic accounts for 76.2µg/m³ (80.5%) of total NO_x concentration (94.6µg/m³). Of the 76.2µg/m³ total road NO_x the separate vehicle apportionment remain very similar, Diesel Cars (38.0%), Diesel LGVs (23.6%) and HGVs (10.7%) with the remaining vehicle source groups contributing less than 5.2% each.

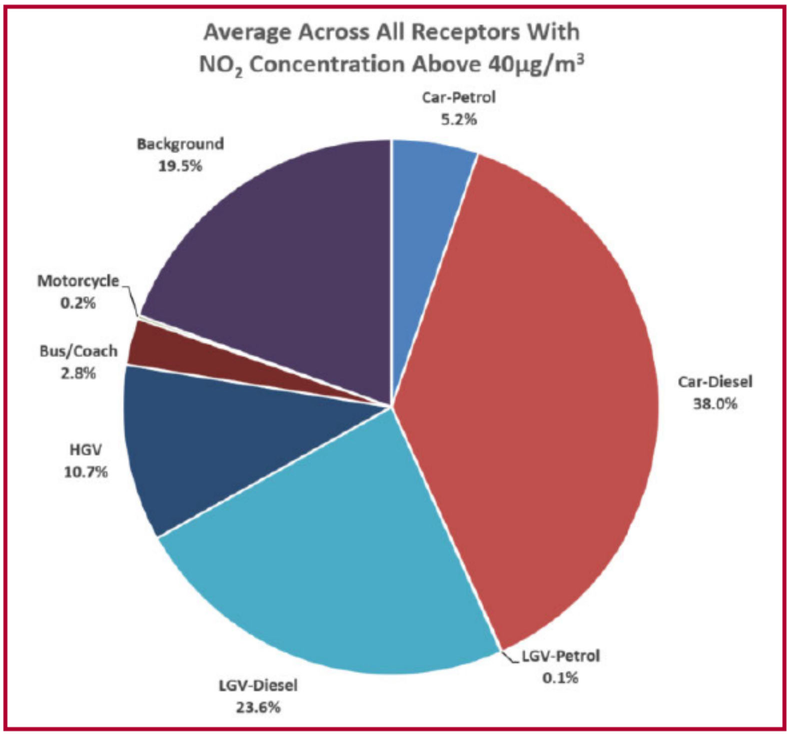
The receptor with the maximum road NO_x concentration is receptor ID 32, whereby the total road NO_x was predicted to be 127.6µg/m³. At receptor ID 268 road traffic accounts for 87.6% of total NO_x concentration (111.1µg/m³). Of the 111.1µg/m³ total road NO_x the separate vehicle apportionment remains similar to the previous assessments but with an increased apportionment to Diesel Cars; Diesel Cars (44.0%), Diesel LGVs (25.3%) and HGVs (10.4%). The apportionment to Petrol Cars also increased to 6.2%, with the remaining vehicle source groups contributing less than 5.0% each.

Table 3.21 – NO_x Source Apportionment Results: AQMA No.13

Results	All Vehicles	Car			LGV			HGV	Bus and Coach	Motorcycle	Background
		Petrol	Diesel	EV/LPG	Petrol	Diesel	EV/LPG				
Average across all modelled receptors											
NO_x Concentration (µg/m³)	42.3	2.7	19.8	0.0	0.0	13.0	0.0	5.3	1.4	0.1	18.5
Percentage of Total NO_x	69.6%	4.4%	32.6%	0.0%	0.0%	21.4%	0.0%	8.8%	2.3%	0.2%	30.4%
Percentage Contribution to Road NO_x	100.0%	6.3%	46.8%	0.0%	0.1%	30.7%	0.0%	12.6%	3.3%	0.2%	-
Average Across All Receptors With NO_2 Concentration exceeding the AQS Annual Mean Objective											
NO_x Concentration (µg/m³)	76.2	4.9	36.0	0.0	0.0	22.3	0.0	10.1	2.7	0.2	18.4
Percentage of Total NO_x	80.5%	5.2%	38.0%	0.0%	0.1%	23.6%	0.0%	10.7%	2.8%	0.2%	19.5%
Percentage Contribution to Road NO_x	100.0%	6.5%	47.2%	0.0%	0.1%	29.2%	0.0%	13.2%	3.5%	0.2%	-
At The Receptor With the Maximum Road NOx Concentration (ID 268)											
NO_x Concentration (µg/m³)	111.1	7.8	55.9	0.0	0.1	32.1	0.0	13.2	1.8	0.2	15.7
Percentage of Total NO_x	87.6%	6.2%	44.0%	0.0%	0.1%	25.3%	0.0%	10.4%	1.4%	0.2%	12.4%
Percentage Contribution to Road NO_x	100.0%	7.0%	50.3%	0.0%	0.1%	28.9%	0.0%	11.9%	1.6%	0.2%	-

Figure 3.21 – NO_x Source Apportionment Results: AQMA No.13




Average Across All Receptors With
NO_2 Concentration Above 40µg/m^3
Car-Petrol
5.2%
Car-Diesel
38.0%
LGV-Petrol
0.1%
LGV-Diesel
23.6%
HGV
10.7%
Bus/Coach
2.8%
Motorcycle
0.2%
Background
19.5%

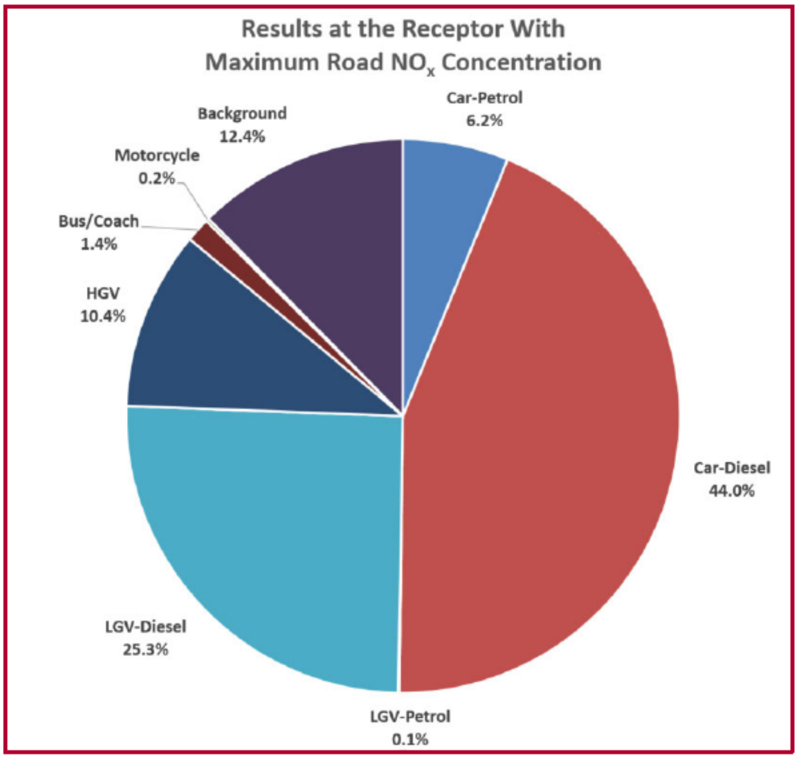

Results at the Receptor With
Maximum Road NO_x Concentration
Car-Petrol
6.2%
Car-Diesel
44.0%
LGV-Petrol
0.1%
LGV-Diesel
25.3%
HGV
10.4%
Bus/Coach
1.4%
Motorcycle
0.2%
Background
12.4%

Figure 3.22 – Full Extent of AQMA No.13 with Relative Location of Other Images

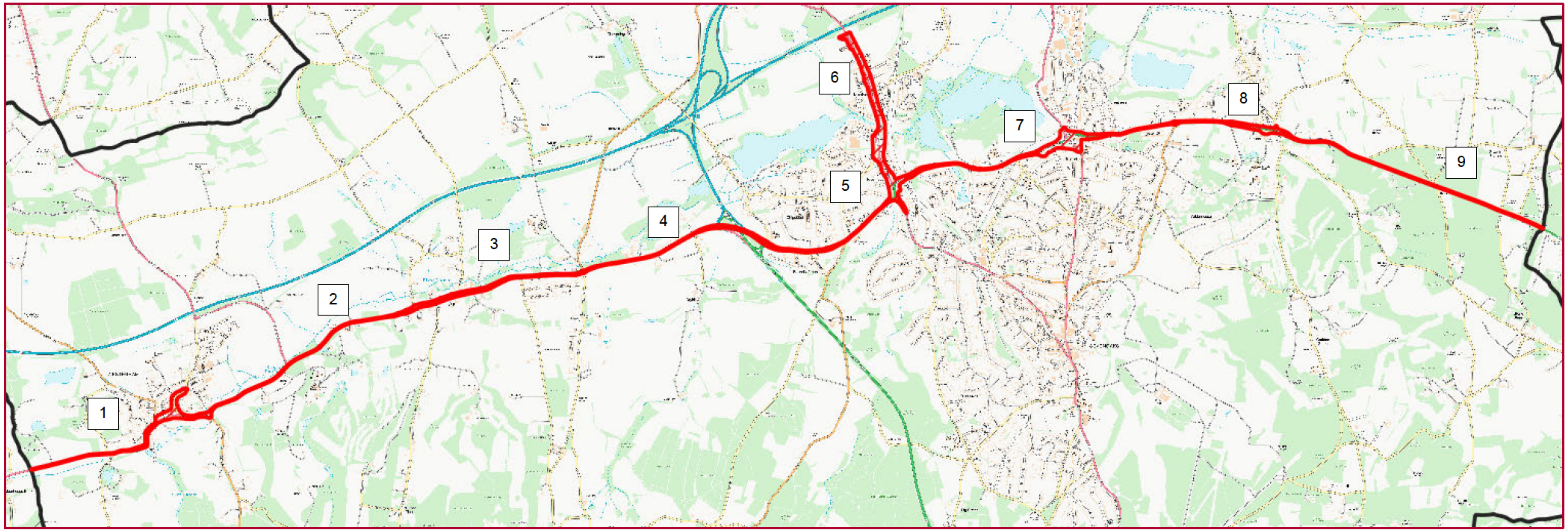
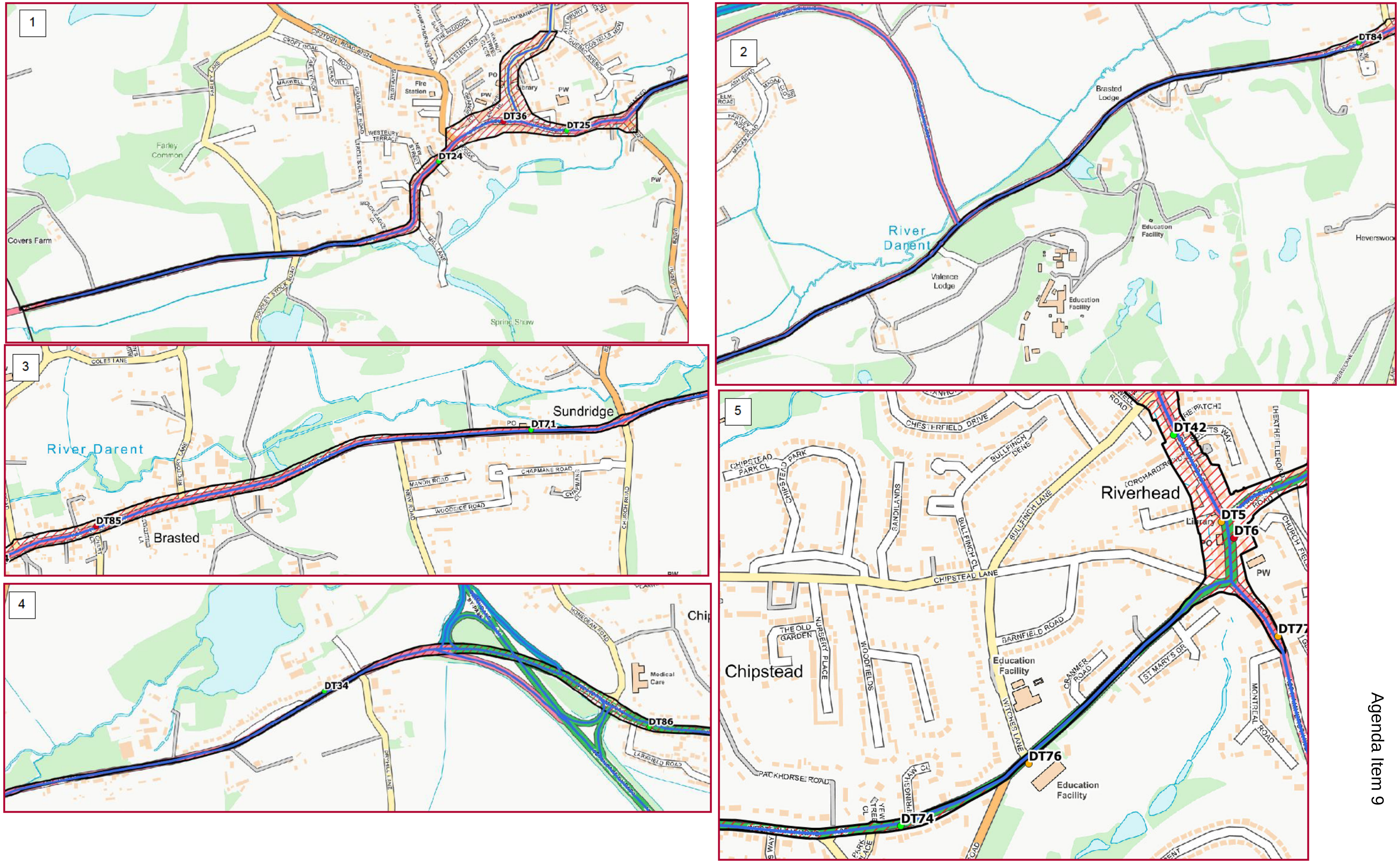


Figure 3.23 – AQMA No.13, Modelled Roads and Monitoring Locations (Continued Overleaf)



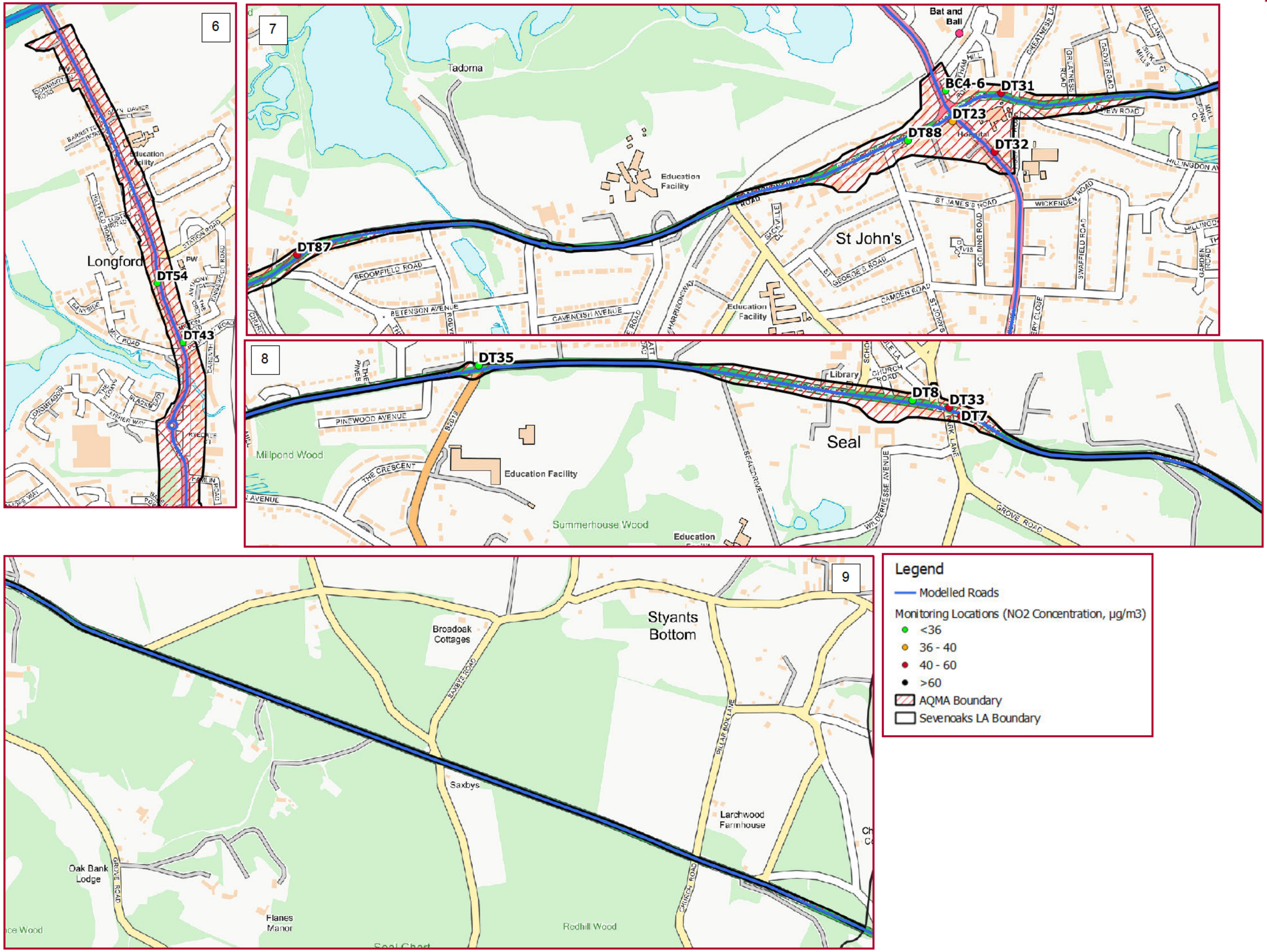
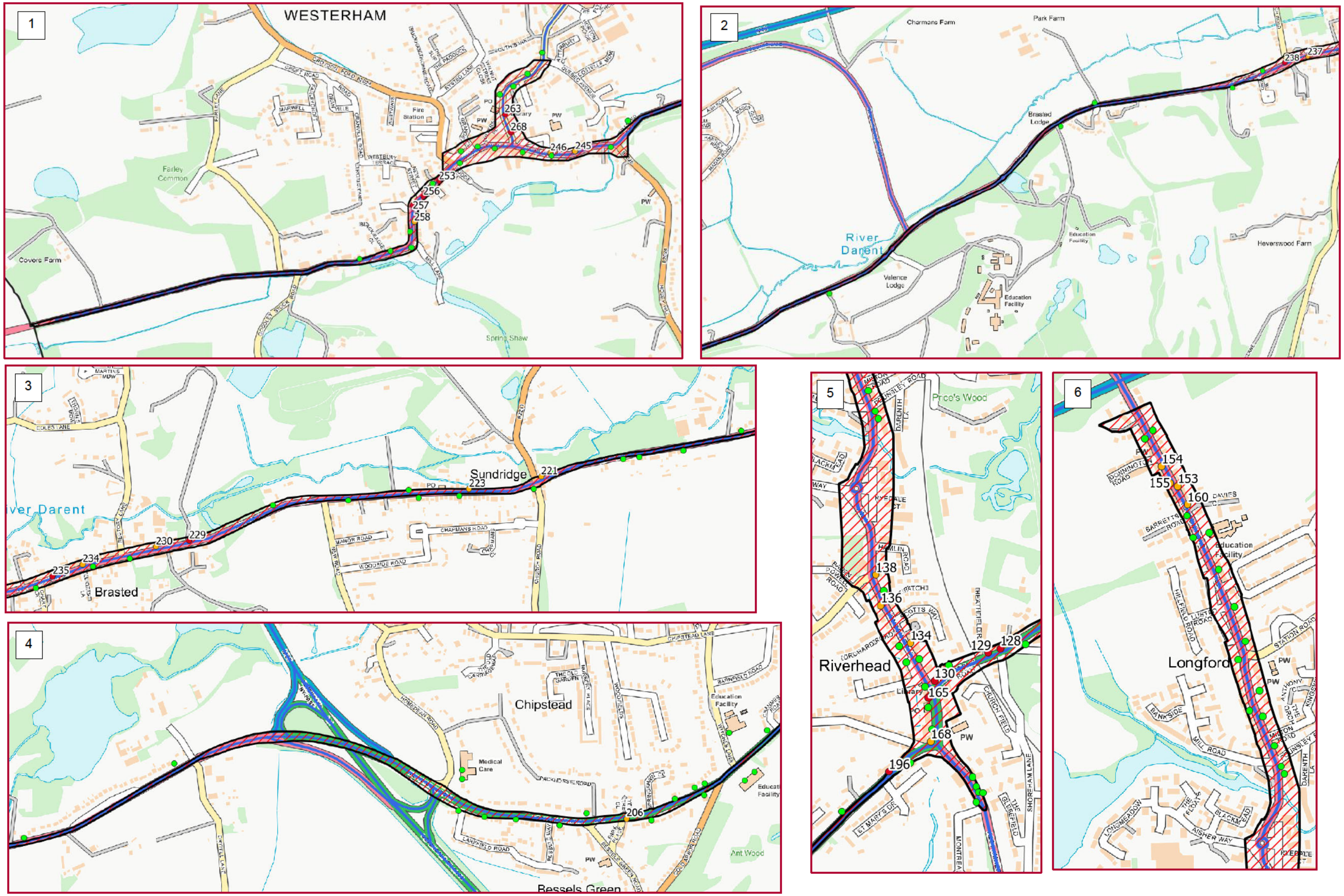

6
Longford
DT54
DT43
Education Facility
7
Tadorna
Bat and Ball
BC4-6
DT31
DT23
DT88
DT32
DT87
Education Facility
St John's
BROOMFIELD ROAD
CAVENDISH AVENUE
ST JAMES'S ROAD
WICKENDEN ROAD
8
DT35
DT8
DT33
DT7
Library
Seal
Millpond Wood
PINEWOOD AVENUE
THE CRESCENT
Education Facility
Summerhouse Wood
GROVE ROAD
9
Broadoak Cottages
Styants Bottom
Saxbys
Larchwood Farmhouse
Oak Bank Lodge
Flanes Manor
Redhill Wood
Legend
Modelled Roads
Monitoring Locations (NO2 Concentration, µg/m3)
<36
36 - 40
40 - 60
>60
AQMA Boundary
Sevenoaks LA Boundary

Figure 3.24 – AQMA No.13, Modelled Receptor Locations (Continued Overleaf)



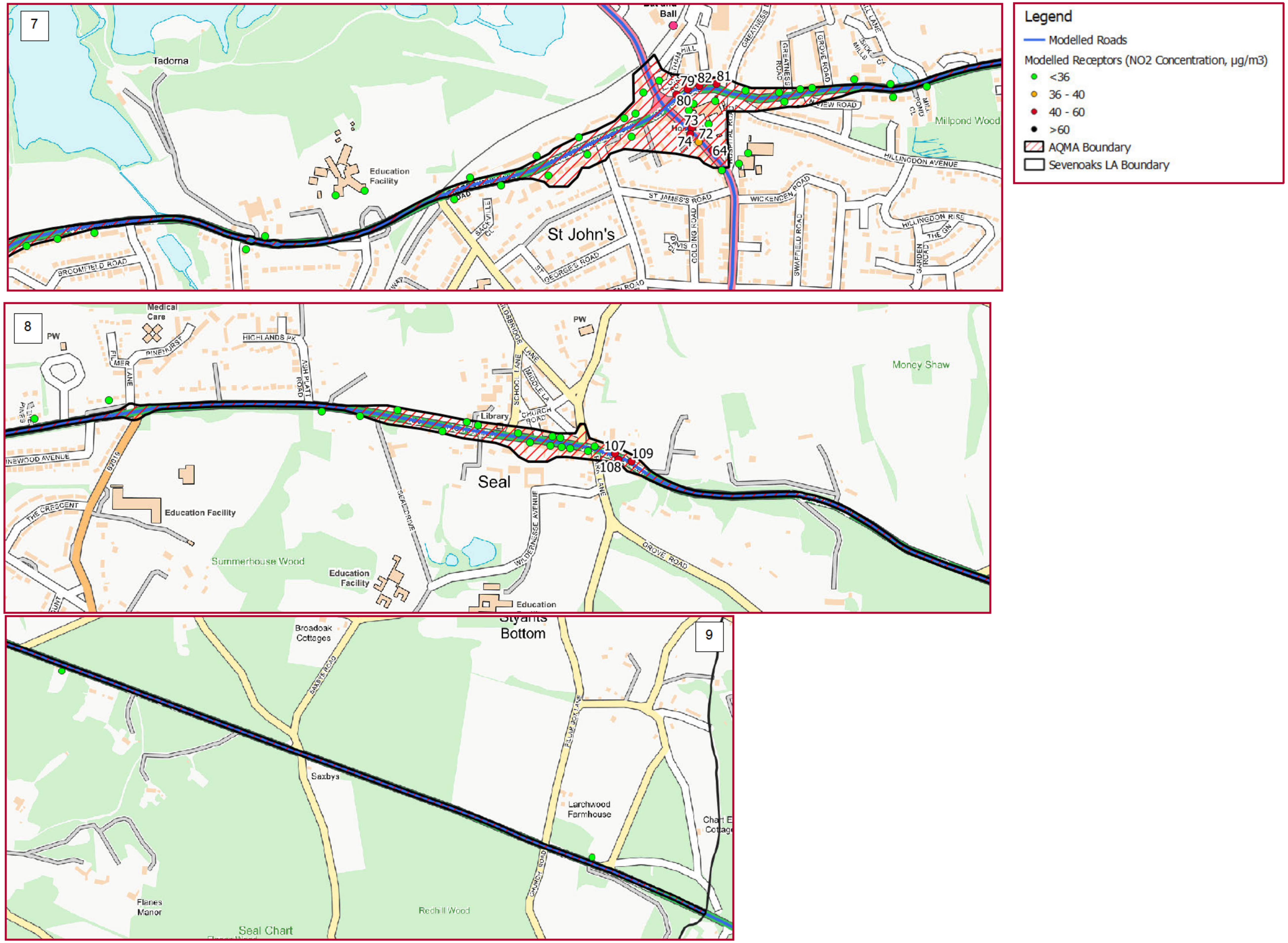
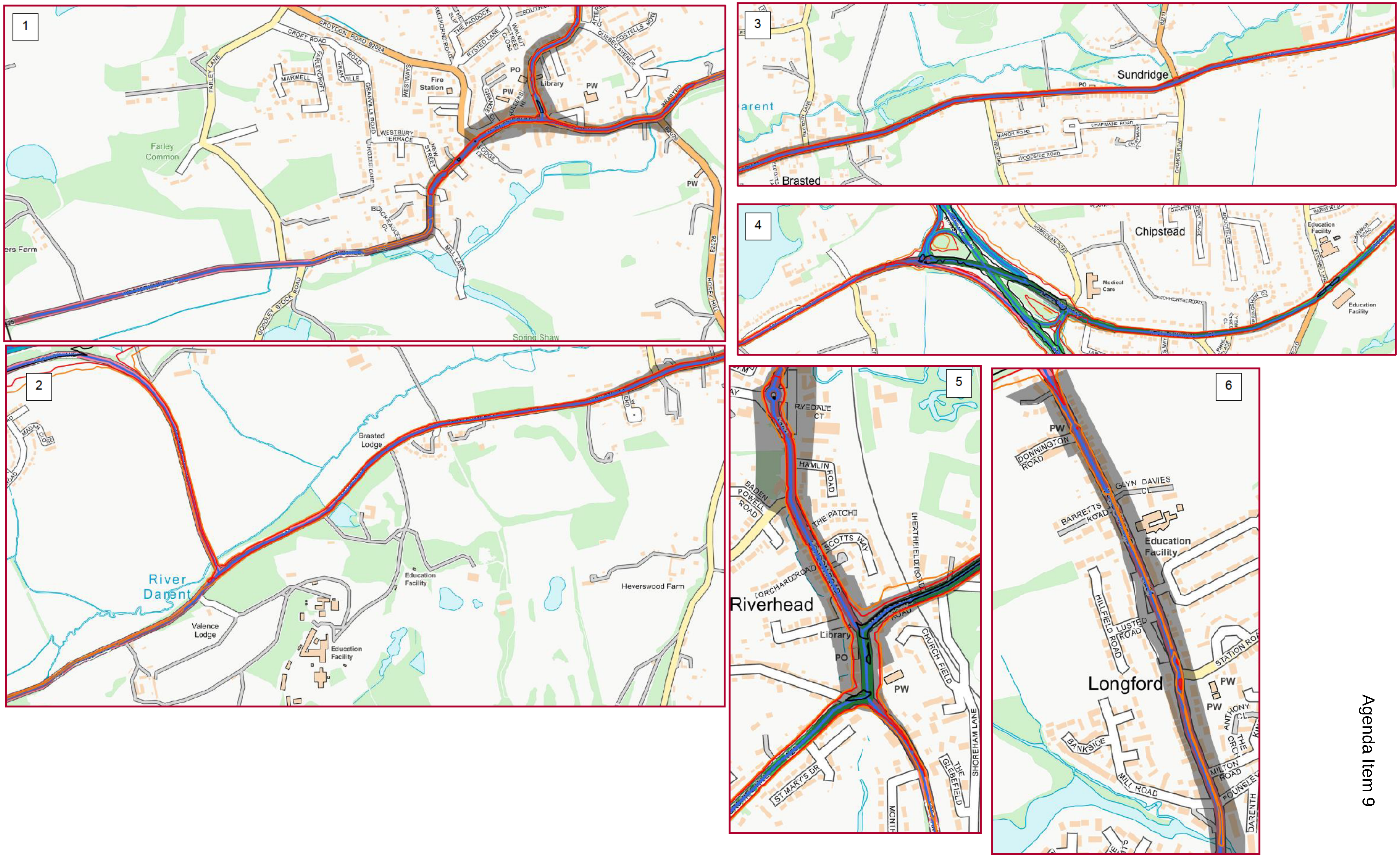
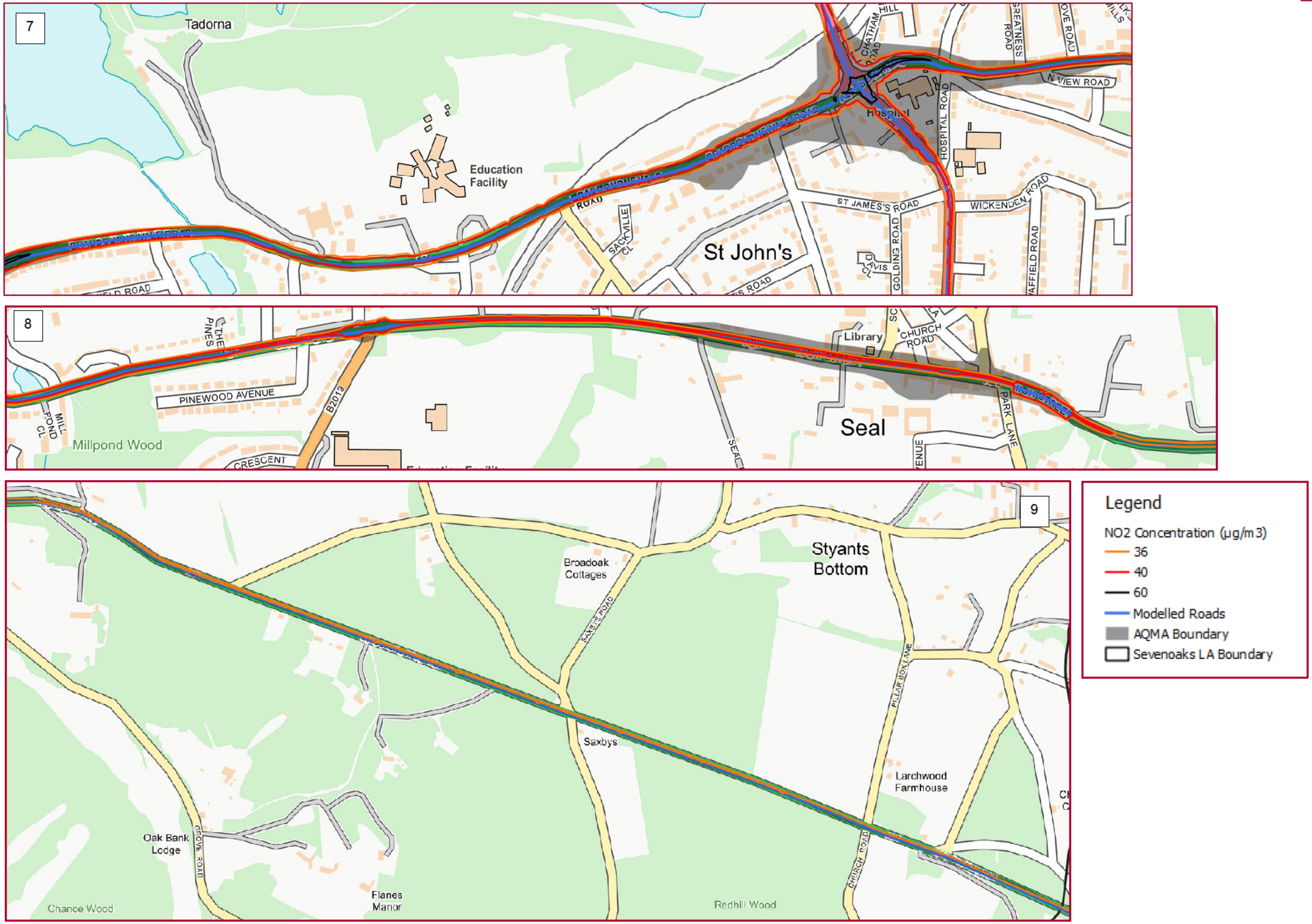

7
Legend
Modelled Roads
Modelled Receptors (NO2 Concentration, µg/m3)
<36
36 - 40
40 - 60
>60
AQMA Boundary
Sevenoaks LA Boundary
Tadorna
Education Facility
St John's
Millpond Wood
ST JAMES'S ROAD
WICKENDEN ROAD
HILLINGDON AVENUE
HILLINGDON RISE
BROOMFIELD ROAD
79
82
81
80
73
72
74
64
8
Medical Care
PW
HIGHLANDS PK
PINEHURST
Library
CHURCH ROAD
SCHOOL LANE
Seal
Money Shaw
107
108
109
Education Facility
Summerhouse Wood
GROVE ROAD
THE CRESCENT
WILDERNESSE AVENUE
9
Broadoak Cottages
Styants Bottom
Saxbys
Larchwood Farmhouse
Fienes Manor
Redhill Wood
Seal Chart

Figure 3.25 – AQMA No.13 Modelled NO_2 Concentration Isopleths (Continued Overleaf)




7
Tadorna
Education Facility
St John's
ST JAMES'S ROAD
WICKENDEN ROAD
HOSPITAL ROAD
GOLDING'S ROAD
Hospital
CHATHAM ROAD
SACKVILLE CL
8
PINEWOOD AVENUE
B2019
Millpond Wood
MILL POND CL
THE PINES
CRESCENT
Library
CHURCH ROAD
Seal
PARK LANE
9
Broadoak Cottages
SAXBYS ROAD
Styants Bottom
PILLAR BOX LANE
Saxbys
Larchwood Farmhouse
Oak Bank Lodge
GROVE ROAD
Flanes Manor
Chance Wood
Redhill Wood
CHURCH ROAD
Legend
NO2 Concentration (µg/m3)
36
40
60
Modelled Roads
AQMA Boundary
Sevenoaks LA Boundary

3.8 Outside Existing AQMAs

3.8.1 Council Monitoring Data

There are 10 additional NO_2 monitoring sites that are located outside of the seven declared AQMAs assessed in this report. The locations of these monitoring sites are presented in Figure 3.26, and results for the previous five years are detailed in Table 3.22. The maximum concentration recorded in 2018 was 39.0µg/m³ at the monitoring site of DT51, which has recorded the highest annual mean concentration for all monitoring located outside of the current AQMAs.

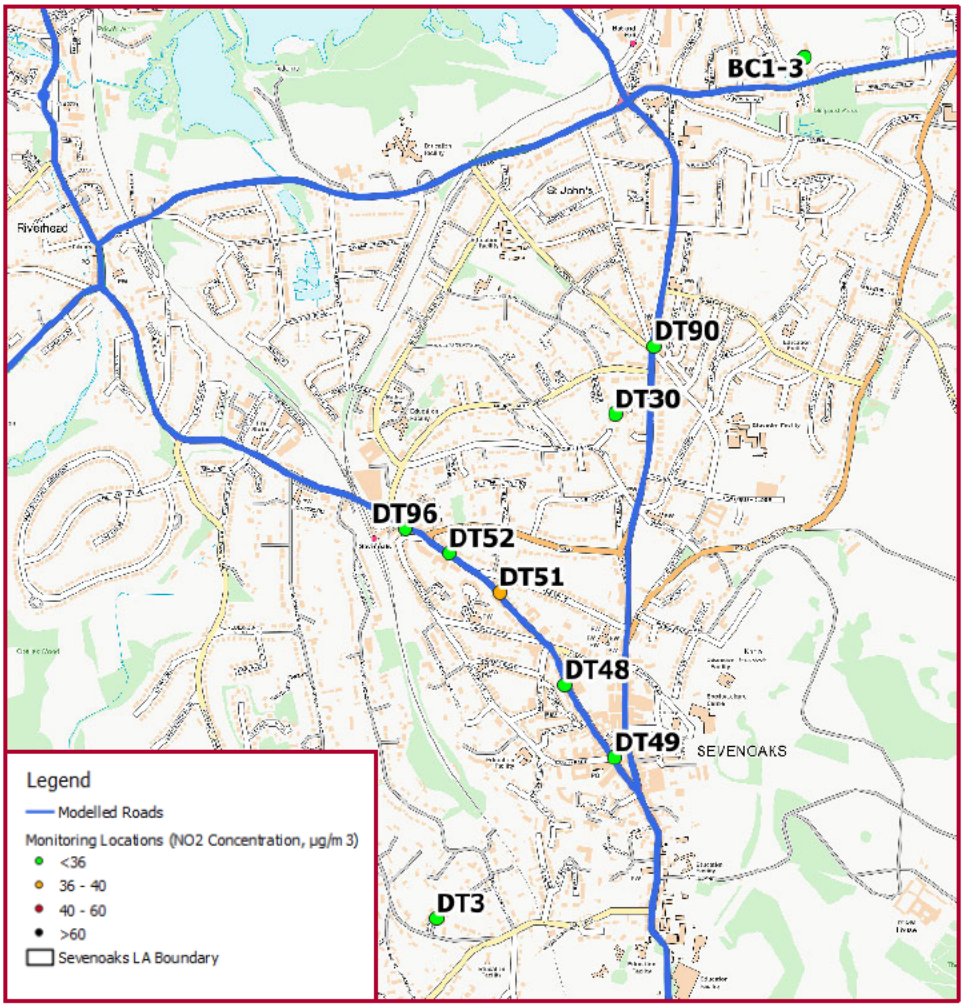
In 2018, no sites reported an annual mean NO_2 concentration in excess of the annual mean objective. Only two exceedances have been reported in the previous 5 years, which were at sites DT48 and DT51 in 2017 and 2016 respectively. Despite a concentration within 10% of the objective being recorded at DT51, this site is not located at a location of relevant exposure.

Table 3.22 – Current NO_2 Monitoring Within, or in Close Proximity to AQMA No.13

Site	Site Type	OS Grid Ref X	OS Grid Ref Y	Distance to Relevant Exposure (m)	Height (m)	Annual Mean NO_2 Concentration (µg/m³)[1]				
						2014	2015	2016	2017	2018
DT3	UB	552467	154167	N/A	2	12.3	10.8	12.7	11.1	11.8
DT30	R	553019	155692	7	2.5	35.1	32.2	*36.1*	32.4	35.1
DT48	R	552863	154873	0.1	2	32.6	25.6	27.7	**40.7**	23.9
DT49	R	553018	154654	0.1	2	34.9	30.4	33.7	28.2	29.1
DT51	K	552662	155153	3	2.5	*39.2*	*36.1*	**40.4**	35.1	*39.0*
DT52	R	552506	155272	6	2.5	*39.6*	*37.9*	*38.3*	33.1	34.0
DT90	R	553140	155898	4	2.5	35.3	32.4	*36.9*	31.5	34.5
DT96	R	552371	155345	1.8	2.5	-	-	-	-	34.5
BC1-3	UB	553603	156774	N/A	2	*	*	*	15.7	13.9
CM1	UB	553603	156774	N/A	1.8	17	17	17	16	15

In **bold**, exceedance of the annual mean NO_2 AQS objective of 40µg/m³.
When **underlined**, NO_2 annual mean exceeds 60µg/m³, indicating a potential exceedance of the NO_2 1-hour mean objective
R= Roadside
K= Kerbside
UB= Urban Background
*= Site not clearly listed in previous ASRs

Figure 3.26 –Modelled Roads and Monitoring Locations Outside Existing AQMAs



3.8.2 Modelled Receptors, Annual Mean NO_2

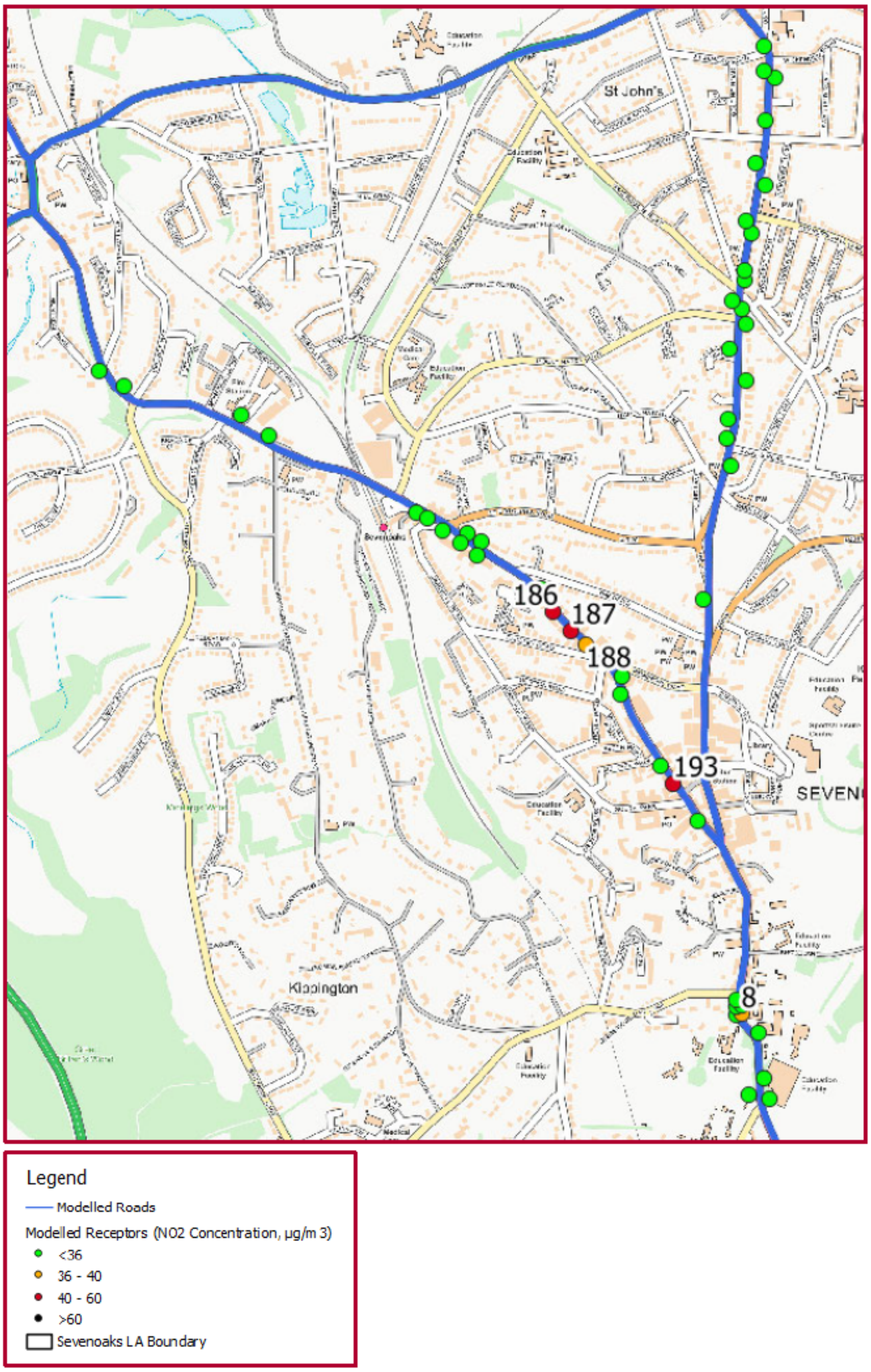
Table 3.23 shows the modelled annual mean NO_2 concentrations predicted at existing residential receptor locations outside of the existing AQMAs which are predicted to be exceeding, or near to exceeding, for 2018. The full summary of receptor locations outside all AQMAs is presented in Table D.2 Of the 62 modelled receptor locations, exceedances of the annual mean NO_2 objective have been predicted at three of the modelled receptor locations, with an additional two modelled receptor locations having a predicted concentration within 10% of the AQS objective.

Figure 3.27 presents the modelled receptor locations in reference to their predicted annual mean NO_2 concentrations. From this it can be seen that the three predicted exceedances are located along the A224 London Road/Tubs Hill in Sevenoaks. Receptor ID 193 is located above a commercial unit, with a modelled height of 4m, and it is unclear whether this location is used for residential purposes, therefore may not be at relevant exposure. Additionally, receptor IDs 186 and 187 are located along an area which is relatively narrow with buildings on either side. In this area, there is an additional receptor (ID 188) which has predicted a concentration within 10% of the AQS objective. This receptor was modelled at 4m height as it would be above the commercial units; however it is unclear if these spaces are used for residential purposes. Receptor ID 8 also has a predicted concentration within 10% of the AQS objective, and is located just outside of AQMA No.10 in a similar street canyon setting.

Table 3.23 – Outside AQMAs, Summary of Exceeding and Near Exceeding Modelled Receptor Results (NO_2)

Receptor ID	OS Grid X	OS Grid Y	Height (m)	AQS objective (µg/m³)	2018 Annual Mean NO_2 (µg/m³)	% of AQS objective
8	553139	154142	1.5	40	*37.1*	*92.7*
186	552683	155113	1.5	40	**41.3**	**103.2**
187	552727	155067	1.5	40	**41.1**	**102.8**
188	552764	155033	4	40	*38.7*	*96.8*
193	552974	154698	4	40	**42.6**	**106.5**

Figure 3.27 –Modelled Receptor Locations Outside Existing AQMAs



4 Conclusions and Recommendations

Following the completion of the analysis of both monitoring data and modelled concentrations across the assessed areas, including the seven designated AQMAs where traffic data is available, a number of recommendations have been made in terms of the current designations of the AQMAs within Sevenoaks.

4.1 AQMA No.1 M20

AQMA No.1 is currently designated for exceedances of the annual mean NO_2, with two monitoring locations located within and nearby to the AQMA using NO_2 diffusion tubes. There has continued to be exceedances of the NO_2 annual mean objective at DT26, however this site is located close to the A20, an additional road source. When distance corrected to the nearest relevant exposure as per LAQM.TG(16), this site has a predicted concentration well below the AQS objective. Discrete receptor locations have predicted concentrations below the AQS objective at relevant receptor locations within and in close proximity to the AQMA. Due to the low number of monitoring locations, it is recommended that monitoring is undertaken further eastwards at points of relevant exposure to understand the influence in other areas. If no exceedances are monitored at these locations then the AQMA could be considered for revocation.

The M20 is a Highways England controlled road and therefore the measures to be developed would have to be a collaboration between the Council and Highways England. From the source apportionment completed, road traffic sources account for less than 50% of the NO_x and NO_2 concentrations, however Diesel Cars and Diesel LGVs have a significant contribution to the concentrations.

4.2 AQMA No.2 M25

AQMA No.2 is currently designated for exceedances of the annual mean NO_2 and monitoring is completed within, and close to the AQMA using NO_2 diffusion tubes. DT12, located in the southern section near Westerham, has reported exceedances for 4 years, with the concentration in 2018 being within 10% of the annual mean NO_2 exceedance value. Once distance corrected to a point of relevant exposure however, this site has been well below 40µg/m^3. All other monitoring locations within or in close proximity to the AQMA have continually reported concentrations below 40µg/m^3 for the past 5 years. The modelling results show that at relevant points of exposure, most sites have a predicted concentration well below the AQS objective, however one receptor (ID 301) predicts a concentration in exceedance of this.

It is recommended that additional monitoring is carried out near the roundabout of London Road in Westerham, close to the residential properties where receptor ID 301 is located in order to verify whether there are exceedances here. Additionally, further monitoring should be carried out through the section of the M25 between junction 5 and 6, near to any residential properties, such as along the A224 and B2211, due to a lack of monitoring in these areas. If these sites show no exceedances, the AQMA could be considered for revocation, or at least reduced in size to focus on the exceedance area.

The M25 is a Highways England controlled road and therefore the measures to be developed would have to be a collaboration between the Council and Highways England. From the source apportionment completed, Diesel Cars, Diesel LGVs and HGVs have a significant contribution to the NO_x and NO_2 concentrations.

4.3 AQMA No.3 M26

AQMA No.3 is currently designated for exceedances of the annual mean NO_2, however no monitoring is completed within or close to the AQMA. The modelling results predict that there are no concentrations greater than 40µg/m^3, however one location (receptor ID 161) reports a concentration within 10% of the AQS objective. This receptor is located at a residential property, on the northern side of the A224 London Road flyover.

It is recommended that monitoring is carried out close to relevant exposure near the A224 London Road flyover to determine the annual concentrations in these areas as the model has predicted a concentration to be within 10% of the annual mean NO_2 objective. If there are no exceedances monitored then the AQMA could be considered for revocation.

The M26 is a Highways England controlled road and therefore the measures to be developed would have to be a collaboration between the Council and Highways England. From the source apportionment completed, Diesel Cars, Diesel LGVs and HGVs have a significant contribution to the NO_x and NO_2 concentrations.

4.4 AQMA No.4 A20(T)

AQMA No.4 is currently designated for exceedances of the annual mean NO_2, however no monitoring is completed within or close to the AQMA. The modelling results predict that there are no concentrations greater than 40µg/m^3, nor any within 10% of the AQS objective.

It is recommended that monitoring is carried out close to relevant exposure along this stretch, primarily near to residential properties close to the A20 on Phillip Avenue/Ladds Way/Cyclamen Road, as the 36µg/m^3 contour comes into contact with these properties. If no exceedances are reported, revoking the AQMA could be considered.

The A20 is a Highways England controlled road and therefore the measures to be developed would have to be a collaboration between the Council and Highways England. From the source apportionment completed, Diesel Cars, Diesel LGVs have a significant contribution to the NO_x and NO_2 concentrations.

4.5 AQMA No.6 M25 (PM_{10})

AQMA No.6 is currently designated for exceedances of the 24-hour mean PM_{10}, however no monitoring is completed within or close to the AQMA. From estimations through calculations of the annual PM_{10} concentrations, it is estimated that there will be 4 daily concentrations greater than 50µg/m^3. The modelling results therefore predict that there are no receptors which are likely to be exposed to concentrations greater than 50µg/m^3 any more than 35 times in a year. As a result of this, the AQMA could potentially be revoked.

The M25 is a Highways England controlled road and therefore the measures to be developed would have to be a collaboration between the Council and Highways England.

4.6 AQMA No.10 Sevenoaks High Street

AQMA No.10 is currently designated for exceedances of the annual mean NO_2 concentration, with four monitoring locations located within the AQMA using NO_2 diffusion tubes. There has continued to be exceedances of the NO_2 annual mean objective at DT2 over the past 5 years, DT28 has shown exceedances for 3 years with the past 2 years being within 10% of the AQS objective, and DT27 has also continued to remain within 10% of the AQS objective. Once distance corrected, DT2 continues to report concentrations greater than 40µg/m^3. The model has also predicted an area of concentration greater than 60µg/m^3 along the narrow section of the High Street near Bank Street.

It is recommended that the AQMA remains in place, with additional monitoring being carried out in the narrow section of the High Street where receptor ID 32 is located in order to verify whether there are annual mean NO_2 concentrations greater than 60µg/m^3, as this would indicate exceedances of the hourly NO_2 objective. If this is the case, then the AQMA should be amended to include the hourly NO_2 objective. Furthermore, the model has shown exceeding concentrations to be located along the A224 at receptor ID 193, from where the High Street splits off to just past the junction to Lime Tree Walk. Although monitoring at DT49 shows no exceedances, it could be considered that AQMA No.10 is extended along here, especially if residential properties are located above the commercial units as receptor ID 193 has a predicted exceedance at a first floor level.

From the source apportionment completed, road traffic sources account for over 75% of the NO_x and NO_2 concentrations, with Diesel Cars having the most significant contribution to the concentrations, followed by diesel LGVs. It is therefore recommended that any measures to improve air quality in this area largely focuses on reducing the emissions from diesel cars.

4.7 AQMA No.13 A25

AQMA No.13 is currently designated for exceedances of the annual mean NO_2 concentration, with 8 monitoring locations with a reporting an exceedance in 2018, 7 of which have reported exceedances for the past 5 years.

Once distance corrected, 3 sites, DT31, DT32 and DT85, continue to report concentrations in excess of 40µg/m^3 at the nearest relevant receptor.

Both the 40µg/m^3 and 36µg/m^3 contours don't extend as far west along the A25 High Street from Westerham as the current boundary, nor do the 40µg/m^3 contour extend east along the A25 from Seal. Therefore, the AQMA could be reduced in these areas, and additional monitoring can be used to support this.

On the other hand, one receptor outside the AQMA boundary (receptor ID 196) was predicted to be exceeding. This is located just west along the A25 from the Riverhead junction. Therefore, it may be worthwhile considering extending the AQMA slightly west along the northern side of the A25 from the Riverhead junction. In some areas, such as the stretch of the A25 between Westerham and Brasted, Sundridge and the junction to the A21, and between the junction to the A21 and Riverhead, the exceedance contours extend beyond the AQMA, however neither the receptors or monitoring data here predict exceedances.

The model has predicted areas of concentrations greater than 60µg/m^3, located along part of London Road coming from the junction to the A25 Market Square in Westerham, along the junction to the A21, near to the junction to Witches Lane, as well as along areas of the Riverhead junction and the Bat & Ball Junction. Many of these contours lie within the middle of the road, or in areas where there is no relevant exposure. Monitoring is already carried out at the Bat & Ball junction, and near to the junction to Witches Lane, however none is carried out along London Road from the A25 Market Square in Westerham, or near to the southern roundabout in Riverhead. It is therefore advisable that monitoring is carried out here to verify whether there are annual mean concentrations in excess of 60µg/m^3. Annual mean NO_2 concentrations greater than 60µg/m^3 indicate that there are exceedances of the hourly NO_2 objective. If monitoring identifies annual concentrations greater than 60µg/m^3 here, the AQMA should be updated to include this objective, or an additional smaller AQMA should be declared in the area.

From the source apportionment completed, road traffic sources account for over 50% of the NO_x and NO_2 concentrations, and at the maximum and at exceeding receptors, this is over 75%. Diesel cars and diesel LGVs have the most significant contributions, however HGVs also have a important contribution. It is therefore recommended that any measures to improve air quality within this AQMA are largely focused on reducing emissions from diesel cars, diesel LGVs, and HGVs. Additionally, most of the areas of exceedances are at junctions, therefore measures should also focus on reducing congestion and improving traffic flow in these areas.

4.8 Outside of Existing AQMAs

In addition to the assessment of NO_2 within the existing AQMAs, monitored and modelled concentrations of annual mean NO_2 have been assessed outside of the AQMAs. Currently there are no monitoring locations recording an annual mean NO_2 concentrations in exceedance of the annual mean objective at a location of relevant exposure. There were three modelled receptor locations that were predicted to exceed the annual mean objective, and an additional two receptors were predicted to be within 10% of the objective.

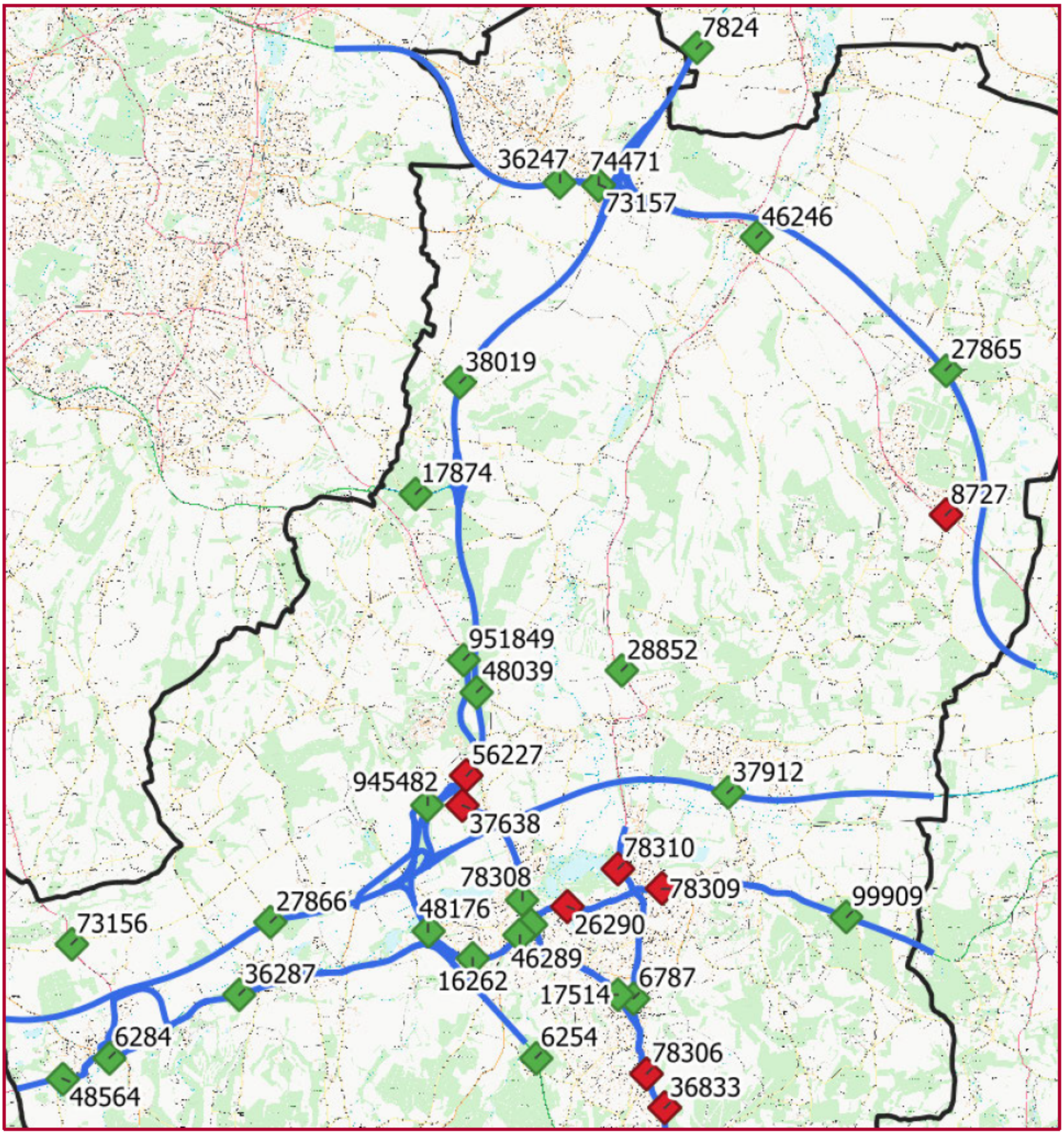
Based upon the review of the current monitoring network outside of existing AQMAs, and the modelling completed it is recommended that monitoring location DT51 is moved further south along the road, between receptor ID 186 and 187 to ascertain the NO_2 concentration within this area along the A224. DT51 is currently located further north along this stretch and has reported concentrations within 10% of the AQS annual mean NO_2 objective, however due to recent developments the area may become more congested towards the junction. If an exceedance is detected, AQMA 10 could be extended to cover this area.

The exceedance predicted at receptor ID 193 has been discussed above in section 4.6, and there are no other receptors located outside an existing AQMA that have predicted exceedances in areas which have been modelled.

Appendices

Appendix A – Traffic Data

Figure A.1 – DfT Count Point Locations



Legend

DfT Traffic Count Locations

- Estimates or manual counts within 3 years
- Estimates or manual counts over 3 years
- Modelled Roads
- Sevenoaks LA Boundary

Table A.1 – DfT Traffic Data

Source ID	Description	2018 Traffic Flow (AADT)	% Car	% LGV	% HGV	% Bus/ Coach	% Motorcycle
6787	Estimated using previous year's AADF on this link	14528	88.4	9.2	1.0	0.8	0.6
99909	Estimated using previous year's AADF on this link	15057	82.2	12.8	3.4	0.4	1.2
78309*	Estimated using previous year's AADF on this link	12849	78.6	15.8	4.1	0.5	1.0
26290*	Estimated using previous year's AADF on this link	16258	80.3	14.7	4.2	0.3	0.5
74797	Manual count	21291	84.5	12.1	2.4	0.6	0.5
46289	Estimated using previous year's AADF on this link	18513	81.9	14.0	3.2	0.4	0.6
16262	Manual count	17752	81.3	14.7	3.3	0.4	0.4
36287	Estimated using previous year's AADF on this link	15554	77.5	17.8	3.1	0.4	1.2
6284	Manual count	10706	80.3	14.3	3.1	0.9	1.4
48564	Estimated using previous year's AADF on this link	10107	83.3	13.1	2.7	0.2	0.7
78308	Estimated using previous year's AADF on this link	18689	87.6	9.7	1.4	0.8	0.6
37912	Automatic counter	48494	65.3	19.5	14.2	0.6	0.4
27866	Estimated using previous year's AADF on this link	129011	70.1	18.3	10.9	0.2	0.4
48039	Automatic counter	107739	71.5	18.9	9.0	0.2	0.4
38019	Automatic counter	118889	71.5	19.2	8.6	0.2	0.5
73157	Estimated from nearby links	43511	75.3	18.9	4.1	0.3	1.4
74471	Estimated using previous year's AADF on this link	28472	75.3	18.9	4.1	0.3	1.4
27865	Manual count	57855	68.4	17.7	12.7	0.3	0.9
36247	Automatic counter	54390	75.3	18.9	4.1	0.3	1.4
945482	Manual count	5220	84.9	12.6	1.3	0.0	1.1
56227*	Estimated using previous year's AADF on this link	12839	82.2	14.8	1.9	0.2	1.0
48176	Manual count	55018	74.6	18.8	5.9	0.2	0.5
78310*	Estimated using previous year's AADF on this link	15213	83.3	13.1	2.7	0.4	0.5
6254	Manual count	49823	77.8	16.6	4.7	0.3	0.6
37638*	Estimated using previous year's AADF on this link	8816	80.9	14.3	3.5	0.5	0.8
17874	Manual count	36805	76.2	18.3	4.7	0.2	0.5

Source ID	Description	2018 Traffic Flow (AADT)	% Car	% LGV	% HGV	% Bus/ Coach	% Motorcycle
7824	Estimated using previous year's AADF on this link	115104	69.8	16.9	12.4	0.3	0.6
46246	Estimated using previous year's AADF on this link	22321	80.5	15.4	1.9	0.3	1.9
73156	Estimated using previous year's AADF on this link	10027	80.6	16.6	1.7	0.4	0.7
78306*	Estimated using previous year's AADF on this link	12468	85.9	11.3	1.6	0.7	0.5
36833*	Estimated using previous year's AADF on this link	11713	84.9	12.4	1.6	0.5	0.6
17514	Estimated using previous year's AADF on this link	12058	90.0	7.7	0.9	0.7	0.7
951849	Manual count	1247	82.2	13.4	2.3	0.9	1.1
8727*	Estimated using previous year's AADF on this link	8871	69.5	23.7	4.4	0.6	1.8
28852	Estimated using previous year's AADF on this link	6970	84.5	13.5	0.9	0.2	0.8

Notes:
* = Estimates based on manual counts conducted more than 3 years ago

Appendix B – Verification

Table B.1 – Details of All Passive NO2 Monitoring Locations within Sevenoaks District Council

Site ID	X Coordinate	Y Coordinate	Site Type	Height (m)
DT2	553156	154409	Roadside	2
DT27	553139	154259	Roadside	2.5
DT28	553045	154889	Kerbside	2.5
DT48	552867	154858	Roadside	2
DT49	553018	154654	Roadside	2
DT51	552662	155153	Kerbside	2.5
DT52	552506	155272	Roadside	2.5
DT77	551529	155967	Roadside	2.5
DT87	551640	156335	Roadside	2.5
DT88	552963	156583	Roadside	2.5
DT90	553140	155898	Roadside	2.5
DT23	553050	156625	Roadside	2.5
DT30	553019	156692	Roadside	2.5
DT31	553165	156686	Roadside	2.5
DT32	553146	156563	Roadside	2.5
DT5	551414	156194	Kerbside	2.5
DT6	551442	156158	Roadside	2.5
DT42	551315	156380	Roadside	2.5
DT76	551020	155711	Roadside	2.5
DT7	555096	156692	Roadside	2.5
DT8	554992	156727	Roadside	2.5
DT33	555068	156711	Roadside	2
DT34	549427	155691	Roadside	2.5
DT35	554092	156797	Roadside	2.5
DT43	551279	156864	Roadside	2.5
DT54	551225	156974	Roadside	2.5
DT74	550768	155583	Roadside	2.5
DT86	550318	155593	Roadside	2
DT71	548238	155355	Roadside	2.5
DT12	546816	155851	Roadside	2
DT84	546801	155000	Roadside	2.5
DT85	547095	155099	Roadside	2.5
DT24	544416	153916	Roadside	2.5
DT25	544770	154000	Roadside	2.5
DT36	544602	154024	kerbside	2.5
DT13	552504	167700	Roadside	2.5
DT14	553108	167869	Roadside	2.5
DT81	553416	167615	Urban	2.5
DT26	554219	167254	Roadside	2
DT96	552371	155345	Roadside	2.5

Table B.2 – Initial Model Wide Verification

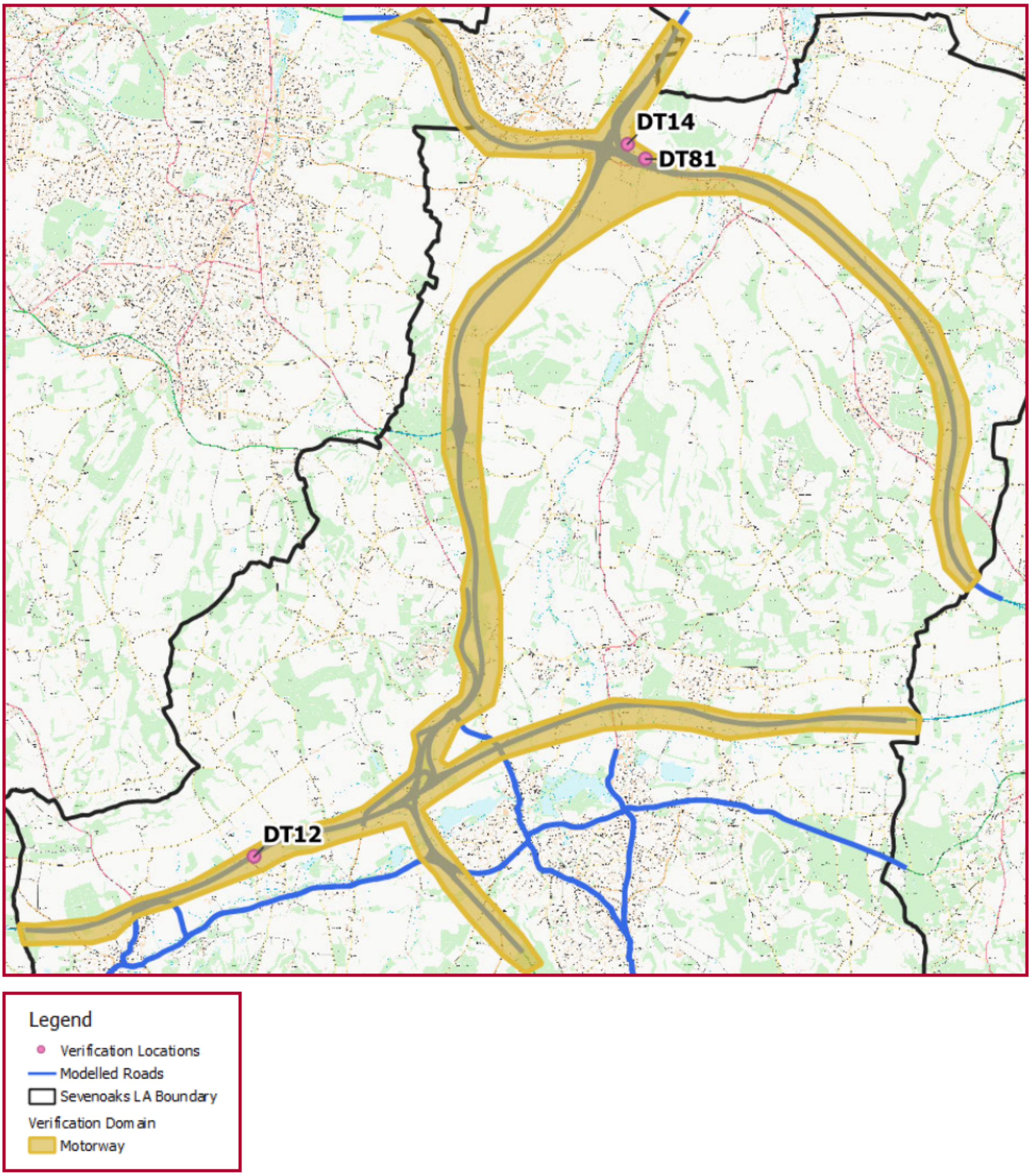
Site ID	Ratio of monitored road contribution NO_x / modelled road contribution NO_x	Adjustment factor for modelled road contribution NO_x	Adjusted modelled road contribution NO_x (µg/m³)	Adjusted modelled total NO_x (including background NO_x) (µg/m³)	Modelled total NO_2 (based upon empirical NO_x / NO_2 relationship) (µg/m³)	Monitored total NO_2 (µg/m³)	% Difference (adjusted modelled NO_2 vs. monitored NO_2)
DT2	3.13	2.610	70.22	86.91	44.54	49.89	-10.72
DT27	3.67		37.96	54.66	30.93	37.70	-17.96
DT28	2.78		48.11	64.81	35.42	36.80	-3.75
DT48	3.56		16.82	33.51	20.89	23.90	-12.61
DT49	2.72		32.64	49.33	28.49	29.12	-2.16

DT51	3.08		45.98	64.34	35.48	39.02	-9.07
DT52	4.68		23.76	42.12	25.33	34.02	-25.55
DT77	4.54		30.64	49.10	28.67	38.71	-25.93
DT90	3.40		33.77	51.92	29.91	34.48	-13.25
DT32	3.12		71.56	90.99	46.62	51.91	-10.20
DT96	5.91		19.29	37.64	23.15	34.48	-32.86
DT87	3.66		51.09	70.96	38.58	46.96	-17.84
DT88	3.11		28.28	47.18	27.82	30.32	-8.25
DT23	3.66		37.89	57.33	32.55	39.16	-16.88
DT30	3.65		31.25	50.69	29.52	35.13	-15.96
DT31	4.31		50.48	69.91	38.04	51.11	-25.57
DT5	3.05		45.13	65.00	36.02	39.29	-8.33
DT6	2.89		52.81	72.68	39.30	41.67	-5.69
DT42	3.34		32.51	52.38	30.38	34.50	-11.95
DT76	3.44		38.95	57.41	32.47	37.86	-14.24
DT7	2.28		72.45	88.24	44.92	41.29	8.78
DT8	2.86		29.38	46.09	27.00	28.33	-4.71
DT33	4.66		34.37	50.16	28.75	40.50	-29.02
DT34	2.06		35.20	51.72	29.61	26.12	13.36
DT35	3.54		32.52	49.23	28.47	33.72	-15.57
DT43	3.27		22.62	42.49	25.73	28.46	-9.59
DT54	5.32		18.51	38.37	23.73	32.74	-27.51
DT74	4.07		31.43	48.30	28.08	35.94	-21.87
DT86	3.59		33.57	50.44	29.07	34.71	-16.26
DT71	2.60		38.79	55.51	31.37	31.30	0.22
DT12	1.00		150.01	167.35	72.93	39.83	83.09
DT84	2.52		42.05	59.38	33.20	32.54	2.03
DT85	4.11		41.73	60.10	33.69	43.75	-22.99
DT24	3.21		40.86	56.56	31.66	35.81	-11.58
DT25	1.97		31.18	50.88	29.65	26.07	13.72
DT36	4.67		30.74	50.43	29.45	40.13	-26.61
DT13	2.34		40.69	61.70	34.70	32.85	5.62
DT14	1.75		33.92	56.82	32.80	27.62	18.75
DT81	1.66		39.08	61.98	35.11	28.62	22.69
DT26	7.84		19.52	41.07	25.24	42.66	-40.83

Motorway Verification

The motorway verification factor includes diffusion tubes DT12, DT13, DT14, DT81, and DT26, as these were all located in close proximity to a motorway, and likely to be more representative of the pollutant emissions here as opposed to the other roadside locations. These are presented, alongside the verification domain, in Figure B.1. The results of this initial motorway verification is presented in Table B.3, and it can be seen that DT26 is significantly under predicting. This was due to this diffusion tube being located on a main road which has not been modelled, and was therefore removed from verification. This was also the case with DT13, which was also removed from further verification.

Figure B.1 – Motorway Verification Domain and Diffusion Tubes used for Verification



The results of the final motorway verification factor are presented in Table B.4 and Figure B.2. Although DT81 and DT14 are still under predicting, they are within the ±25% acceptance level. Alongside this, the RMSE for this verification is 3.6µg/m^3, and the R^2 value is 1, indicating that this finalised motorway verification is performing accurately. It is important to note that the R^2 value is influenced by the number of data points used to produce a line, and in this case, there are only 3. The verification factor used for any receptors located near to a motorway within the boundary of Sevenoaks District Council is 1.075.

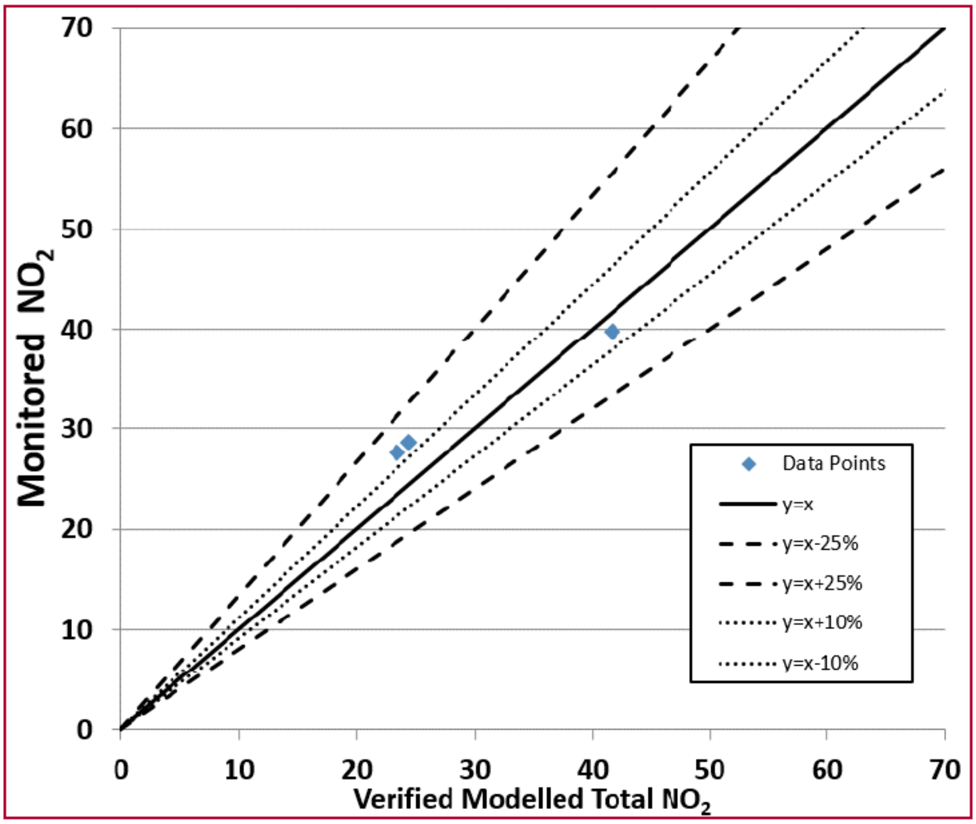
Table B.3 – Initial Motorway Verification

Site ID	Ratio of monitored road contribution NO_x / modelled road contribution NO_x	Adjustment factor for modelled road contribution NO_x	Adjusted modelled road contribution NO_x (µg/m³)	Adjusted modelled total NO_x (including background NO_x) (µg/m³)	Modelled total NO_2 (based upon empirical NO_x / NO_2 relationship) (µg/m³)	Monitored total NO_2 (µg/m³)	% Difference (adjusted modelled NO_2 vs. monitored NO_2)
DT81	1.66	1.247	18.67	41.57	25.64	28.62	-10.40
DT14	1.75		16.21	39.10	24.43	27.62	-11.55
DT12	1.00		71.68	89.01	45.53	39.83	14.30
DT13	2.34		19.44	40.46	24.85	32.85	-24.36
DT26	7.84		9.33	30.88	20.16	42.66	-52.74

Table B.4 – Final Motorway Verification

Site ID	Ratio of monitored road contribution NO_x / modelled road contribution NO_x	Adjustment factor for modelled road contribution NO_x	Adjusted modelled road contribution NO_x (µg/m³)	Adjusted modelled total NO_x (including background NO_x) (µg/m³)	Modelled total NO_2 (based upon empirical NO_x / NO_2 relationship) (µg/m³)	Monitored total NO_2 (µg/m³)	% Difference (adjusted modelled NO_2 vs. monitored NO_2)
DT81	1.66	1.075	16.10	39.00	24.38	28.62	-14.80
DT14	1.75		13.97	36.87	23.33	27.62	-15.53
DT12	1.00		61.80	79.13	41.59	39.83	4.41

Figure B.2 – Final Motorway Adjusted Verification Monitored NO_2 Concentrations vs. Verified Modelled NO_2



Model Wide (Excluding Motorway and Westerham) Area Verification

Following the removal of the diffusion tubes located near the motorway, verification was carried out with the remaining 35 sites. The results of this are presented in Table B.5, and for the majority of sites the model is now performing better than it was previously. Despite this, three sites, DT7, DT34 and DT25 were over predicting NO_2 concentrations by more than 25%, and one site, DT96, was under predicting by more than 25%. DT33 and DT85 were under predicting due to located near un-modelled roads. There was however no clear reason why the model was over or under predicting at the other locations, and the model was unable to be adjusted further. Sites DT25 and DT36 (which was also under predicting, but by less than 25%) are located within Westerham, whilst the other monitoring sites are located outside of Westerham. It was therefore decided that a separate verification for the Westerham Area would be required.

Table B.5 – Model Wide Verification (Excluding Motorway)

Site ID	Ratio of monitored road contribution NO_x / modelled road contribution NO_x	Adjustment factor for modelled road contribution NO_x	Adjusted modelled road contribution NO_x (µg/m^3)	Adjusted modelled total NO_x (including background NO_x) (µg/m^3)	Modelled total NO_2 (based upon empirical NO_x / NO_2 relationship) (µg/m^3)	Monitored total NO_2 (µg/m^3)	% Difference (adjusted modelled NO_2 vs. monitored NO_2)
DT2	3.13		87.66	104.36	51.21	49.89	2.65
DT27	3.67		47.39	64.09	35.11	37.70	-6.87
DT28	2.78		60.06	76.76	40.46	36.80	9.95
DT48	3.56		21.00	37.69	22.96	23.90	-3.95
DT49	2.72		40.75	57.44	32.18	29.12	10.51
DT51	3.08		57.40	75.76	40.32	39.02	3.34
DT52	4.68		29.67	48.02	28.13	34.02	-17.32
DT77	4.54		38.25	56.71	32.15	38.71	-16.94
DT90	3.40		42.16	60.31	33.69	34.48	-2.29
DT32	3.12		89.33	108.76	53.34	51.91	2.75
DT87	3.66		63.79	83.66	43.81	46.96	-6.71
DT88	3.11		35.31	54.20	31.07	30.32	2.47
DT23	3.66		47.31	66.74	36.69	39.16	-6.31
DT30	3.65		39.02	58.45	33.05	35.13	-5.91
DT31	4.31		63.02	82.46	43.23	51.11	-15.41
DT5	3.05	3.258	56.34	76.21	40.78	39.29	3.78
DT6	2.89		65.93	85.80	44.67	41.67	7.19
DT42	3.34		40.58	60.45	34.03	34.50	-1.37
DT76	3.44		48.63	67.09	36.71	37.86	-3.04
DT7	2.28		90.45	106.24	51.76	41.29	25.35
DT8	2.86		36.67	53.38	30.37	28.33	7.19
DT34	2.06		43.95	60.46	33.54	26.12	28.41
DT35	3.54		40.60	57.31	32.15	33.72	-4.66
DT43	3.27		28.24	48.10	28.40	28.46	-0.20
DT54	5.32		23.10	42.97	25.96	32.74	-20.70
DT74	4.07		39.23	56.10	31.65	35.94	-11.94
DT86	3.59		41.91	58.78	32.85	34.71	-5.37
DT71	2.60		48.42	65.15	35.62	31.30	13.80
DT84	2.52		52.49	69.82	37.72	32.54	15.92
DT85	4.11		52.10	70.47	38.18	43.75	-12.72
DT24	3.21		51.01	66.71	36.10	35.81	0.82

Site ID	Ratio of monitored road contribution NO_x / modelled road contribution NO_x	Adjustment factor for modelled road contribution NO_x	Adjusted modelled road contribution NO_x (µg/m^3)	Adjusted modelled total NO_x (including background NO_x) (µg/m^3)	Modelled total NO_2 (based upon empirical NO_x / NO_2 relationship) (µg/m^3)	Monitored total NO_2 (µg/m^3)	% Difference (adjusted modelled NO_2 vs. monitored NO_2)
DT36	4.67		38.37	58.07	32.93	40.13	-17.93
DT25	1.97		38.93	58.62	33.17	26.07	27.22
DT33	4.66		42.91	58.70	32.62	40.50	-19.46
DT96	5.91		24.08	42.43	25.48	34.48	-26.10

The Model Wide (ex. Motorway and Westerham) verification was carried out using the remaining 32 monitoring sites throughout the Sevenoaks District. These can be seen, alongside the verification domain, in Figure B.4. The results of the verification are presented in Table B.6 and Figure B.4. For the majority of sites, the modelled NO_2 concentration is well within ±25% of the monitored NO_2 concentration, with the exception of DT7, DT34, and DT96. This may be a result of inaccuracies in the traffic data, or unknown/unmodelled influences. Despite this, all sites where exceedances have been monitored, have also been modelled as an exceedance, with the exception of DT85 and DT33. As discussed in the Westerham area verification, these two sites are located on directly opposite junctions, where a joining road has not been modelled.

The verification factor for the Model Wide area (ex. Motorway and Westerham) is 3.258, with an RMSE of 4.6µg/m^3 and a R^2 value of 0.638. This verification factor shall be used for all remaining modelled receptors.

Figure B.3 – Model Wide (Excluding Motorway and Westerham) Verification Domain and Diffusion Tubes used for Verification

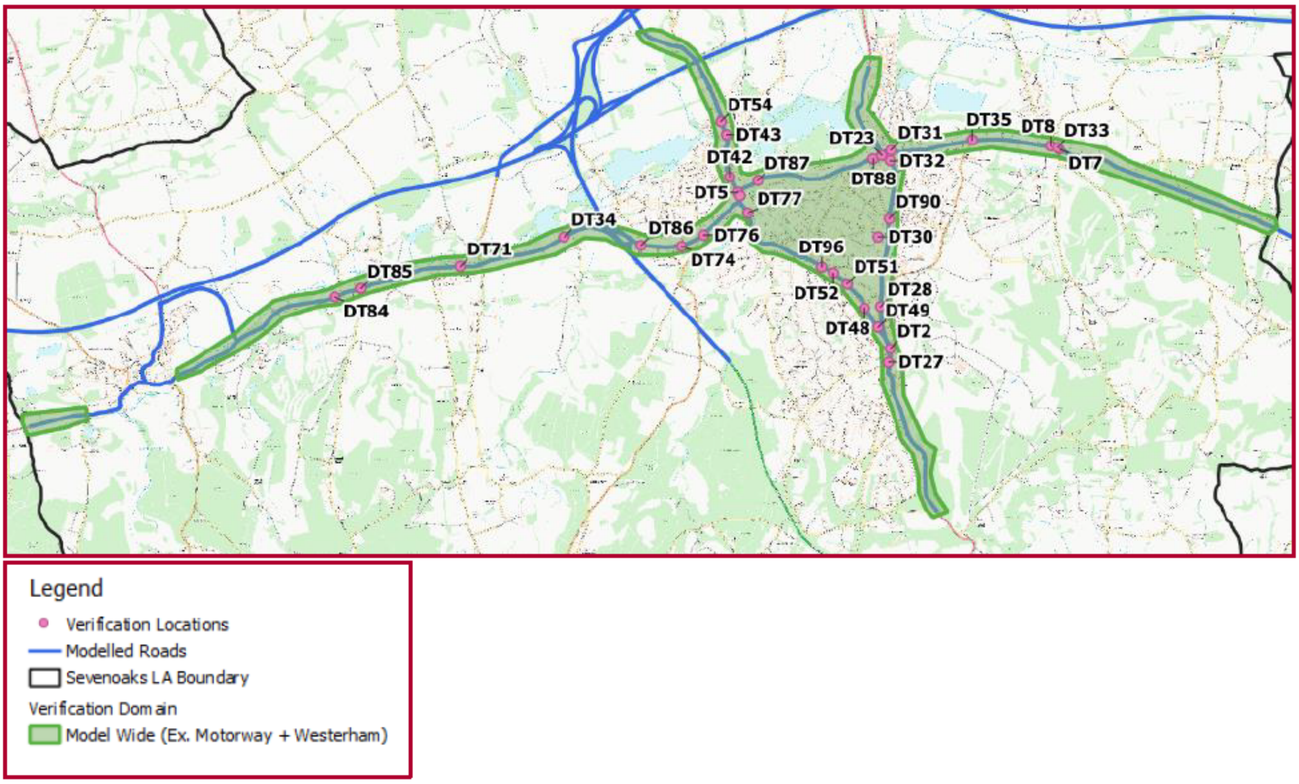
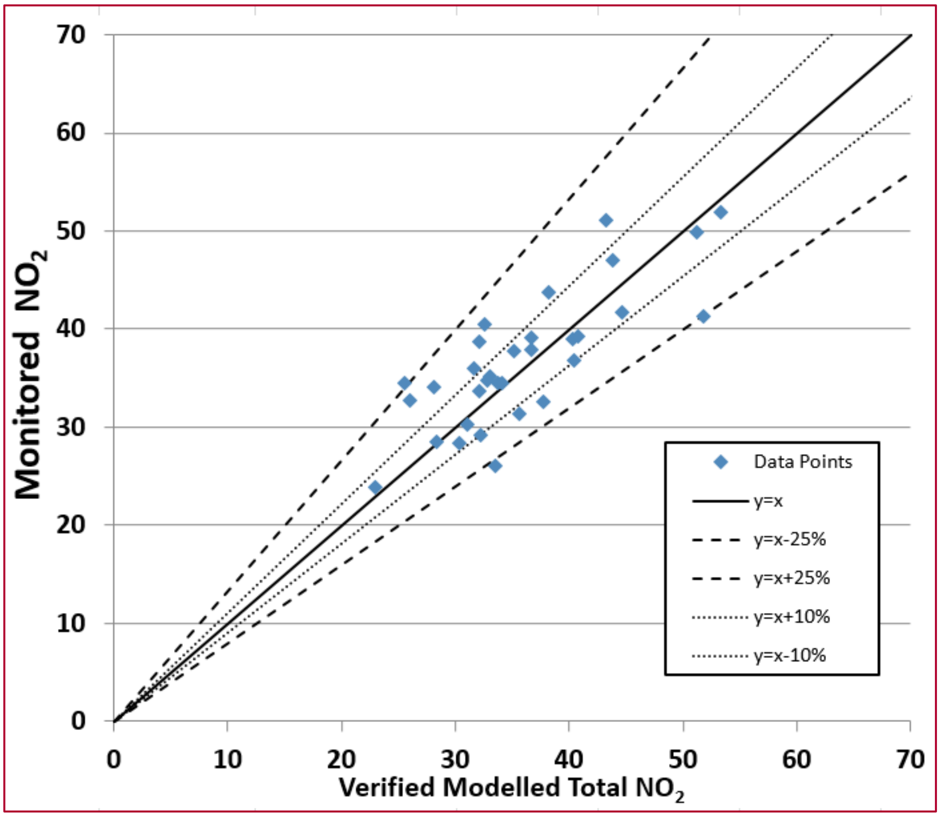


Table B.6 – Final Model Wide (Ex. Motorway and Westerham) Verification

Site ID	Ratio of monitored road contribution NO_x / modelled road contribution NO_x	Adjustment factor for modelled road contribution NO_x	Adjusted modelled road contribution NO_x ($\mu g/m^3$)	Adjusted modelled total NO_x (including background NO_x) ($\mu g/m^3$)	Modelled total NO_2 (based upon empirical NO_x / NO_2 relationship) ($\mu g/m^3$)	Monitored total NO_2 ($\mu g/m^3$)	% Difference (adjusted modelled NO_2 vs. monitored NO_2)
DT2	3.13	3.258	87.65	104.35	51.21	49.89	2.65
DT27	3.67		47.39	64.08	35.11	37.70	-6.87
DT28	2.78		60.06	76.75	40.45	36.80	9.92
DT48	3.56		20.99	37.69	22.96	23.90	-3.95
DT49	2.72		40.74	57.44	32.18	29.12	10.51
DT51	3.08		57.40	75.75	40.32	39.02	3.34
DT52	4.68		29.66	48.02	28.13	34.02	-17.32
DT77	4.54		38.24	56.70	32.15	38.71	-16.94
DT90	3.40		42.15	60.31	33.69	34.48	-2.29
DT32	3.12		89.32	108.76	53.34	51.91	2.75
DT87	3.66		63.78	83.65	43.81	46.96	-6.71
DT88	3.11		35.30	54.20	31.07	30.32	2.47
DT23	3.66		47.30	66.73	36.68	39.16	-6.33
DT30	3.65		39.01	58.45	33.05	35.13	-5.91
DT31	4.31		63.02	82.45	43.23	51.11	-15.41
DT5	3.05		56.34	76.21	40.77	39.29	3.75
DT6	2.89		65.93	85.79	44.67	41.67	7.19
DT42	3.34		40.58	60.45	34.03	34.50	-1.37
DT76	3.44		48.62	67.08	36.71	37.86	-3.04
DT7	2.28		90.44	106.23	51.75	41.29	25.32
DT8	2.86		36.67	53.38	30.37	28.33	7.19
DT34	2.06		43.95	60.46	33.54	26.12	28.41
DT35	3.54		40.60	57.31	32.14	33.72	-4.69
DT43	3.27		28.23	48.10	28.40	28.46	-0.20
DT54	5.32		23.10	42.97	25.96	32.74	-20.70
DT74	4.07		39.23	56.10	31.65	35.94	-11.94
DT86	3.59		41.91	58.78	32.85	34.71	-5.37
DT71	2.60		48.42	65.14	35.62	31.30	13.80
DT84	2.52		52.49	69.82	37.72	32.54	15.92
DT85	4.11		52.09	70.46	38.17	43.75	-12.75
DT33	4.66		42.90	58.69	32.61	40.50	-19.49
DT96	5.91		24.07	42.43	25.48	34.48	-26.10

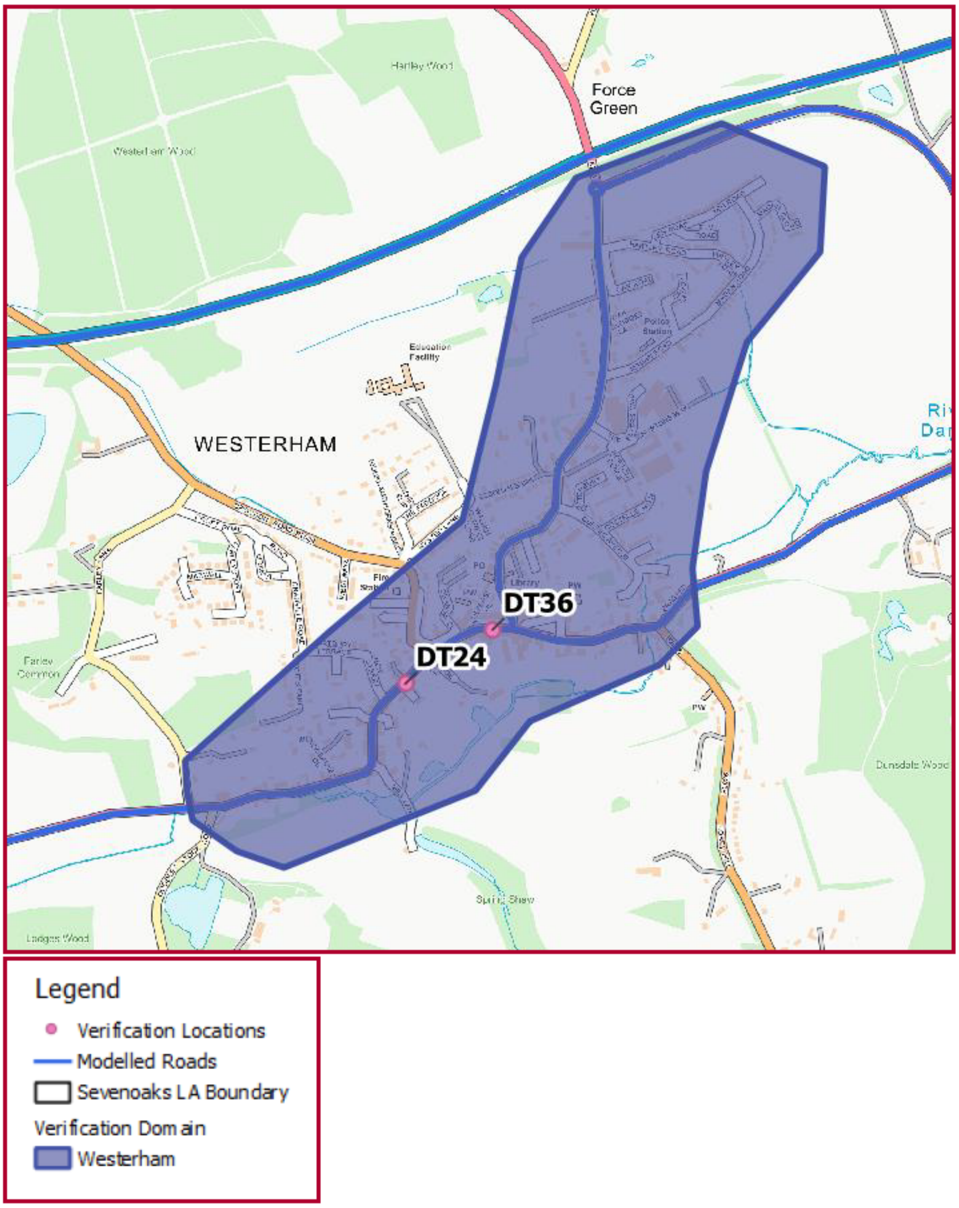
Figure B.4 – Final Model Wide (Ex. Motorway and Westerham) Adjusted Verification Monitored NO_2 Concentrations vs. Verified Modelled NO_2



Westerham Verification

Using the monitoring sites located within Westerham, DT36, DT24 and DT25, an initial verification was carried out. The verification domain and monitoring site locations can be seen in Figure B.5. The results of this is shown in Table B.7, and DT25 was significantly over predicting whilst DT36 continued to under predict. Upon further investigation, DT25 was found to be obscured by vegetation, which could impede the air flow around the tube. This would likely explain why the model is over predicting the concentration compared to the monitored concentration, and DT25 was therefore removed from the verification.

Figure B.5 – Westerham Verification Domain and Diffusion Tubes used for Verification



The final verification for the Westerham area is presented in Table B.8 and Figure B.6. Although DT36 is still under predicting, no further adjustments could be carried out to the model in this area. The under prediction is likely a result of a nearby bus stop and parking, neither of which could be modelled. This verification has an RMSE of 4.1µg/m^3, and an R^2 value of 1. The verification factor is 3.742, and shall be used for all receptors located in Westerham, south of the M25, east of Farley Lane, and west of the first bend in Brasted Road leaving Westerham (grid coordinates 545009, 154111).

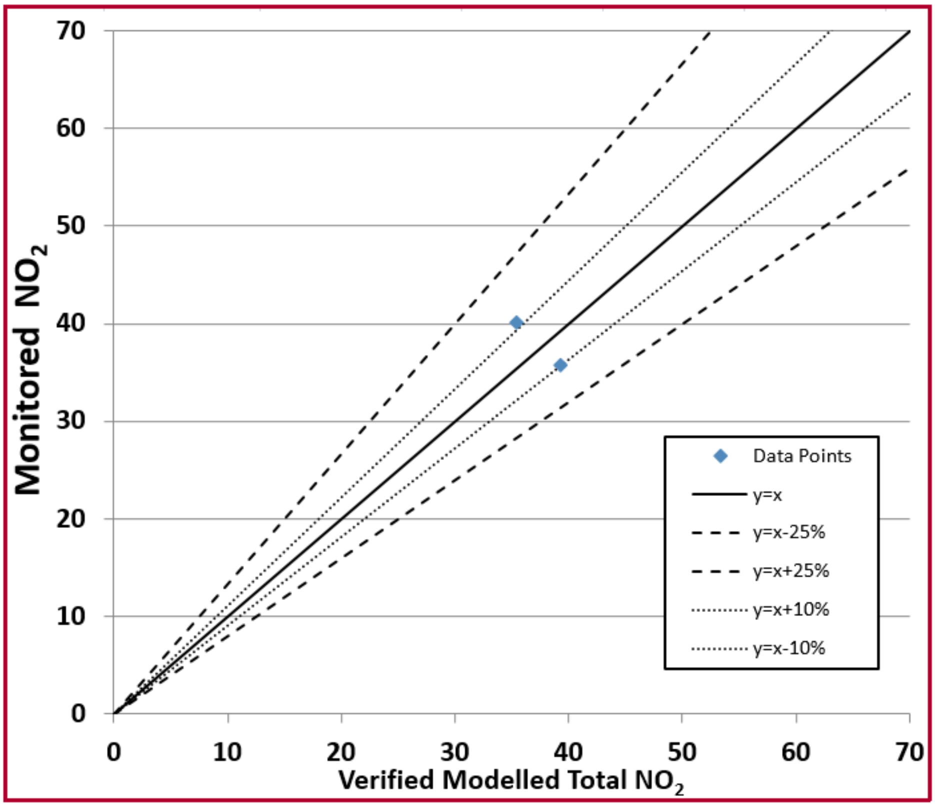
Table B.7 – Initial Westerham Area Verification

Site ID	Ratio of monitored road contribution NO_x / modelled road contribution NO_x	Adjustment factor for modelled road contribution NO_x	Adjusted modelled road contribution NO_x (µg/m^3)	Adjusted modelled total NO_x (including background NO_x) (µg/m^3)	Modelled total NO_2 (based upon empirical NO_x / NO_2 relationship) (µg/m^3)	Monitored total NO_2 (µg/m^3)	% Difference (adjusted modelled NO_2 vs. monitored NO_2)
DT36	4.67	3.263	38.43	58.12	32.95	40.13	-17.89
DT24	3.21		51.08	66.78	36.13	35.81	0.90
DT25	1.97		38.98	58.68	33.20	26.07	27.33

Table B.8 – Final Westerham Area Verification

Site ID	Ratio of monitored road contribution NO_x / modelled road contribution NO_x	Adjustment factor for modelled road contribution NO_x	Adjusted modelled road contribution NO_x (µg/m^3)	Adjusted modelled total NO_x (including background NO_x) (µg/m^3)	Modelled total NO_2 (based upon empirical NO_x / NO_2 relationship) (µg/m^3)	Monitored total NO_2 (µg/m^3)	% Difference (adjusted modelled NO_2 vs. monitored NO_2)
DT36	4.67	3.742	44.07	63.77	35.45	40.13	-11.65
DT24	3.21		58.59	74.28	39.29	35.81	9.72

Figure B.6 – Final Westerham Area Adjusted Verification Monitored NO_2 Concentrations vs. Verified Modelled NO_2



Appendix C – Background Concentrations

Table C.1 – Background Concentrations in Sevenoaks

Grid Square (X, Y)	NO_2	NO_x	PM_{10}
557500, 155500	10.5	14.3	14
545500, 154500	13.3	18.3	16
550500, 154500	11.5	15.7	15.5
553500, 158500	15	21	16.4
550500, 159500	17.5	24.9	17.3
550500, 160500	17	24.1	16.8
550500, 161500	16.7	23.7	16.7
551500, 167500	16.6	23.6	16.8
553500, 169500	21.9	32.6	17.8
557500, 165500	16.6	23.5	16.7
558500, 163500	15.4	21.7	16.3
558500, 162500	15.5	21.8	16.4
Background locations have been taken from the Defra Background Mapping resource for Sevenoaks District Council.			

Appendix D – Additional Information

Table D.1 – AQMA No.13, Summary of Modelled Receptor Results (NO_2)

Receptor ID	OS Grid X	OS Grid Y	Height (m)	In AQMA?	AQS objective (µg/m³)	2018 Annual Mean NO_2 (µg/m³)	% of AQS objective
63	553178	156506	1.5	N	40	30.1	75.2
64	553159	156547	1.5	Y	40	**41.6**	**104.0**
65	553235	156542	1.5	N	40	20.9	52.4
66	553150	156604	1.5	Y	40	25.4	63.5
67	553165	156653	1.5	Y	40	27.2	68.1
68	553109	156633	1.5	Y	40	30.3	75.7
69	553118	156648	1.5	Y	40	30.0	75.0
70	553215	156520	1.5	N	40	23.4	58.4
72	553130	156567	1.5	Y	40	*36.1*	*90.2*
73	553113	156595	1.5	Y	40	**43.5**	**108.8**
74	553111	156583	4	Y	40	**48.4**	**121.0**
75	553045	156697	1.5	Y	40	35.7	89.2
76	553012	156672	1.5	Y	40	29.5	73.8
77	552995	156627	1.5	Y	40	31.8	79.5
79	553105	156679	1.5	Y	40	**49.2**	**123.0**
80	553082	156667	1.5	Y	40	**50.8**	**127.0**
81	553168	156689	1.5	Y	40	**40.6**	**101.6**
82	553131	156686	1.5	Y	40	**49.8**	**124.5**
83	553229	156676	1.5	Y	40	32.1	80.3
84	553300	156671	1.5	Y	40	33.6	84.1
85	553312	156652	1.5	Y	40	26.3	65.7
86	553345	156678	1.5	Y	40	32.9	82.2
87	553371	156682	1.5	Y	40	33.6	83.9
88	553461	156699	1.5	N	40	27.1	67.8
89	553543	156662	1.5	N	40	22.8	56.9
90	553538	156689	1.5	N	40	31.7	79.2
91	553615	156684	1.5	N	40	25.2	63.1
92	554738	156746	1.5	Y	40	22.9	57.3
93	554481	156788	1.5	N	40	22.7	56.8
94	554562	156778	1.5	N	40	23.2	57.9
95	554642	156791	1.5	Y	40	25.8	64.5
96	554790	156766	1.5	Y	40	25.2	63.1
97	554814	156759	1.5	Y	40	26.8	67.1
98	554900	156742	1.5	Y	40	31.5	78.8
99	554924	156722	1.5	Y	40	25.9	64.7
100	554968	156715	1.5	Y	40	25.5	63.7
101	554972	156735	4	Y	40	22.4	56.1
102	554989	156732	1.5	Y	40	29.7	74.2
103	554992	156712	1.5	Y	40	25.1	62.8
104	555010	156709	1.5	Y	40	24.6	61.5
105	555047	156703	1.5	Y	40	25.8	64.4
106	555062	156713	1.5	Y	40	34.3	85.7
107	555105	156698	1.5	Y	40	**57.8**	**144.6**
108	555113	156686	1.5	Y	40	**53.5**	**133.7**
109	555141	156682	1.5	Y	40	**49.3**	**123.1**
110	557280	155925	1.5	N	40	22.0	55.0
111	555978	156382	1.5	N	40	19.3	48.2
112	554028	156812	1.5	N	40	20.7	51.8
113	553869	156772	1.5	N	40	25.4	63.4
114	552986	156577	1.5	Y	40	25.5	63.8

Receptor ID	OS Grid X	OS Grid Y	Height (m)	In AQMA?	AQS objective (µg/m³)	2018 Annual Mean NO_2 (µg/m³)	% of AQS objective
115	552971	156616	1.5	Y	40	30.0	75.1
116	552874	156576	1.5	Y	40	27.4	68.5
117	552893	156539	1.5	Y	40	24.5	61.3
118	552810	156494	1.5	Y	40	22.5	56.1
119	552784	156537	1.5	N	40	26.1	65.3
120	552709	156473	1.5	N	40	26.0	65.1
121	552609	156444	1.5	N	40	24.9	62.2
122	552206	156366	1.5	N	40	30.4	76.1
123	552166	156337	1.5	N	40	23.2	58.0
124	551842	156373	1.5	N	40	26.7	66.7
125	551764	156360	1.5	N	40	27.7	69.2
126	551698	156344	1.5	Y	40	31.0	77.4
127	551629	156306	1.5	Y	40	32.7	81.9
128	551573	156296	1.5	Y	40	**44.9**	**112.2**
129	551547	156286	1.5	Y	40	**43.9**	**109.7**
130	551427	156222	3	Y	40	**42.3**	**105.8**
131	551459	156257	5	Y	40	30.7	76.6
132	551406	156210	4	Y	40	32.2	80.5
133	551364	156265	1.5	Y	40	29.3	73.1
134	551374	156308	1.5	Y	40	*36.9*	*92.3*
135	551349	156301	1.5	Y	40	30.4	76.1
136	551309	156392	1.5	Y	40	*37.4*	*93.6*
137	551315	156426	1.5	Y	40	35.2	87.9
138	551297	156461	1.5	Y	40	*37.9*	*94.7*
139	551393	156272	4	Y	40	30.8	77.1
140	551295	156828	4	Y	40	24.2	60.4
141	551302	156811	1.5	Y	40	26.4	66.1
142	551280	156875	1.5	Y	40	28.0	69.9
143	551255	156941	1.5	Y	40	27.3	68.3
144	551225	156954	1.5	Y	40	24.4	61.0
145	551247	156999	1.5	Y	40	24.0	60.1
146	551200	157069	1.5	Y	40	25.3	63.3
147	551215	157109	1.5	Y	40	29.5	73.9
148	551191	157187	1.5	Y	40	26.0	65.0
149	551157	157271	4	Y	40	23.5	58.7
150	551136	157354	1.5	Y	40	23.7	59.2
151	551100	157343	1.5	Y	40	24.8	62.0
152	551086	157391	1.5	Y	40	27.9	69.8
153	551066	157458	1.5	Y	40	*37.0*	*92.5*
154	551030	157502	1.5	Y	40	*36.5*	*91.3*
155	551049	157465	1.5	Y	40	*38.0*	*95.1*
156	550993	157564	1.5	Y	40	29.4	73.5
157	551011	157584	1.5	Y	40	30.4	75.9
160	551088	157416	1.5	Y	40	*37.8*	*94.5*
165	551413	156184	1.5	Y	40	**42.9**	**107.2**
166	551413	156164	6	Y	40	27.1	67.9
167	551421	156115	4	Y	40	34.1	85.3
168	551419	156086	4	Y	40	*37.2*	*93.0*
169	551512	156006	1.5	Y	40	30.3	75.8
170	551519	155985	1.5	Y	40	33.0	82.5
171	551525	155973	1.5	Y	40	33.5	83.8

Receptor ID	OS Grid X	OS Grid Y	Height (m)	In AQMA?	AQS objective (µg/m³)	2018 Annual Mean NO_2 (µg/m³)	% of AQS objective
172	551520	155950	1.5	N	40	26.4	66.1
173	551536	155971	1.5	N	40	27.0	67.5
195	551374	156039	1.5	Y	40	32.2	80.5
196	551326	156019	1.5	N	40	**41.9**	**104.9**
197	551222	155930	1.5	N	40	32.5	81.4
198	551074	155708	1.5	N	40	21.3	53.3
199	551047	155683	1.5	N	40	21.2	52.9
200	551003	155817	1.5	N	40	21.0	52.4
201	550936	155675	1.5	N	40	32.6	81.5
202	550908	155664	1.5	N	40	30.1	75.3
203	550934	155643	1.5	N	40	26.3	65.8
204	550854	155633	1.5	N	40	34.5	86.1
205	550788	155573	1.5	N	40	23.4	58.4
206	550720	155578	1.5	Y	40	*36.1*	*90.2*
207	550609	155592	1.5	N	40	28.1	70.3
208	550535	155559	1.5	N	40	27.8	69.5
209	550414	155576	1.5	N	40	32.6	81.5
210	550328	155582	1.5	Y	40	30.1	75.3
211	550255	155599	1.5	N	40	30.0	74.9
212	550266	155688	1.5	N	40	26.0	64.9
213	550265	155713	1.5	N	40	24.7	61.8
214	549470	155731	1.5	N	40	27.0	67.4
216	549054	155524	1.5	N	40	31.8	79.5
217	548893	155468	1.5	N	40	25.8	64.4
218	548770	155449	1.5	N	40	27.1	67.8
219	548724	155444	1.5	N	40	31.2	78.0
220	548530	155409	1.5	N	40	35.4	88.5
221	548496	155394	1.5	Y	40	*38.4*	*95.9*
222	548475	155360	5	N	40	21.4	53.6
223	548294	155359	1.5	Y	40	*36.7*	*91.7*
224	548267	155340	1.5	N	40	26.7	66.9
225	548126	155357	1.5	N	40	31.4	78.4
226	547746	155313	1.5	Y	40	33.0	82.5
227	547957	155328	1.5	N	40	31.7	79.3
229	547513	155213	1.5	Y	40	**41.5**	**103.8**
230	547420	155196	1.5	Y	40	*36.9*	*92.4*
231	546278	154908	1.5	N	40	31.4	78.5
232	547346	155163	1.5	Y	40	29.2	72.9
233	547244	155140	1.5	Y	40	30.9	77.2
234	547215	155147	1.5	Y	40	*36.9*	*92.2*
235	547131	155113	1.5	Y	40	**41.6**	**104.0**
236	547084	155080	1.5	Y	40	27.9	69.8
237	546953	155055	1.5	Y	40	*36.4*	*90.9*
238	546881	155035	1.5	Y	40	**45.2**	**113.0**
239	546810	155010	1.5	Y	40	34.5	86.3
240	546715	154955	1.5	N	40	25.5	63.7
241	546169	154830	1.5	N	40	24.8	62.0
242	545436	154293	1.5	N	40	21.6	53.9
243	544965	154099	1.5	N	40	24.9	62.4
244	544917	154024	1.5	Y	40	30.0	75.1
245	544814	154010	1.5	Y	40	*38.3*	*95.7*

Receptor ID	OS Grid X	OS Grid Y	Height (m)	In AQMA?	AQS objective (µg/m³)	2018 Annual Mean NO_2 (µg/m³)	% of AQS objective
246	544743	154006	1.5	Y	40	*39.7*	*99.2*
247	544664	154008	5	Y	40	22.1	55.3
248	544534	154024	5	Y	40	25.5	63.8
249	544487	154010	6	Y	40	23.0	57.5
250	544484	153978	5	Y	40	21.3	53.2
251	544747	153998	1.5	Y	40	33.7	84.4
252	544584	154019	5	Y	40	23.6	59.0
253	544424	153924	1.5	Y	40	**58.3**	**145.7**
255	544405	153917	1.5	Y	40	32.6	81.5
256	544379	153879	1.5	Y	40	**47.5**	**118.7**
257	544349	153855	1.5	Y	40	**48.8**	**122.0**
258	544353	153808	1.5	Y	40	*38.1*	*95.3*
259	544340	153778	1.5	Y	40	34.2	85.5
260	544345	153731	1.5	Y	40	22.5	56.3
261	544285	153722	1.5	Y	40	30.5	76.2
262	544197	153699	1.5	N	40	30.5	76.3
263	544612	154118	1.5	Y	40	**40.7**	**101.8**
264	544597	154177	1.5	Y	40	27.4	68.4
265	544636	154199	1.5	Y	40	30.7	76.9
266	544678	154235	1.5	Y	40	33.6	84.0
267	544720	154298	1.5	N	40	35.3	88.3
268	544629	154066	1.5	Y	40	**59.4**	**148.5**
271	552418	156463	1.5	N	40	20.0	49.9
272	552356	156452	1.5	N	40	19.7	49.3
121a	552643	156490	1.5	N	40	29.7	74.3
198a	551109	155824	1.5	N	40	30.5	76.4
224a	548153	155334	1.5	N	40	25.4	63.5

Table D.2 – Outside AQMAs, Summary of Modelled Receptor Results (NO_2)

Receptor ID	OS Grid X	OS Grid Y	Height (m)	AQS objective (µg/m³)	2018 Annual Mean NO_2 (µg/m³)	% of AQS objective
1	553545	152728	1.5	40	15.7	39.3
2	553521	152909	1.5	40	14.8	37.0
3	553156	153948	1.5	40	15.9	39.7
4	553205	153936	1.5	40	18.8	47.1
5	553193	153988	1.5	40	22.6	56.4
6	553178	154097	1.5	40	24.4	61.0
7	553126	154138	1.5	40	34.3	85.8
8	553139	154142	1.5	40	*37.1*	*92.7*
9	553125	154160	1.5	40	35.6	89.0
10	553139	154163	1.5	40	30.1	75.2
11	553126	154176	1.5	40	33.5	83.7
45	553047	155144	1.5	40	23.9	59.8
46	553114	155464	1.5	40	24.8	61.9
47	553102	155532	1.5	40	24.4	60.9
48	553107	155579	1.5	40	22.6	56.4
49	553150	155670	1.5	40	22.1	55.3
50	553111	155746	1.5	40	21.8	54.4
51	553148	155806	1.5	40	24.0	60.0

Receptor ID	OS Grid X	OS Grid Y	Height (m)	AQS objective (µg/m^3)	2018 Annual Mean NO_2 (µg/m^3)	% of AQS objective
52	553141	155843	4	40	22.8	57.1
53	553117	155863	1.5	40	23.6	59.0
54	553146	155913	1.5	40	32.0	80.0
55	553147	155936	1.5	40	35.2	88.0
56	553196	156142	1.5	40	25.0	62.5
57	553165	156026	1.5	40	35.0	87.5
58	553149	156055	1.5	40	24.3	60.8
59	553173	156195	1.5	40	24.5	61.3
60	553195	156300	1.5	40	30.8	76.9
61	553219	156401	1.5	40	26.5	66.2
62	553192	156478	4	40	23.4	58.6
71	553194	156417	1.5	40	26.6	66.6
78	552837	157395	1.5	40	28.2	70.5
162	550659	157892	1.5	40	30.7	76.9
163	550557	157927	1.5	40	30.5	76.3
164	550388	157994	1.5	40	32.8	82.1
174	551590	155693	1.5	40	21.9	54.7
175	551651	155657	4	40	21.3	53.4
176	551934	155588	1.5	40	20.8	51.9
177	552001	155537	1.5	40	23.2	57.9
178	552356	155353	5	40	19.2	48.0
179	552384	155340	4	40	20.3	50.8
180	552418	155311	6	40	17.7	44.4
181	552479	155301	1.5	40	25.8	64.5
182	552460	155280	4	40	19.2	48.1
183	552511	155281	1.5	40	25.1	62.8
184	552501	155248	1.5	40	20.7	51.7
185	552656	155168	1.5	40	27.3	68.3
186	552683	155113	1.5	40	**41.3**	**103.2**
187	552727	155067	1.5	40	**41.1**	**102.8**
188	552764	155033	4	40	*38.7*	*96.8*
189	552821	155005	1.5	40	25.5	63.7
190	552849	154957	1.5	40	28.0	69.9
191	552849	154913	1.5	40	24.8	62.1
192	552944	154741	8	40	15.6	39.1
193	552974	154698	4	40	**42.6**	**106.5**
194	553033	154608	4	40	19.8	49.5
269	544796	154496	1.5	40	28.7	71.7
273	550239	155519	1.5	40	19.0	47.6
274	550821	154855	1.5	40	21.7	54.2
339	553062	167386	1.5	40	20.3	50.8
340	553037	167315	1.5	40	20.0	49.9
341	553295	167426	1.5	40	20.6	51.6
78a	552855	157312	1.5	40	25.7	64.3

2020 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management

2020

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Report Reference number	SDC_ASR2020
Date	2020

Executive Summary: Air Quality in Our Area

This report fulfils the requirements of the Local Air Quality Management as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents.

Monitoring in 2019 has shown a decrease in NO_2 levels at all monitoring locations from levels monitored in 2018. Only one diffusion tube recorded levels above the annual mean objective where there is relevant exposure.

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].

[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

Air Quality in Sevenoaks

The primary source of air pollution within the district is from nitrogen dioxide and particulate matter from road traffic. The district is traversed by three major motorways and these have a considerable flow of continental HGVs using the port at Dover and the Channel Tunnel. Local journeys, school runs, commuting to London or connection with London contribute significantly to a number of hot spots in Sevenoaks, Swanley and in several small towns along the A25 road.

Air quality monitoring in 2019 has shown a decrease in NO_2 levels at all monitoring locations. Only five of the 49 diffusion tube recorded NO_2 levels above the annual average objective.

A decrease in levels were reported at the continuous monitors for both NO_2 and PM_{10}. No breaches of the NO_2 hourly mean or PM_{10} daily mean objectives were recorded within the District.

All results that show any breaches of the annual objectives are located within current AQMA's.

The majority of monitoring carried out within the district is at locations classified as being roadside, and consideration should be given that these results do not indicate the levels of exposure at the nearest receptor to the pollution source. Monitored levels have been corrected for distance to the nearest residential receptor where appropriate. This is displayed in table B1 and full details of the calculations can be found in Appendix C.

Following the distance correction only one diffusion tube recorded levels above the annual mean objective where there is relevant exposure.

Actions to Improve Air Quality

The primary source of nitrogen dioxide pollution within the district is from road traffic, many of the actions to reduce nitrogen dioxide pollution requires the input of highways authorities. Sevenoaks District Council continues to work closely with Kent County Council Highways. Air quality is a theme that is fed into the Sevenoaks Joint Transport Board.

As well as actions to improve air quality Sevenoaks District Council also operates a scheme with an aim to improve health and reduce exposure to air pollution. Sevenoaks District Council provides a free messaging service that will send free messages to mobile or home telephones to inform vulnerable people that poor air quality is predicted in the area.

Sevenoaks District Council has commissioned air quality consultants BureauVeritas to carry out a review of the existing AQMAs and to produce a new Air Quality Action Plan which will incorporate new measures to reduced levels of pollution within the declared AQMA's.

The council now has eight electrical charging bays within the town centre Buckhurst car park as well as operating two electric vehicles as part of its fleet. Sevenoaks District Council was part of a successful bid with Kent County Council and five other district councils for funding to provide rapid chargers to be used by taxis and private hire vehicles.

Conclusions and Priorities

Significant improvements in local air quality have been identified in 2019 with only one monitoring location showing levels of NO_2 in exceedance of air quality objectives when distance corrected to the nearest relevant receptor.

The lower levels of nitrogen dioxide recorded in 2019 is likely to mean that the some of the current AQMAs will be able to be amended or revoked in the near future.

As part of the work to develop a new Air Quality Action Plan a review of the existing AQMAs is to be carried out.

The priority for 2020 is for the finalisation of the new Air Quality Action Plan and for progress to begin on the delivery of the measures detailed within the plan.

Local Engagement and How to get Involved

Members of the public can help to improve air quality by making small changes to their everyday lives.

- Walking and cycling instead of making car journeys will reduce the amount of traffic on the local roads and reducing emissions and also helping to improve the congestion. Other small changes include not allowing car engines to idle when vehicles are stationary.
- Anticipate traffic flow, keeping in the highest gear possible and maintaining a steady speed at a low revs per minute (RPM). This will help to reduce pollution from your car, and save on fuel consumption.
- Consider purchasing a cleaner electric, hybrid vehicle or one that meets the euro 6 emission standard.
- Maintain your vehicle regularly, if a diesel, make sure the oil and filters are changed frequently. If you notice sooty emissions from the exhaust, take your vehicle to a servicing garage as soon as possible. Ensure your tyres are maintained at the optimum pressure to achieve the best fuel consumption and save you money.
- Turn off your engine when your vehicle is stationary; not only will this reduce your emissions but you will also save fuel.
- Avoid using your car for short journeys - short trips are very polluting as vehicle engines needs to reach a very high temperature to work efficiently; on short trips it won't reach that temperature.
- For short journeys, walking, cycling and public transport can be the best and cheapest option.
- Sevenoaks District Council operates a free service which provides an early warning of poor air quality by text/SMS, voice-mail or e-mail for individuals with asthma or poor respiratory health.
- Avoid/reduce the burning of solid fuels and garden bonfires as these produce significant particulate pollution.

- Some areas of the District are subject to smoke control orders under the Clean Air Act 1993. Residents can check if their property is include by visiting the councils Website.

In a Smoke Control area only fuel on the list of authorised fuels, or any of the following ‘smokeless’ fuels can be burned, unless an exempt appliance is used.

- Anthracite
- Semi-anthracite
- Gas
- Low volatile steam coal

Even if your property is not within a Smoke Control Area, you should be aware that appliances that burn solid fuel contribute to local air pollution and evidence is that their contribution is increasing due to the popularity of solid fuel burning for occasional heating requirements, especially in the winter time. Domestic solid fuel burning can generate significant levels of particulate pollution, and the council have noted an increase in complaints concerning smoke emitted from domestic properties. Non-compliance with the smoke control rules can result in a fine of up to £1000.

The Department for Environmental Food and Rural Affairs have produced Guidance should residents still wish to use solid fuels or solid fuel appliances.

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1 Local Air Quality Management

This report provides an overview of air quality in Sevenoaks District Council during 2019. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

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

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Sevenoaks District Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at: http://www.sevenoaks.gov.uk/services/community-and-living/pollution/air-quality or see full list at http://uk-air.defra.gov.uk/aqma/list

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
AQMA 1	01/03/2002 Amended 2005	NO2 Annual Mean	SDC	Junction 3 of the M25 to the district boundary with Tonbridge and Malling Borough Council including part of the A20 at Farningham.	YES		45 µg/m³	(DT26)	27.2 µg/m3	Sevenoaks Air Quality Action Plan	2009	http://www.sevenoaks.gov.uk/services/community-and-living/pollution/air-quality
AQMA 2	01/03/2002	NO2 Annual Mean	SDC	County border with Surrey to district border with Dartford, including Junctions 3, 4 and 5 and the extension of Junction 5 to connect with the	YES		55 µg/m³	(DT12)	26.4 µg/m3	Sevenoaks Air Quality Action Plan	2009	http://www.sevenoaks.gov.uk/services/community-and-living/pollution/air-quality

				A25 at Bessel's Green								
AQMA 3	01/03/2002	NO2 Annual Mean	SDC	M26 - from junction 5 of the M25 to the district boundary with Tonbridge and Malling Borough Council.	YES		50 µg/m^3	No current monitoring		Sevenoaks Air Quality Action Plan	2009	http://www.sevenoaks.gov.uk/services/community-and-living/pollution/air-quality
AQMA 4	01/03/2002	NO2 Annual Mean	Swanley	Swanley Bypass - from junction 3 of the M25 to the district boundary with the London Borough of Bromley	YES		45 µg/m^3	No current monitoring		Sevenoaks Air Quality Action Plan	2009	http://www.sevenoaks.gov.uk/services/community-and-living/pollution/air-quality
AQMA 6	01/09/2006	PM10 24 Hour Mean	SDC	Junction 5 to Kent / Surrey border	YES		Risk predicted	No current monitoring		Sevenoaks Air Quality Action Plan	2009	http://www.sevenoaks.gov.uk/services/community-and-living/pollution/air-quality
AQMA 8	01/09/2006	NO2 Annual Mean	Swanley	Swanley – London Road (East); High Street; Bartholomew Way and parts of Central town area	YES		56.7 µg/m^3	(DT40)	28.3 µg/m3	Sevenoaks Air Quality Action Plan	2009	http://www.sevenoaks.gov.uk/services/community-and-living/pollution/air-quality

AQMA 10	10/01/2008	NO2 Annual Mean	Sevenoaks	Sevenoaks – High Street & London Road	YES		46.5 µg/m^3	(DT51)	27.7 µg/m3	Sevenoaks Air Quality Action Plan	2009	http://www.sevenoaks.gov.uk/services/community-and-living/pollution/air-quality
AQMA 13	14/01/2014	NO2 Annual Mean	SDC	The entire length of the A25 from the border with Tonbridge and Malling in the east to the border with Tandridge in the west.	YES		55.3 µg/m^3	(DT32)	40.5 µg/m3	Sevenoaks Air Quality Action Plan	2009	http://www.sevenoaks.gov.uk/services/community-and-living/pollution/air-quality
AQMA 14	14/01/2014	NO2 Annual Mean	Swanley	The junction of London Road and Birchwood Road, Swanley.	YES		48.8 µg/m^3	(DT83)	38.2 µg/m3	Sevenoaks Air Quality Action Plan	2009	http://www.sevenoaks.gov.uk/services/community-and-living/pollution/air-quality

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

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

Defra's appraisal of last year's ASR concluded

The report is generally considered to be well structured, very detailed and comprehensive, and provides the all the information specified in the Guidance, as well as some extra detailed modelling in support of AQMA declarations. More specific comments include:

1. The diffusion tube mapping is comprehensive and clearly demonstrates the monitoring network. However, labelling of the AQMAs in the maps could be made clearer by using the SITE ID code rather than the names and a single map of all the AQMAs would be a helpful addition in future ASRs.

2. Monitoring QA/QC is considered robust. The local bias factor was used and calculations were shown. The bias factor was also compared to the national factor to check it is representative as previously suggested.

3. The Council should give consideration to $PM_{2.5}$ in the new AQAP. Examples of measures that would target that pollutant include regulation of smoke control areas, dust mitigation, wood burning etc.

4. Links to public health outcomes framework should be included in future ASRs.

5. The new AQAP should aim to be included in the 2020 ASR for all AQMAs and should consider more measures to reduce exceedances within the AQMAs.

6. Labelling of diffusion tubes in table A.2, A.3 would be easier to read if tubes were ordered by ascending site ID numbers.

Sevenoaks District Council has taken forward a number of direct measures during the current reporting year of 2019 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

More detail on these measures can be found in their respective Action Plans.

Sevenoaks District Council's priorities for the coming year are to finalise the new Air Quality Action Plan and to begin action to implement the measures detailed in the plan.

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

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	The Sevenoaks Joint Transport Board will continue to consider and review options and proposals made under the Traffic Management Act and the LTP as well as via the Member/Officer air quality working group and both liaise and lobby KCC Highways Services to establish scheme acceptance, prioritisation and funding	Traffic Management	Other	SDC	2009-13	2009-13	N/A	<0.4ugm/3	Ongoing	N/A	
2	The District Council will continue to consider the impact new developments have on air quality and take appropriate steps to minimise any increase in air	Policy Guidance and Development Control	Other	SDC	2009-13	2009-13	N/A	<0.4ugm/4	Ongoing	N/A	

3	Set up an internal working group to identify, implement and monitor air quality mitigation measures secured by Section 106 Agreement.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	SDC	2009-13	2009-13	N/A	<0.4ugm/5	Working group set up and meeting regularly	N/A	Working group set up and meeting regularly
4	For the KCC/SDC Member/officer air quality working group to make recommendations to the JTB regarding suitable traffic reducing proposals	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	SDC	2009-10	2011-13	N/A	<0.2ugm/6	Ongoing	Ongoing	Regular liaison and reporting of air quality issues to JTB
5	The Council will demonstrate best practice in the purchase and operation of its own vehicle fleet in order to cut harmful emissions where possible	Traffic Management	UTC, Congestion management, traffic reduction	SDC	Ongoing	Ongoing	N/A	No Specific Target	Ongoing	Ongoing	SDC currently operate 2 Electric cars used for parking enforcement, 2 electric bicycles and an electric road sweeper.
6	The District Council will continue to promote and publicise schemes including working with partners where appropriate to encourage a reduction in car use	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	SDC	2009-13	2009-13	N/A	No Specific Target	Ongoing	Ongoing	10 electric vehicle charging points recently installed in public car parks and a programme to install more points in districts car parks in coming year
7	Reducing congestion and improving air quality as a result	Promoting Travel Alternatives	Personalised Travel Planning	SDC	Ongoing	Ongoing	N/A	No Specific Target	Ongoing	Ongoing	Regular review of car parks to help ensure drivers can find convenient

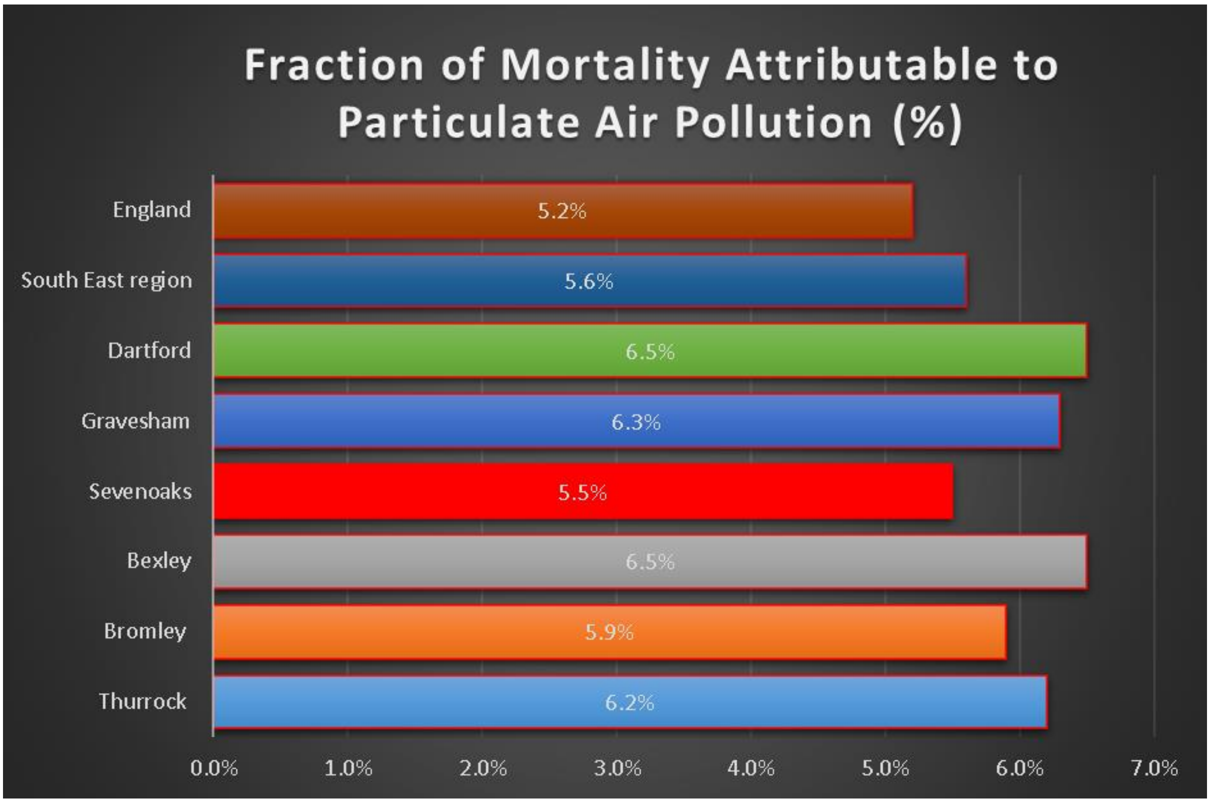
	through parking schemes										parking rather than searching for a space.
8	The District Council will promote a number of initiatives to reduce energy consumption, improve energy efficiency and recycling and develop its carbon management role	Traffic Management	Emission based parking or permit charges	SDC	Ongoing	Ongoing	N/A	<0.2umg/3	Ongoing	Ongoing	Retrofitting low carbon measures in housing stock encouraging switch and save.
9	Continue to improve and raise the level of knowledge and publicity relating to air pollution	Policy Guidance and Development Control	Other policy	SDC	Ongoing	Ongoing	N/A	No Specific Target	Ongoing	Ongoing	SDC is a member of the London Air Quality Network which disseminates information and health advice via their website.
10	AirAlert: Provide AQ health warning for vulnerable people advising them about pollution levels in their area.	Public Information	Other	SDC	Ongoing	Ongoing	N/A	No Specific Target	Ongoing	Ongoing	AirAlert service has been supplemented by the development of an AirAlert app. Allowing information to be accessed by a wider audience.
11	Kent Planning Guidance	Other	Other	Kent and Medway Air Quality Partnership	Completed but not adopted				Whilst not adopted the guidance is being used informally as an advice note to developers		Guidance due for renewal before formal adoption

12	Kent Energy & Low Emission Strategy	Other	Other	KCC/Kent Air Quality Partnership					Working closely with Kent County Council over the formation of an Energy and Low Emissions Strategy. The aim of the strategy is to identify and prioritise action to reduce harmful emissions that contribute to climate change and poor air quality leading to impacts on people's health.	Draft strategy produced – Consultation being carried out June/July 2019	

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

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

The Public Health Outcomes Framework data tool compiled by Public Heath England (5) quantifies the mortality burden of PM2.5 within England on a National, Regional and Local Authority scale. The latest available data (2018) shows the fraction of mortality attributable to air pollution across England is 5.2% and 5.6% within the South East region. The fraction within Sevenoaks District Council 5.5%.



(5) https://fingertips.phe.org.uk/profile/public-health-outcomes-framework

Sevenoaks District Council is working on producing a new Air Quality Action Plan that will include appropriate measures to reduce $PM_{2.5}$ as well as other priority pollutants.

Parts of the District are subject to smoke control orders under the Clean Air Act 1993. Appliances that burn solid fuel contribute to local air pollution and evidence is that their contribution is increasing due to the popularity of solid fuel burning for occasional heating requirements, especially in the winter time. Non-compliance with the smoke control rules can result in a fine of up to £1000.

The Council will continue to work with developers and planners to reduce particulate emissions from construction site and if necessary take enforcement action if required.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with objectives.

Sevenoaks District Council undertook automatic (continuous) monitoring at 2 sites during 2019.Table A.1 in Appendix A shows the details of the sites.

National monitoring results are available at https://uk-air.defra.gov.uk/data/

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

3.1.2 Non-Automatic Monitoring Sites

Sevenoaks District Council undertook non- automatic (passive) monitoring of NO_2 at 49 sites during 2019. Table A.2 in Appendix A shows the details of the sites.

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

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias[4], “annualisation” (where the data capture falls below 75%), and distance correction[5]. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3. Note that the concentration data presented in Table A.3 represents the concentration

[4] https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html
[5] Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

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

Levels of NO2 between 9.9 & 25.7 µg/m^3 have been recorded in 2019 at 2 background sites.

The majority of monitoring carried out within the District of Sevenoaks is at locations classified as being roadside, and consideration should be given that these results do not indicate the levels of exposure at the nearest receptor to the pollution source. Monitored levels have been corrected for distance to the nearest residential receptor where appropriate. This is displayed in table B1 and full details of the calculations can be found in Appendix C.

Monitored levels of NO_2 have decreased at the majority of sites across the borough. Only 5 out of the 49 monitoring sites breached the annual objective level, all of these are already within the declared AQMA's.

The diffusion tube monitoring location with the highest recorded value in 2019 was DT32 which recorded a value of 41.3 µg/m^3 (40.5 µg/m^3 at closest receptor). This is below the threshold for where a risk of a breach of the 1-hour mean objective may be present.

There were no occasions where the hourly mean level exceeded the 200 µg/m^3 threshold at any of the three automatic monitoring stations.

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

3.2.2 Particulate Matter (PM_{10})

Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

Particulate matter is monitored in the form of PM_{10} at one roadside monitoring station and one background station. As was seen in previous years there were no breaches of either the annual mean or the 24 hour mean objectives at the three automatic monitoring station. The annual mean levels recorded at these stations has been fairly constant over the past few years.

Appendix A: Monitoring Results

Table A.1 - Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	Greatness	Urban Background	553603	156774	NOx, NO, NO2, PM10, O3	NO	Chemiluminescent / Teom	Y	46m	1.8
CM2	Bat & Ball	Roadside	553044	156690	NOx, NO, NO2, PM10	YES	Chemiluminescent / Teom	N - (30m)	8m	1.8

Notes:

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

(2) N/A if not applicable

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

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [(1)]	Distance to kerb of nearest road (m) [(2)]	Tube collocated with a Continuous Analyser?	Height (m)
DT2	High Street South 1 (Guitar) Sevenoaks	Roadside	553157	154415	NO2	Y	Y	1	N	2m
DT3	Garvock Drive Sevenoaks	Urban Background	552467	154167	NO2	N	Y	0	N	2m
DT27	High Street South 2 (Sev School) Sevenoaks	Roadside	553139	154259	NO2	Y	Y	3	N	2.5m
DT28	High Street North 2 (Sev Sennockian) Sevenoaks	Kerbside	553043	154890	NO2	Y	N (2m)	0.5	N	2.5m
DT29	High Street North 3 (Water Trough) Sevenoaks	Roadside	553073	155026	NO2	Y	N (3m)	2	N	2.5m
DT48	73 London Road(Brunch) Sevenoaks	Roadside	552863	154873	NO2	Y	Y	1.5	N	2m
DT49	20 London Road (Butchers) Sevenoaks	Roadside	553018	154654	NO2	Y	Y	2	N	2m

DT51	130 London Road (Opp Car Sales) Sevenoaks	Kerbside	552662	155153	NO2	Y	N (3m)	0.5	N	2.5m
DT52	142 London Road (Lulworth) Sevenoaks	Roadside	552506	155272	NO2	Y	N (6m)	2	N	2.5m
DT77	Montreal Cott/ Amherst Hill Sevenoaks	Roadside	551529	155967	NO2	Ny	N (4m)	2	N	2.5m
DT87	Bradbourne Vale Road South	Roadside	551640	156335	NO2	Y	N (10m)	2.5	N	2.5m
DT88	Bradbourne Vale Road North	Roadside	552963	156583	NO2	Y	N (20m)	1.5	N	2.5m
DT90	4a St Johns Hill Sevenoaks	Roadside	553140	155898	NO2	N	N (4m)	1.5	N	2.5m
DT23	Bat & Ball 1 Sevenoaks (Ferrari)	Roadside	553059	156624	NO2	Y	Y	4	N	2.5m
DT30	Bat & Ball 2 Otford Road Sevenoaks	Roadside	553019	155692	NO2	Y	N (7m)	3	N	2.5m
DT31	Bat & Ball 3 Seal Road Sevenoaks	Roadside	553165	156685	NO2	Y	N (1.5m)	1.5	N	2.5m
DT32	Bat & Ball 4 St Johns Sevenoaks	Roadside	553151	156558	NO2	Y	Y	1.5	N	2.5m
DT5	Riverhead 2 (Laundry) North West	Kerbside	551414	156197	NO2	Y	N (1.5m)	0.5	N	2.5m

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DT6	Riverhead 3 (Opp shops) East	Roadside	551440	156165	NO2	Y	N (6m)	3	N	2.5m
DT42	62 London Road Riverhead	Roadside	551318	156373	NO2	Y	N (2m)	2	N	2.5m
DT76	Worships Hill/ Witches Lane, Riverhead	Roadside	551026	155710	NO2	Y	N (36m)	2	N	2.5m
DT7	High Street East 1 (Road Sign) Seal	Roadside	555092	156694	NO2	Y	Y	1	N	2.5m
DT8	High Street West 1 (Garage) Seal	Roadside	554991	156726	NO2	Y	N (3m)	3	N	2.5m
DT33	High Street East 2 (Pizza) Seal	Roadside	555068	156711	NO2	Y	Y	1.5	N	2m
DT34	16 Main Road, Sundridge Dunbrik	Roadside	549427	155691	NO2	N			N	
DT35	Seal Hollow Road/ A25	Roadside	554093	156798	NO2	Y	N (18m)	2.5	N	2.5m
DT43	Miners Arms, London Road, Dunton Green	Roadside	551281	156860	NO2	Y	N (2.5m)	2	N	2.5m
DT54	57 London Road, Dunton Green	Roadside	551216	157007	NO2	Y	N (8m)	2	N	2.5m
DT74	Westerham Road, (Devon Cott) Bessels Green	Roadside	550768	155584	NO2	Y	N (8m)	2	N	2.5m
DT86	59 Westerham Road, Bessels Green	Roadside	550308	155593	NO2	Y	Y	1.5	N	2m

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DT71	204 Main Road, Sundridge	Roadside	548239	155353	NO2	Y	N (1.5m)	1	N	2.5m
DT12	Station Road (M25) Brasted	Roadside	546816	155851	NO2	Y	N (42m)	7m to M25	N	2m
DT84	West End Brasted	Roadside	546802	155000	NO2	Y	Y	1	N	2.5m
DT85	Chart Lane Brasted	Roadside	547097	155099	NO2	Y	Y	1	N	2.5m
DT24	High Street, (Wells Close) Westerham	Roadside	544415	153914	NO2	Y	N (3m)	1	N	2.5m
DT25	Vicarage Hill, Westerham	Roadside	544770	154000	NO2	Y	N (3m)	1	N	2.5m
DT36	Market Square, Westeham	kerbside	544594	154025	NO2	Y	N (3m)	1	N	2.5m
DT13	Wested Lane, Swanley	Roadside	552504	167700	NO2	Y	N (14m)	5	N	2.5m
DT14	Wadard Terrace, Button St Swanley	Roadside	553107	167868	NO2	Y	N (15m)	115m to M25	N	2.5m
DT39	Bartholomew Way, Swanley	Roadside	551492	168695	NO2	Y	N (13m)	2	N	2.5m
DT40	London Road 1(traffic lights) Swanley	Kerbside	551575	168508	NO2	Y	N (2m)	0.5	N	2.5m
DT41	London Road 2 (Bus) Swanley	Roadside	552174	168162	NO2	Y	N (6m)	1.5	N	2.5m
DT81	Farningham Hill Road, Swanley	Urban	553416	167615	NO2	Y	N (17m)	27m to M20	N	2.5m
DT83	Jessamine Terrace, Birchwood Road Swanley	Roadside	550297	169682	NO2	Y	N (0.5m)	1	N	2.5m

DT93	Pucknells, Birchwood Road, Swanley	Roadside	550283	169743	NO2	N	N (10m)	2	N	2.5m
DT94	Birchwood Road Junction London Road	Roadside	550258	169575	NO2	Y	N (10m)	2	N	2m
DT95	Malvern, Birchwood Road, Swanley	Roadside	550351	169499	NO2	Y	N (20m)	2	N	2.5m
DT26	Farningham Hill (A20)	Roadside	554217	167252	NO2	Y	Y	5m to A20/ 90m to M20	N	2m
DT96 (1)	Sevenoaks Station 1	Roadside	552371	155345	NO2	N	1.8	2.9	N	2.5m
DT96 (2)	Sevenoaks Station 2	Roadside	552371	155345	NO2	N	1.8	2.9	N	2.5m
DT96 (3)	Sevenoaks Station 3	Roadside	552371	155345	NO2	N	1.8	2.9	N	2.5m
BC1	Greatness AQ Station 1	Urban Backgroun d	553603	156774	NO2	N	Y	46	Y	2m
BC2	Greatness AQ Station 2	Urban Backgroun d	553603	156774	NO2	N	Y	46	Y	2m
BC3	Greatness AQ Station 3	Urban Backgroun d	553603	156774	NO2	N	Y	46	Y	2m
BC4	Bat & Ball AQ Station 1	Roadside	553044	156690	NO2	Y	N (30m)	8	Y	2m
BC5	Bat & Ball AQ Station 2	Roadside	553044	156690	NO2	Y	N (30m)	8	Y	2m
BC6	Bat & Ball AQ Station 3	Roadside	553044	156690	NO2	Y	N (30m)	8	Y	2m

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3) (4)				
							2015	2016	2017	2018	2019
CM1: Greatness	553603	156774	Urban Background	Automatic		98	17	17	16	15	14
CM2 : Bat & Ball	553044	156690	Roadside	Automatic		97	31.8	31	28	25	23
DT02 High Street South 1 (Guitar) Sevenoaks	553157	154415	Roadside	Diffusion Tube		100%	**53.6**	**54.7**	**48.1**	**49.9**	**40.9**
DT03 Garvock Drive Sevenoaks	552467	154167	Urban Background	Diffusion Tube		92%	10.8	12.7	11.1	11.8	10.0
DT05 Riverhead 2 (Laundry) North West	553139	154259	Kerbside	Diffusion Tube		92%	**42.8**	**47**	**42.7**	39.3	34.9
DT06 Riverhead 3 (Opp shops) East	553043	154890	Roadside	Diffusion Tube		92%	**44.1**	**47.1**	**40.2**	**41.7**	35.3
DT07 High Street East 1 (Road Sign) Seal	553073	155026	Roadside	Diffusion Tube		83%	**44.3**	**46.8**	**42.7**	**41.3**	37.1
DT08 High Street West 1 (Garage) Seal	552863	154873	Roadside	Diffusion Tube		92%	31.1	35.2	26.9	28.3	24.0
DT12 Station Road (M25) Brasted	553018	154654	Roadside	Diffusion Tube		83%	**46.5**	**43.1**	**40**	39.8	33.6

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DT13 Wested Lane, Swanley	552662	155153	Roadside	Diffusion Tube		100%	31.4	36.5	30.5	32.9	28.1
DT14 Wadard Terrace, Button St Swanley	552506	155272	Roadside	Diffusion Tube		83%	32.4	32.6	30.1	27.6	25.6
DT23 Bat & Ball 1 Sevenoaks (Ferrari)	551529	155967	Roadside	Diffusion Tube		100%	35.6	**40.5**	34.3	39.2	33.5
DT24 High Street, (Wells Close) Westerham	551640	156335	Roadside	Diffusion Tube		83%	32.7	35.3	30.4	35.8	28.6
DT25 Vicarage Hill, Westerham	552963	156583	Roadside	Diffusion Tube		50%	28.3	29.8	25.9	26.1	18.7
DT26 Farningham Hill (A20)	553140	155898	Roadside	Diffusion Tube		92%	**41.7**	**45.8**	**41.8**	**42.7**	35.3
DT27 High Street South 2 (Sev School) Sevenoaks	553059	156624	Roadside	Diffusion Tube		100%	37.2	39.8	38.2	37.7	33.6
DT28 High Street North 2 (Sev Sennockian) Sevenoaks	553019	155692	Kerbside	Diffusion Tube		100%	**42.4**	**44.1**	36.7	36.8	31.9
DT29 High Street North 3 (Water Trough) Sevenoaks	553165	156685	Roadside	Diffusion Tube		100%	27.8	31.5	28	28.2	24.1
DT30 Bat & Ball 2 Otford	553151	156558	Roadside	Diffusion Tube		100%	32.2	36.1	32.4	35.1	31.2

Road Sevenoaks											
DT31 Bat & Ball 3 Seal Road Sevenoaks	551414	156197	Roadside	Diffusion Tube		100%	**46.9**	**57.9**	**51.2**	**51.1**	**44.2**
DT32 Bat & Ball 4 St Johns Sevenoaks	551440	156165	Roadside	Diffusion Tube		92%	**49.9**	**56.3**	**47.6**	**51.9**	**41.3**
DT33 High Street East 2 (Pizza) Seal	551318	156373	Roadside	Diffusion Tube		83%	**42.5**	**48.1**	**40.5**	**40.5**	35.1
DT34 16 Main Road, Sundridge Dunbrik	551026	155710	Roadside	Diffusion Tube		100%	30.9	31.7	27.5	26.1	23.8
DT35 Seal Hollow Road/ A25	555092	156694	Roadside	Diffusion Tube		100%	36.3	39.6	32.5	33.7	30.4
DT36 Market Square, Westeham	554991	156726	Kerbside	Diffusion Tube		83%	**44.6**	**45.1**	39.6	**40.1**	34.0
DT39 Bartholomew Way, Swanley	555068	156711	Roadside	Diffusion Tube		100%	34.7	**40.9**	34.5	36.4	35.3
DT40 London Road 1(traffic lights) Swanley	549427	155691	Kerbside	Diffusion Tube		100%	**42.3**	**51.5**	**40.9**	**45.6**	38.0
DT41 London Road 2 (Bus) Swanley	554093	156798	Roadside	Diffusion Tube		100%	37.5	**42.7**	**40.1**	38.6	33.0
DT42 62 London Road Riverhead	551281	156860	Roadside	Diffusion Tube		75%	37.1	39.3	35.5	34.5	27.8
DT43 Miners Arms, London	551216	157007	Roadside	Diffusion Tube		100%	28	34.1	29.5	28.5	26.9

Road, Dunton Green											
DT48 73 London Road(Brunch) Sevenoaks	550768	155584	Roadside	Diffusion Tube		75%	25.6	27.7	**40.7**	23.9	20.2
DT49 20 London Road (Butchers) Sevenoaks	550308	155593	Roadside	Diffusion Tube		92%	30.4	33.7	28.2	29.1	25.4
DT51 130 London Road (Opp Car Sales) Sevenoaks	548239	155353	Kerbside	Diffusion Tube		100%	36.1	**40.4**	35.1	39.0	30.6
DT52 142 London Road (Lulworth) Sevenoaks	546816	155851	Roadside	Diffusion Tube		92%	37.9	38.3	33.1	34.0	29.9
DT54 57 London Road, Dunton Green	546802	155000	Roadside	Diffusion Tube		100%	35.6	36	33.8	32.7	29.2
DT71 204 Main Road, Sundridge	547097	155099	Roadside	Diffusion Tube		75%	29.8	33.5	30	31.3	26.0
DT74 Westerham Road, (Devon Cott) Bessels Green	544415	153914	Roadside	Diffusion Tube		100%	35.5	37.1	35.4	35.9	31.1
DT76 Worships Hill/ Witches Lane, Riverhead	544770	154000	Roadside	Diffusion Tube		100%	35.6	**40**	33.9	37.9	33.8
DT77 Montreal Cott/ Amherst Hill Sevenoaks	544594	154025	Roadside	Diffusion Tube		75%	**40.7**	**40**	38.8	38.7	32.1

DT81 Farningham Hill Road, Swanley	552504	167700	Urban Background	Diffusion Tube		83%	32.2	32.9	30.9	28.6	26.1
DT83 Jessamine Terrace, Birchwood Road Swanley	553107	167868	Roadside	Diffusion Tube		100%	**55.6**	**60.5**	**49.8**	**46.7**	**43.0**
DT84 West End Brasted	551492	168695	Roadside	Diffusion Tube		100%	32.8	35.4	31.2	32.5	26.9
DT85 Chart Lane Brasted	551575	168508	Roadside	Diffusion Tube		100%	**45**	**51.1**	**43.9**	**43.7**	36.2
DT86 59 Westerham Road, Bessels Green	552174	168162	Roadside	Diffusion Tube		92%	36.7	**40.8**	36	34.7	31.2
DT87 Bradbourne Vale Road South	553416	167615	Roadside	Diffusion Tube		100%	**48.1**	**51.7**	**45.7**	**47.0**	**42.9**
DT88 Bradbourne Vale Road North	550297	169682	Roadside	Diffusion Tube		42%	29.1	32.9	28.7	30.3	23.1
DT90 4a St Johns Hill Sevenoaks	550283	169743	Roadside	Diffusion Tube		100%	32.4	36.9	31.5	34.5	29.9
DT93 Pucknells, Birchwood Road, Swanley	550258	169575	Roadside	Diffusion Tube		100%	29.3	32.4	27.2	28.8	26.2
DT94 Birchwood Road Junction London Road	550351	169499	Roadside	Diffusion Tube		100%	33.7	36.9	32.2	33.8	29.0

DT95 Malvern, Birchwood Road, Swanley	554217	167252	Roadside	Diffusion Tube		100%	34.1	38	33.6	33.0	30.6
DT96 Sevenoaks Rail Station	552371	155345	Roadside	Diffusion Tube						34.5	30.9
DT96 Sevenoaks Rail Station	552371	155345	Roadside	Diffusion Tube							30.9
DT96 Sevenoaks Rail Station	552371	155345	Roadside	Diffusion Tube							30.9

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

☒ **Annualisation has been conducted where data capture is <75%**

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

Notes:

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

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

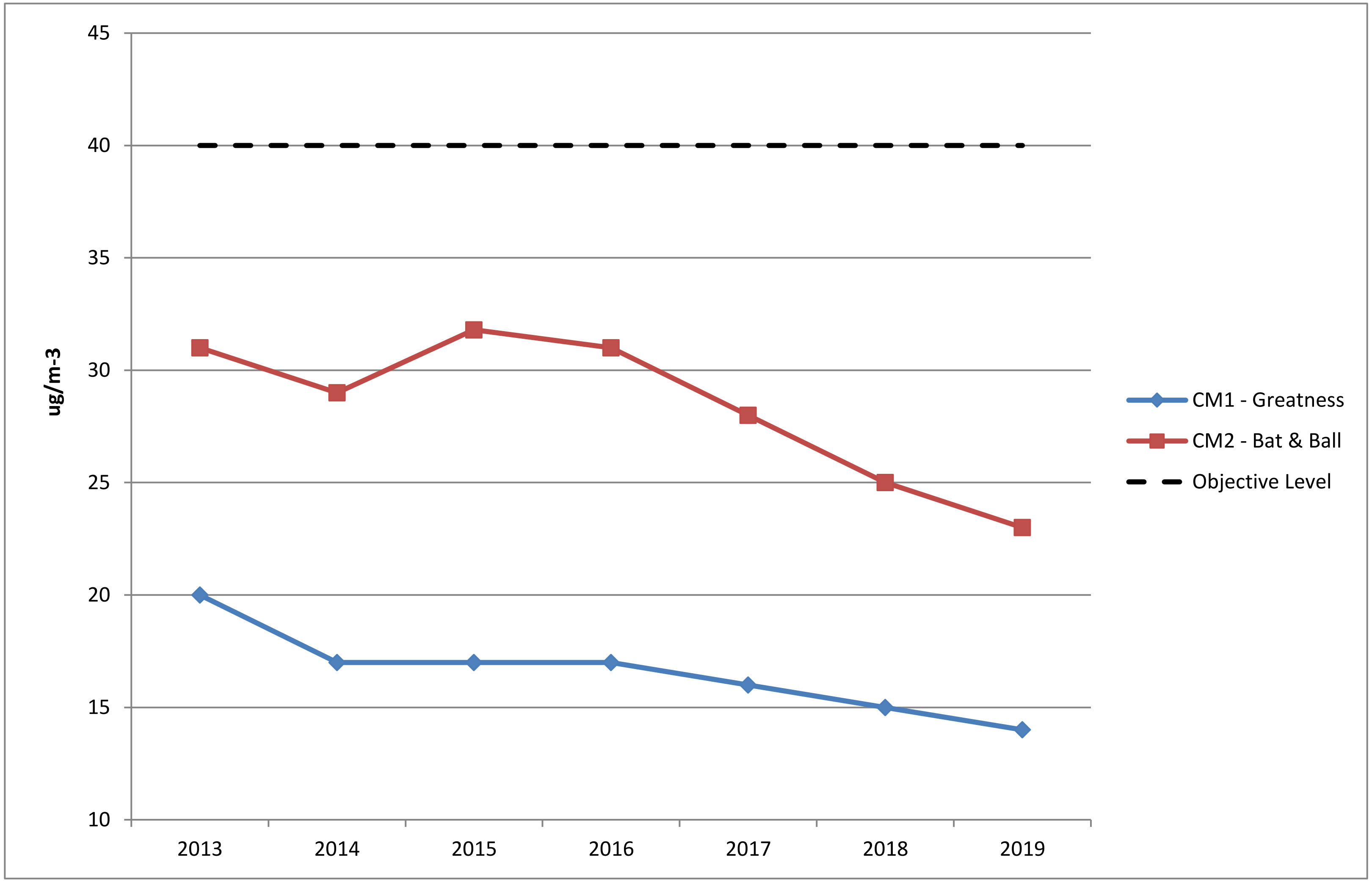
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

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

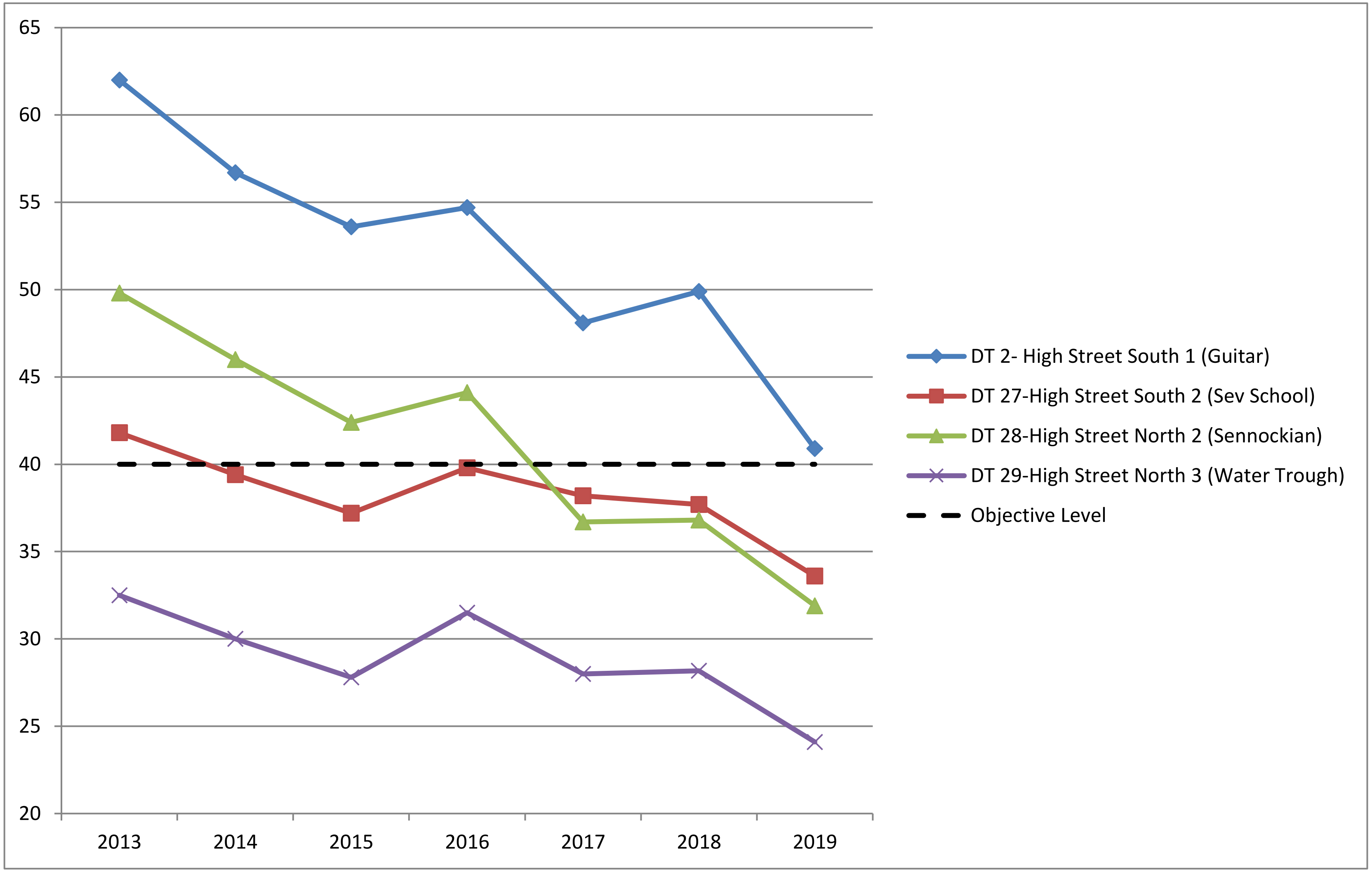
(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

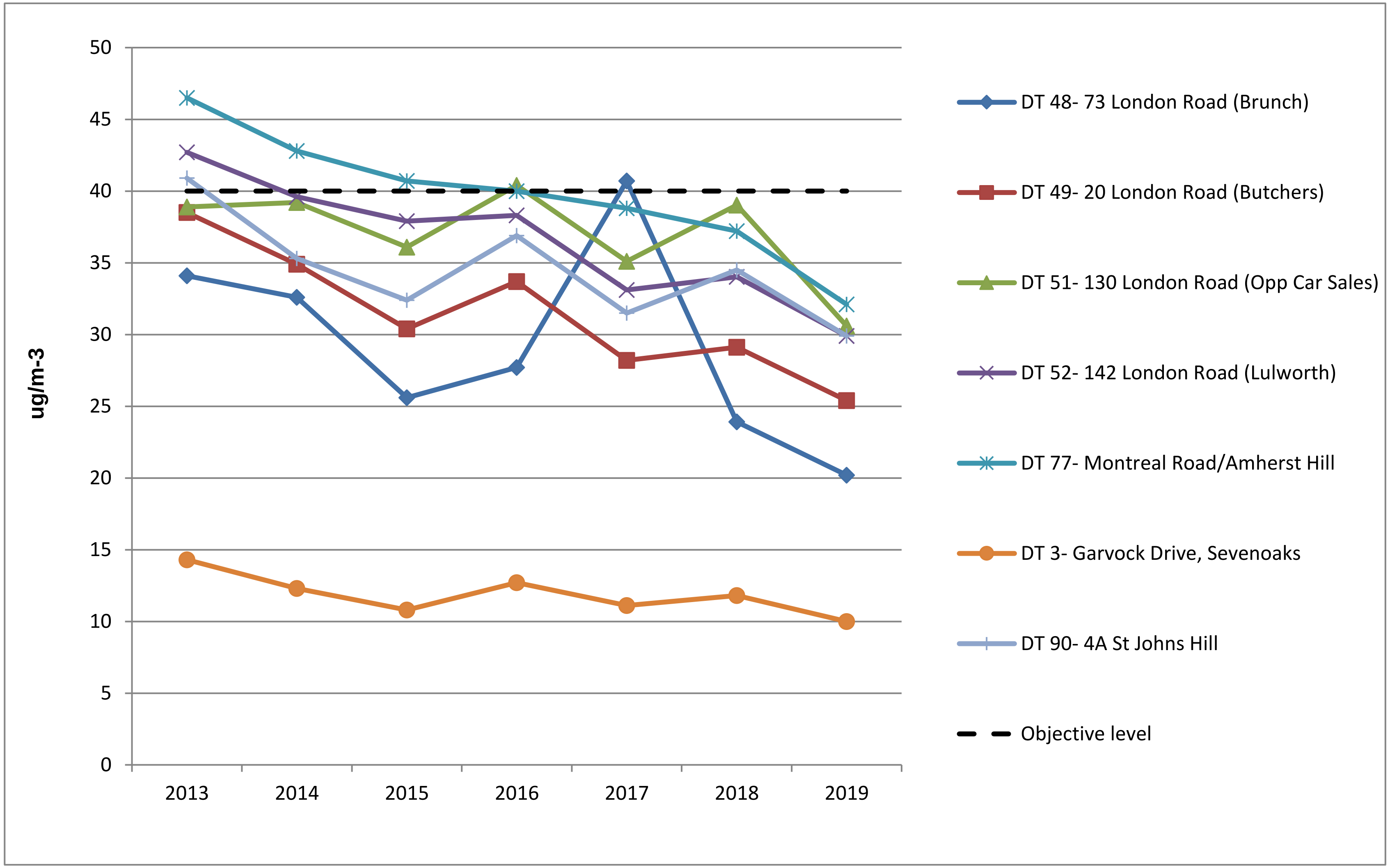
Figure A.1 – Trends in Annual Mean NO_2 Concentrations - Automatic Monitoring Stations



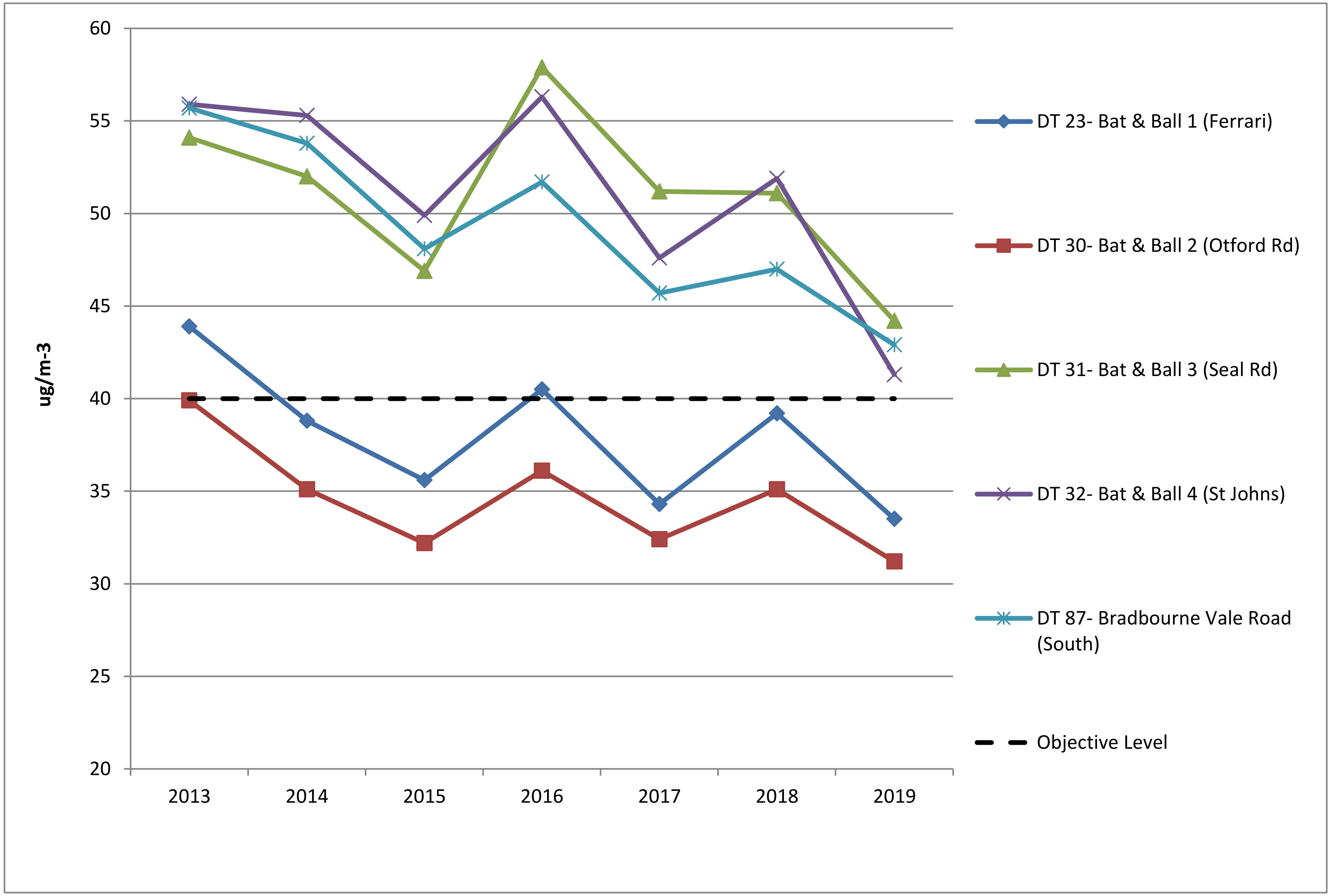
Diffusion Tube Network - Nitrogen Dioxide Diffusion tubes in the vicinity of Sevenoaks High Street



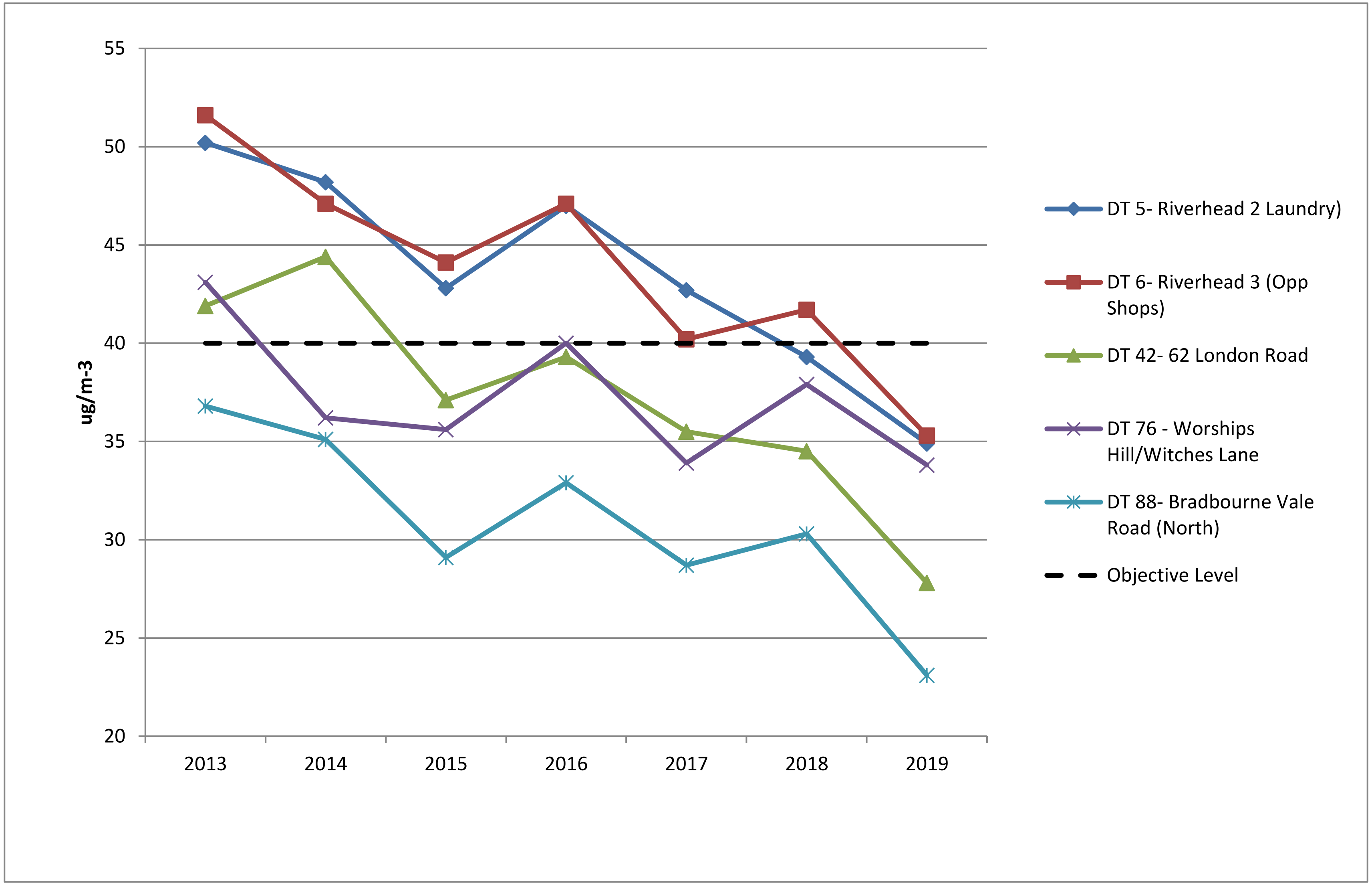
Nitrogen Dioxide Diffusion tubes in Sevenoaks



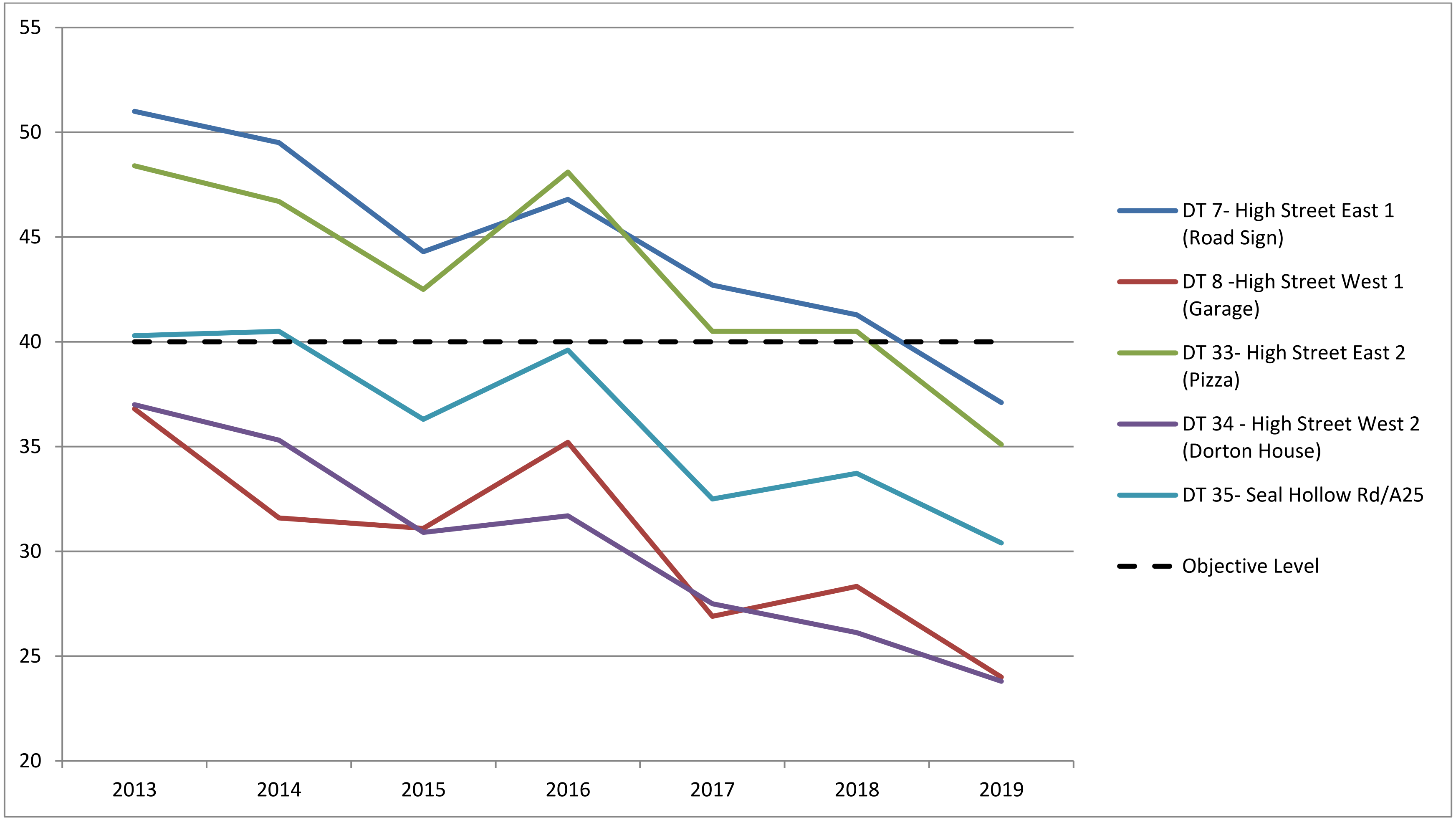
Nitrogen Dioxide Diffusion tubes in the vicinity of Bat & Ball



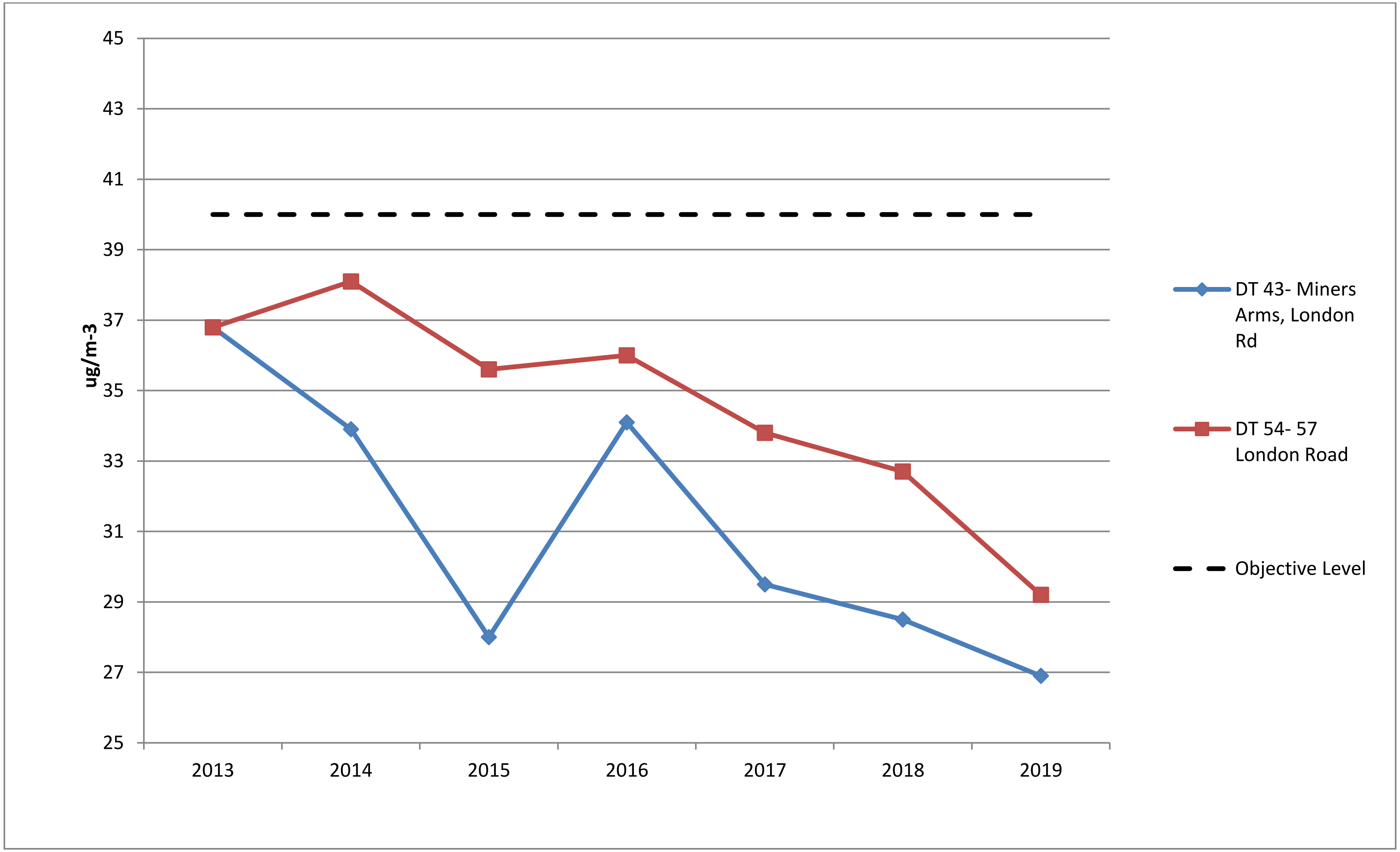
Nitrogen Dioxide Diffusion tubes in the vicinity of Riverhead



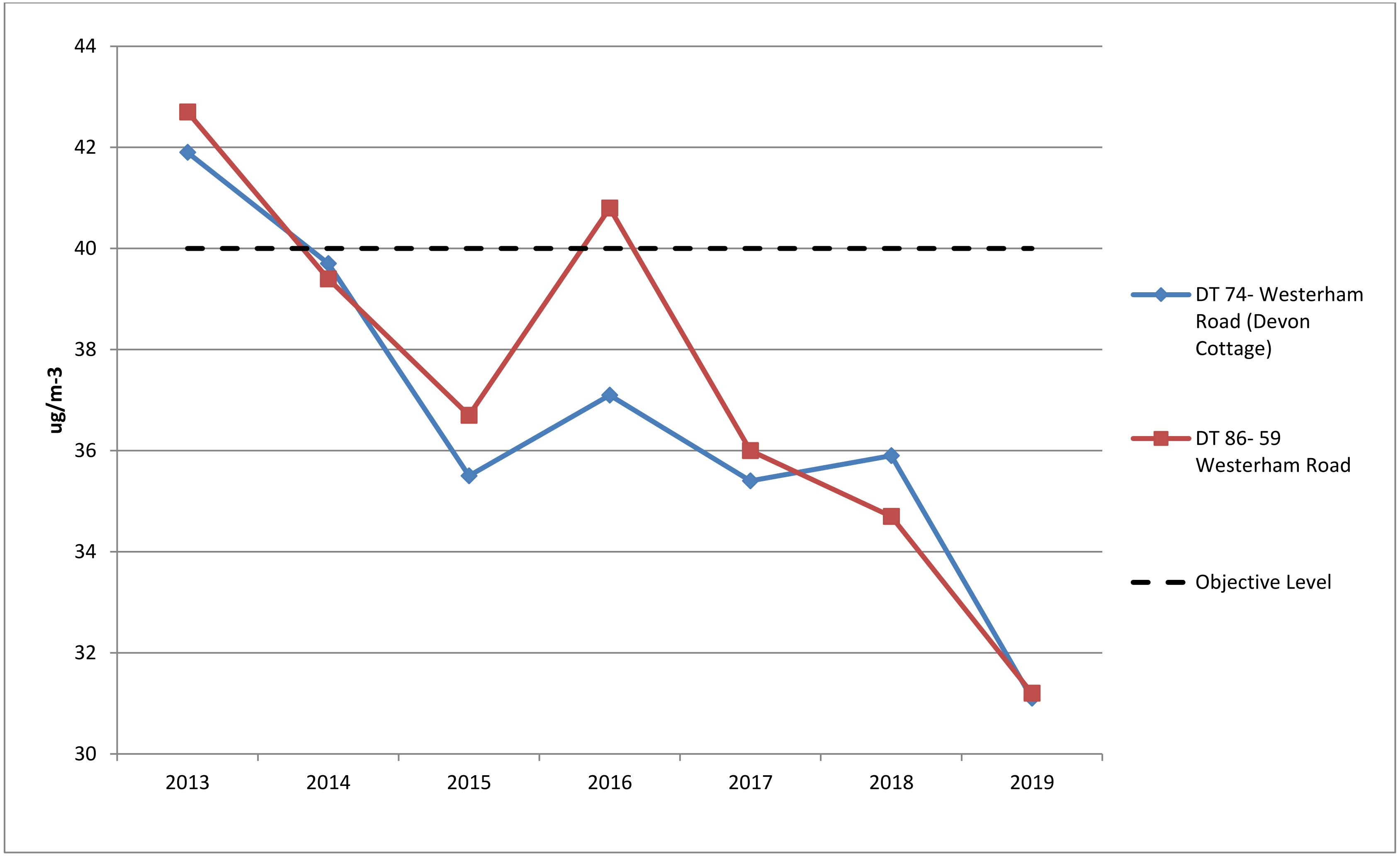
Nitrogen Dioxide Diffusion tubes in the vicinity of Seal



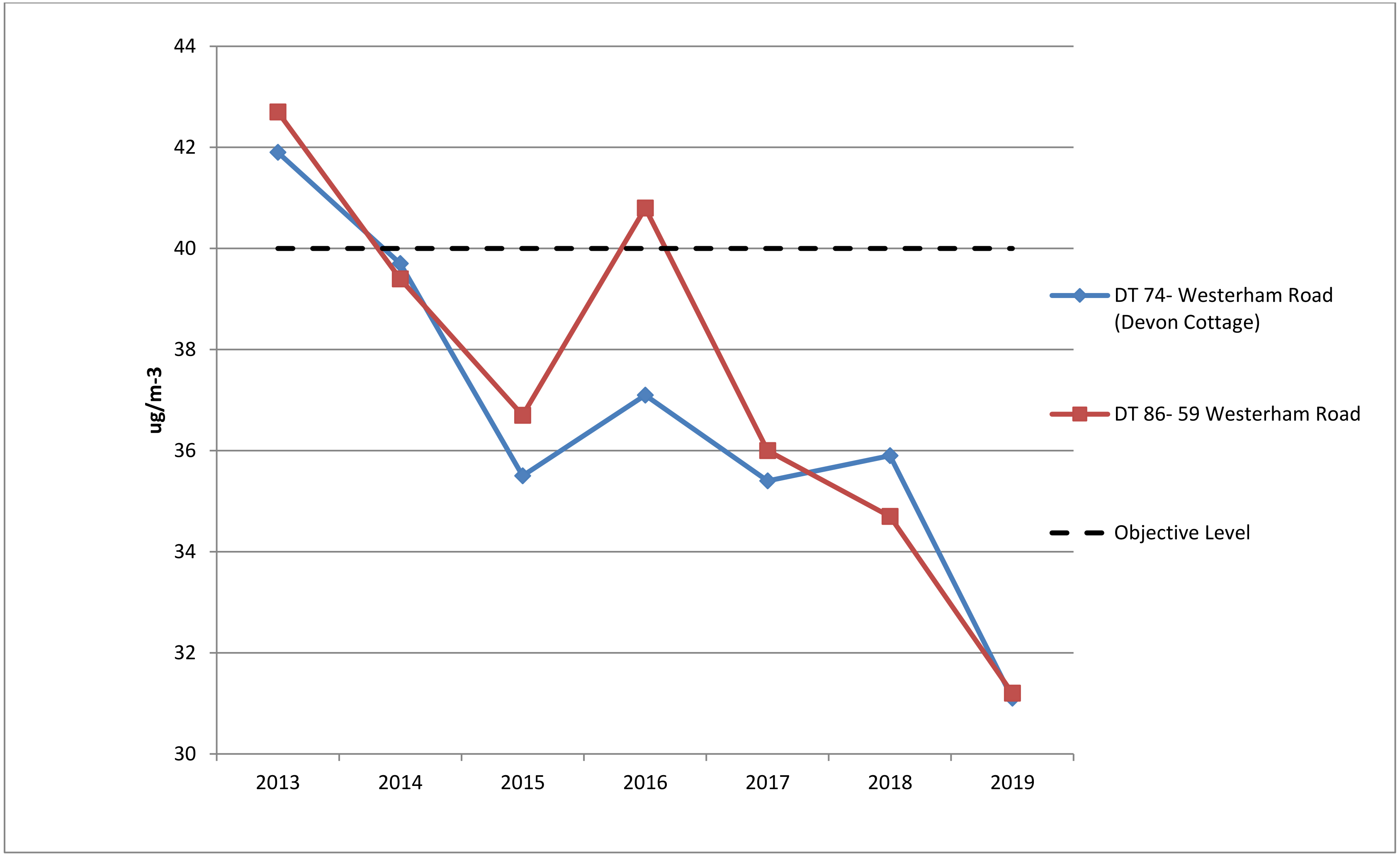
Nitrogen Dioxide Diffusion tubes in the vicinity of Dunton Green



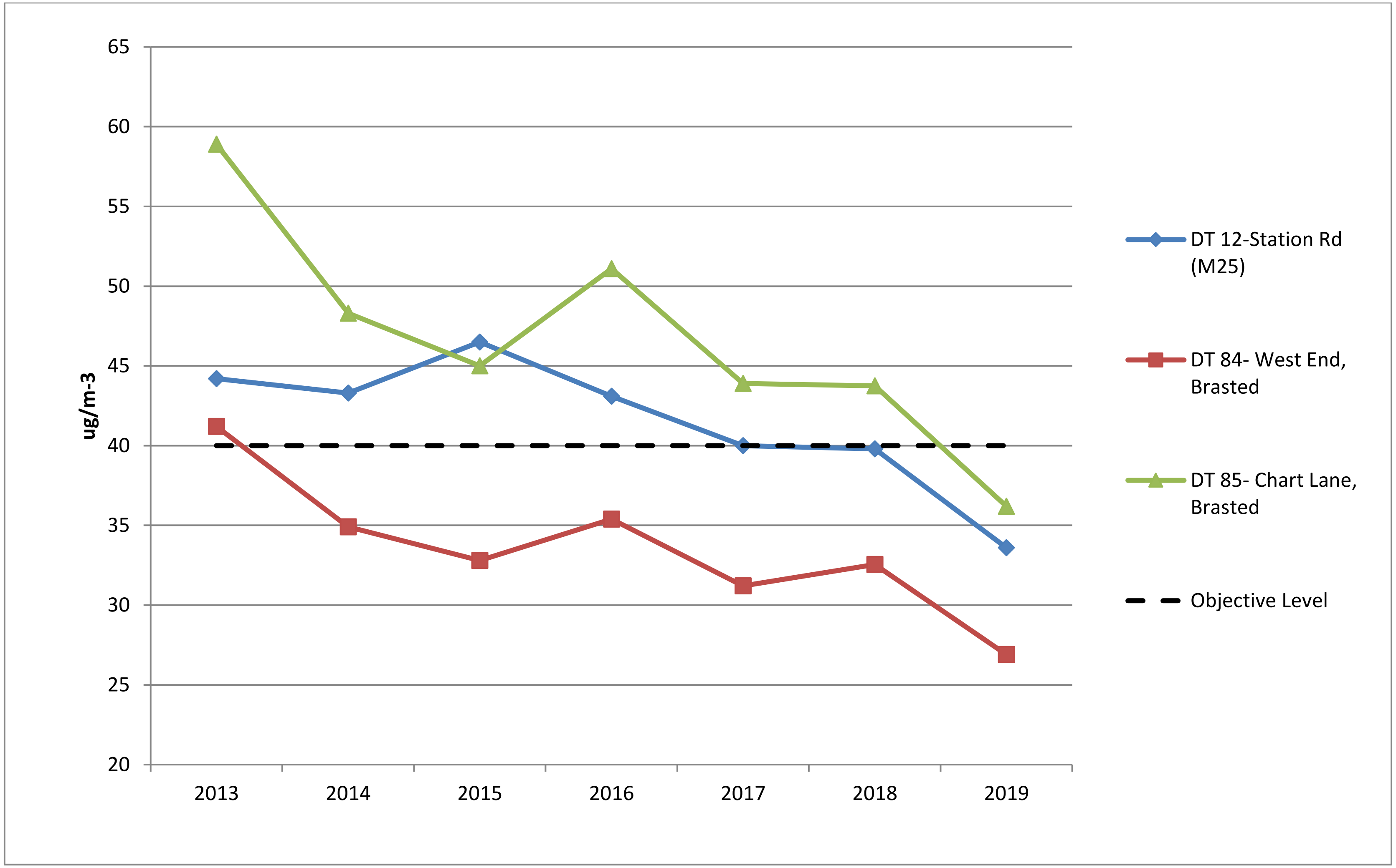
Nitrogen Dioxide Diffusion tubes in the vicinity of Dunton Green



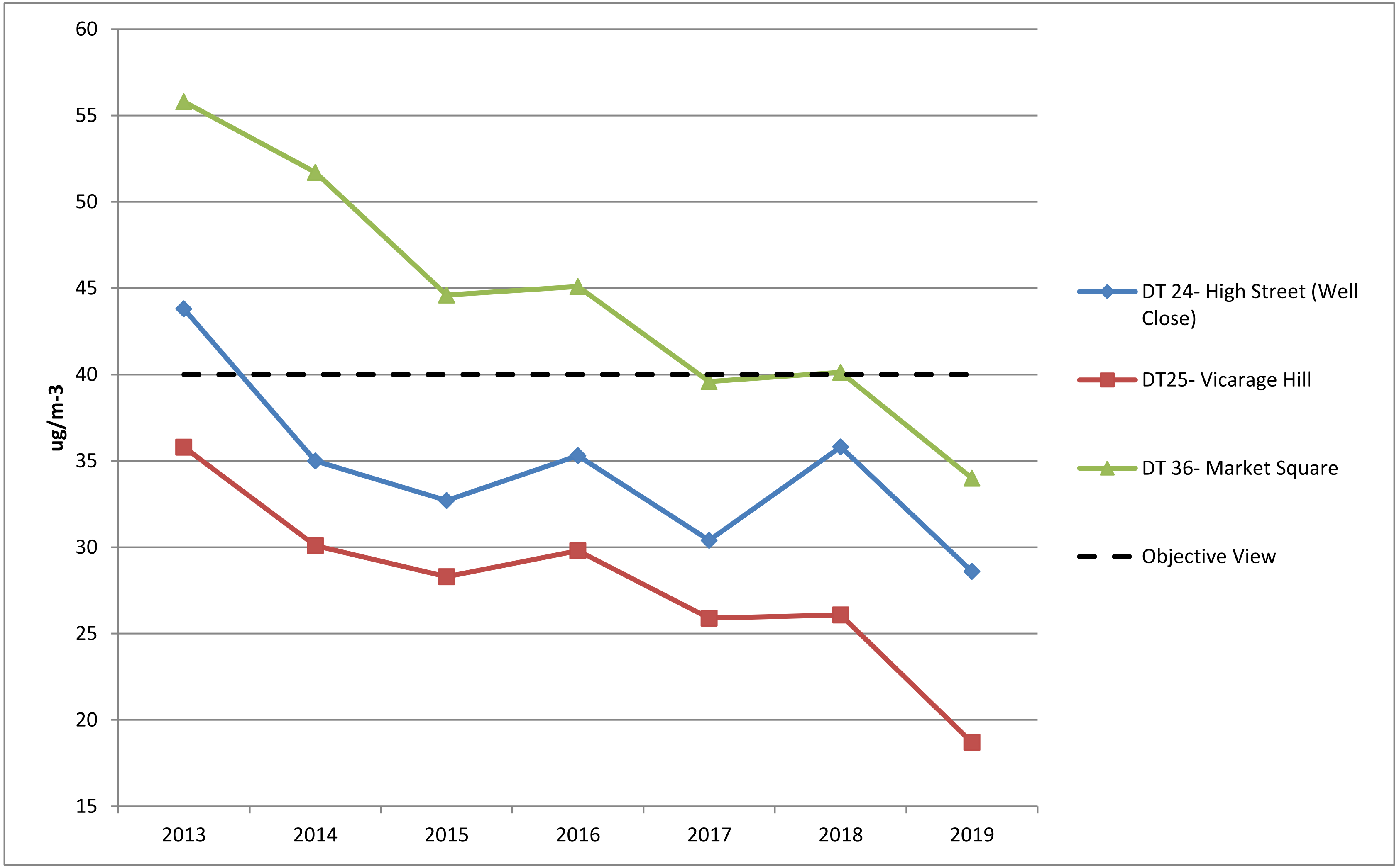
Nitrogen Dioxide Diffusion tubes in the vicinity of Bessels Green



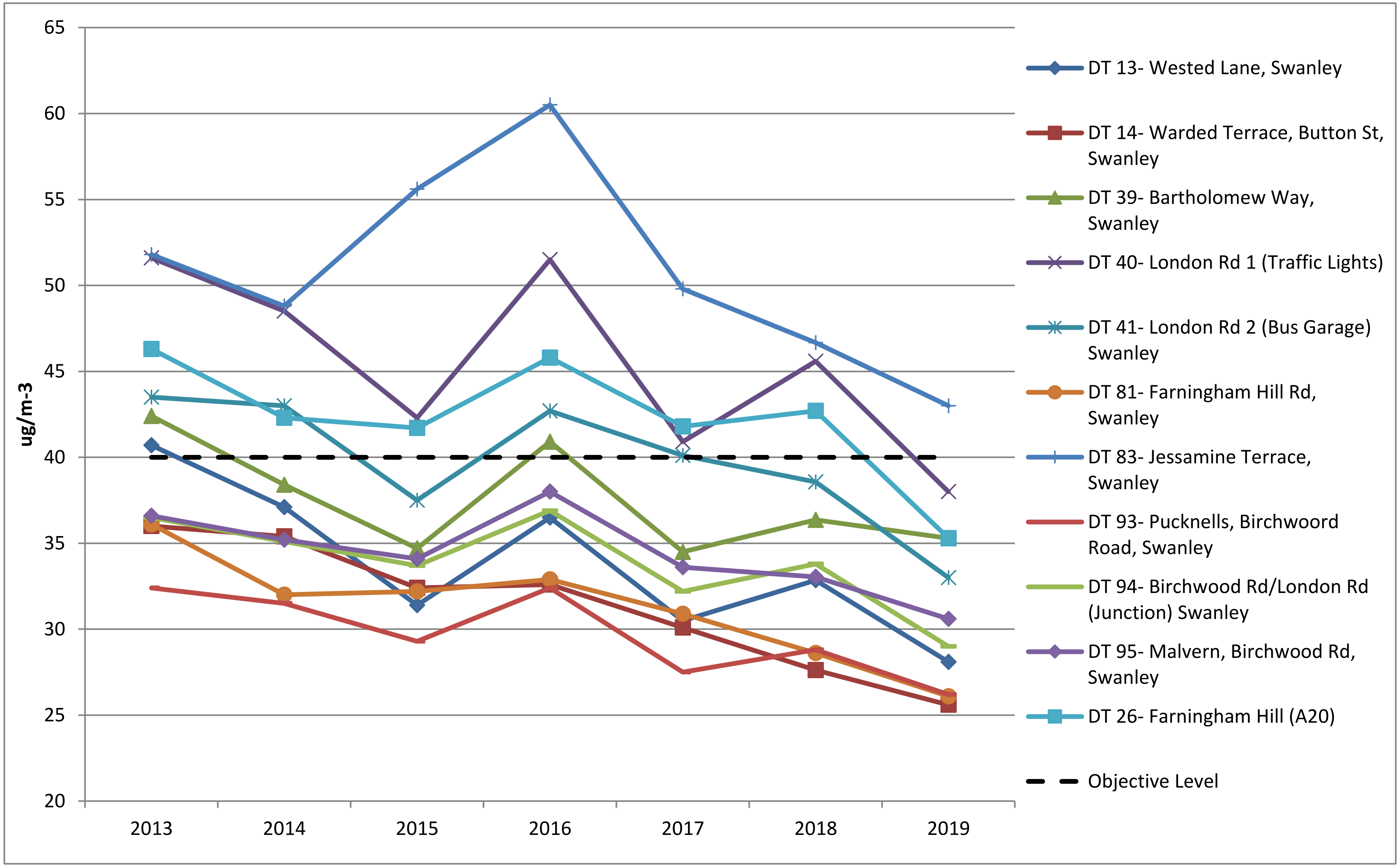
Nitrogen Dioxide Diffusion tubes in the vicinity of Brasted



Nitrogen Dioxide Diffusion tubes in the vicinity of Westerham



Nitrogen Dioxide Diffusion tubes in the vicinity of Swanley



Nitrogen Dioxide Diffusion tubes in the vicinity of Sundridge

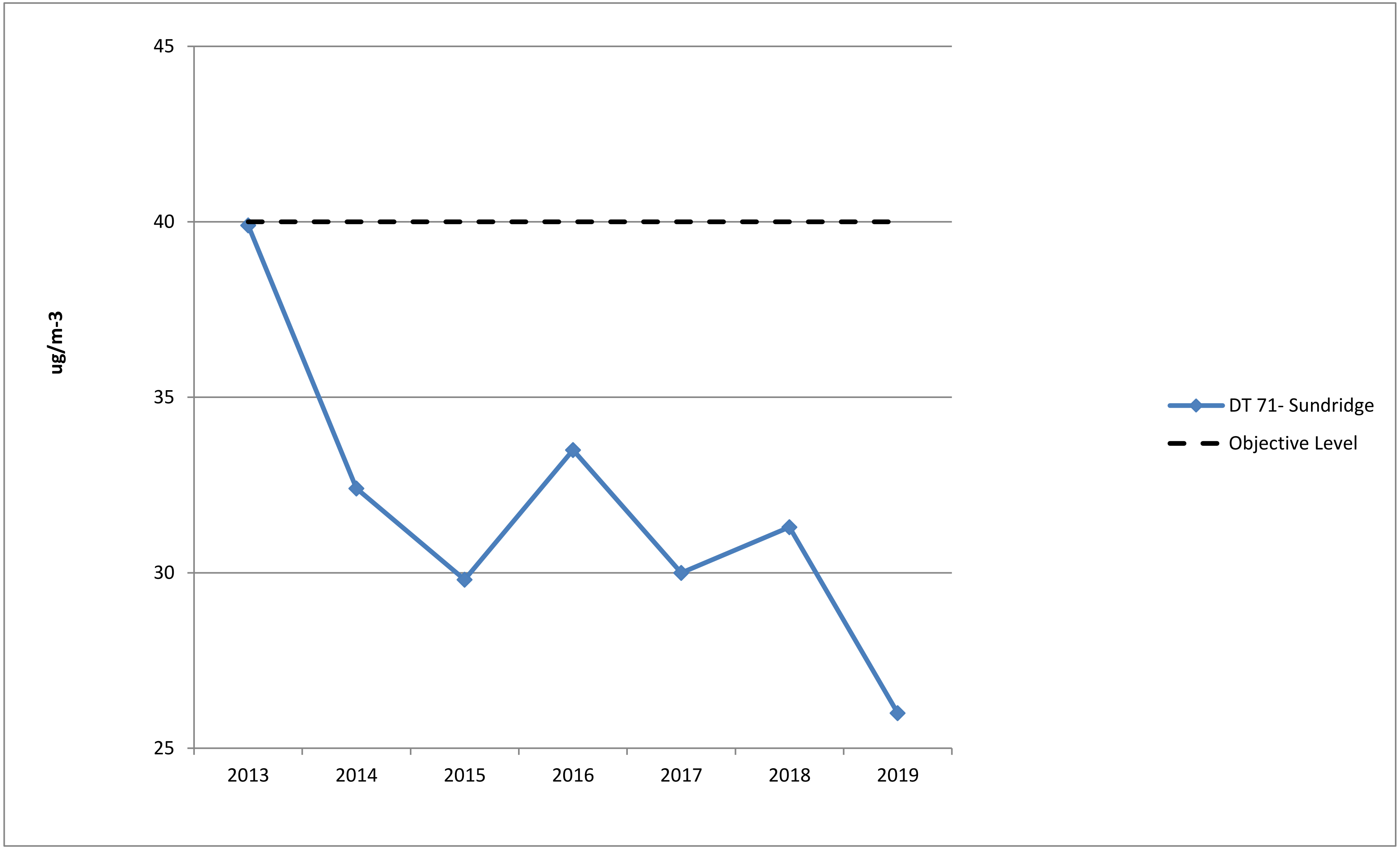


Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
							2015	2016	2017	2018	2019
CM1	553603	156774	Urban Background	Automatic		98	0	0	0	0	0
CM2	553044	156690	Roadside	Automatic		97	1	3	0	0	0

Notes:

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

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

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

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

Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
						2015	2016	2017	2018	2019
CM1: Greatness	553603	156774	Urban Background		99	21	18	18	19	20
CM2: Bat & Ball	553044	156690	Roadside		98	21	21	20	21	20

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

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

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

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

(3) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

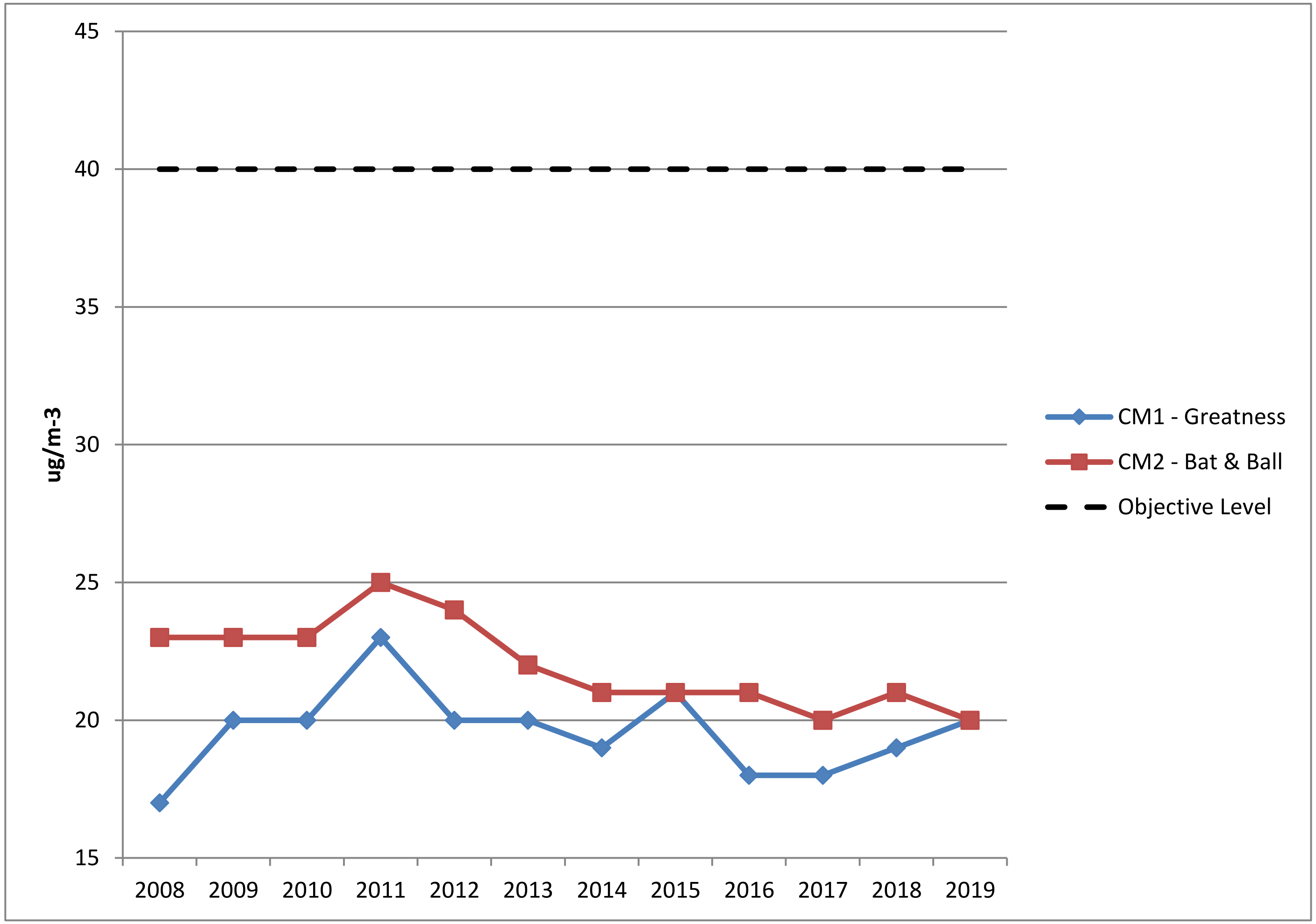


Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
						2015	2016	2017	2018	2019
CM1: Greatness	553603	156774	Urban Background		99	2	0	4	1	9
CM2 : Bat & Ball	553044	156690	Roadside		98	3	7	5	8	8

Notes:

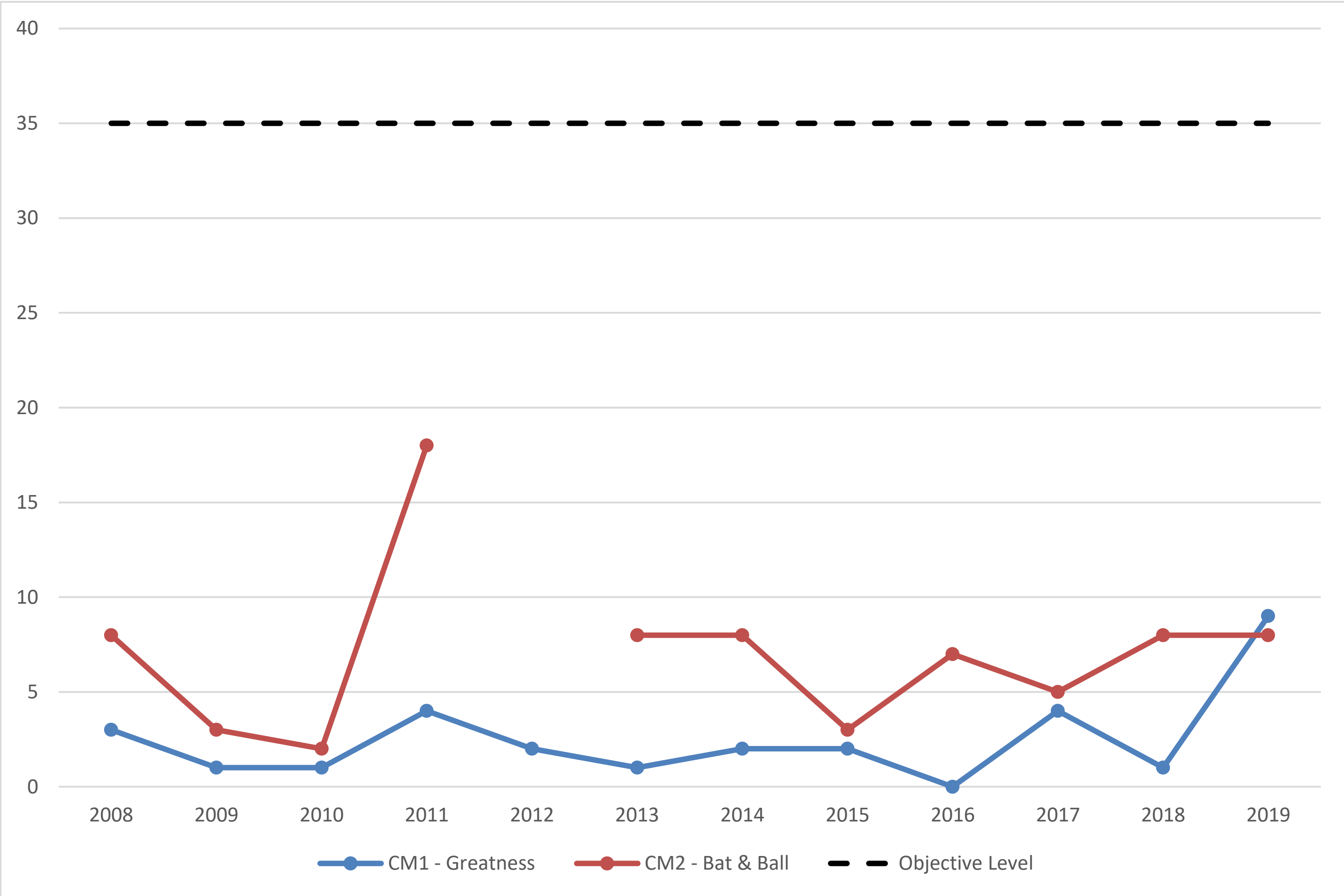
Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold.**

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

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

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

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



Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO_2 Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.75) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
DT02	553157	154415	73.4	59.1	62.3	60.4	54.2	52.4	49.7	47.0	53.8	55.8	49.6	36.7	54.5	**40.9**	38.0
DT03	552467	154167	20.6	14.2	13.6	15.5	11.0	10.0	8.5		11.1	10.6	19.4	12.6	13.4	10.0	
DT05	551414	156197	50.2	52.5	51.5	47.8	46.0	44.4	43.5	40.6	45.6	44.9		44.7	46.5	34.9	
DT06	551440	156165	47.9	50.3	44.4	61.7	46.1	49.5	46.3	39.0	46.4	45.6		39.9	47.0	35.3	
DT07	555092	156694	52.7	59.0	53.0	43.4	44.6		48.6		43.6	49.3	58.6	42.2	49.5	37.1	35.7
DT08	554991	156726	39.0	33.7	35.2	34.1		30.3	26.3	21.5	30.1	30.7	39.8	31.6	32.0	24.0	
DT12	546816	155851	55.6	34.3	51.4	51.8	44.0	38.6	39.3		41.7		50.2	41.7	44.9	33.6	
DT13	552504	167700	45.4	38.4	40.3	48.1	33.6	34.3	31.6	26.3	33.7	34.5	51.6	32.1	37.5	28.1	
DT14	553107	167868	43.7	44.1	38.2	33.9	26.7	21.4	25.4			29.2	43.6	34.9	34.1	25.6	
DT23	553059	156624	47.5	44.3	48.7	53.0	39.7	43.7	40.3	34.0	40.5	44.7	60.2	38.6	44.6	33.5	
DT24	544415	153914			38.6	53.8	33.2	40.6	37.4	27.9	31.7	40.2	49.3	28.6	38.1	28.6	
DT25	544770	154000	38.6	35.1	33.0	17.3							38.0	28.2	31.7	18.7	
DT26	554217	167252	59.5	55.4	48.0	27.1	45.4	45.9	44.5	41.3		46.1	62.7	41.7	47.1	35.3	
DT27	553139	154259	47.4	49.1	52.6	41.7	44.4	36.8	33.9	34.5	38.3	40.6	70.0	48.8	44.8	33.6	
DT28	553043	154890	56.6	48.8	44.8	38.5	39.6	35.7	38.6	33.7	38.4	41.6	52.3	41.6	42.5	31.9	

DT29	553073	155026	45.4	36.8	33.8	37.1	27.5	27.9	24.8	22.4	28.9	33.5	38.0	28.7	32.1	24.1	
DT30	553019	155692	52.0	41.4	44.5	45.8	37.3	36.3	34.5	33.0	37.9	41.3	57.2	38.0	41.6	31.2	
DT31	553165	156685	45.5	70.9	59.6	56.3	58.8	57.3	57.7	53.8	55.5	54.3	80.2	56.5	58.9	**44.2**	36.0
DT32	553151	156558	55.0	61.8		48.1	54.0	50.6	51.6	43.8	54.4	58.5	75.7	51.7	55.0	**41.3**	40.5
DT33	555068	156711	51.2	46.2		59.1	46.1	47.7		35.9	42.7	40.7	59.3	39.2	46.8	35.1	
DT34	549427	155691	40.4	38.6	28.5	34.2	25.6	27.9	26.6	25.2	28.2	32.3	42.7	30.1	31.7	23.8	
DT35	554093	156798	40.7	43.7	36.6	42.4	38.1	40.0	40.3	38.7	42.6	42.2	49.9	30.5	40.5	30.4	
DT36	544594	154025	47.1	57.9	44.3	49.3	36.9	42.2	44.1	34.6	40.6		56.3		45.3	34.0	
DT39	551492	168695	53.8	49.7	48.8	51.7	38.2	41.6	42.0	39.6	45.3	45.0	62.4	46.1	47.0	35.3	
DT40	551575	168508	59.9	51.1	50.3	65.1	52.6	45.5	48.9	38.4	50.4	43.2	68.9	34.2	50.7	38.0	28.3
DT41	552174	168162	52.8	54.1	49.6	43.5	37.8	36.8	38.1	38.3	41.2	42.1	54.7	39.1	44.0	33.0	
DT42	551318	156373	16.4	45.8		33.1			35.4	34.8	36.9	41.8	51.1	38.0	37.0	27.8	
DT43	551281	156860	72.3	36.7	34.9	31.6	28.9	29.9	26.8	27.2	30.5	34.3	44.0	33.4	35.9	26.9	
DT48	552863	154873	35.1			29.4	22.9	24.5	20.8	20.9		27.9	35.4	25.8	27.0	20.2	
DT49	553018	154654	42.2	38.2	33.8	39.3	28.6	30.7	27.0		27.1	30.9	49.1	26.0	33.9	25.4	
DT51	552662	155153	50.6	47.9	40.4	44.4	39.7	34.9	35.3	31.4	36.0	41.5	54.5	32.7	40.8	30.6	
DT52	552506	155272	48.8	43.1		41.5	40.6	41.1	36.1	29.8	36.6	38.8	49.8	32.5	39.9	29.9	
DT54	551216	157007	53.4	43.1	43.4	38.0	33.2	33.8	30.0	35.1	35.3	39.0	48.3	34.5	38.9	29.2	
DT71	548239	155353	46.7	44.0		37.5	28.8	30.1	30.9	27.2	31.3			34.9	34.6	26.0	
DT74	550768	155584	48.7	46.1	46.4	42.8	36.2	37.4	37.1	35.1	35.8	37.6	54.7	39.5	41.5	31.1	
DT76	551026	155710	48.7	41.0	50.2	49.0	46.2	43.6	38.1	37.9	47.0	45.8	52.7	40.4	45.1	33.8	
DT77	551529	155967	64.3	35.1			43.1	44.3	37.0	33.6	39.3	41.7	46.5		42.8	32.1	
DT81	553416	167615	42.1	45.5	34.2	30.6	27.4	26.6	29.0		32.9		44.3	35.2	34.8	26.1	
DT83	550297	169682	69.6	68.5	63.9	54.2	53.5	49.6	52.4	57.4	51.2	57.0	53.1	57.8	57.4	**43.0**	38.2
DT84	546802	155000	38.9	38.2	34.5	42.7	9.0	37.4	37.6	34.0	36.6	40.4	46.9	33.5	35.8	26.9	
DT85	547097	155099	38.6	59.5	53.9	54.7	38.7	46.7	48.6	42.5	47.1	47.8	57.2	43.9	48.3	36.2	35.6
DT86	550308	155593	44.7	50.4	45.5	42.5	36.6	35.4	36.2	32.6	38.9		53.8	40.3	41.5	31.2	

DT87	551640	156335	46.1	55.9	59.9	54.0	59.0	55.5	56.7	57.7	55.8	61.8	67.5	55.8	57.1	**42.9**	36.4
DT88	552963	156583	41.5	38.0	37.1	42.6								30.9	38.0	23.1	
DT90	553140	155898	47.0	47.4	35.8	43.7	40.3	35.8	34.2	25.7	38.4	40.2	55.7	33.5	39.8	29.9	
DT93	550283	169743	43.1	36.2	36.6	40.0	32.8	28.9	29.4	27.1	30.3	32.6	50.3	32.6	35.0	26.2	
DT94	550258	169575	37.1	47.7	40.5	43.1	33.4	31.8	30.7	31.7	35.4	36.5	56.2	39.1	38.6	29.0	
DT95	550351	169499	41.6	46.2	37.9	49.2	34.3	34.0	36.8	37.0	39.8	36.9	54.7	41.7	40.8	30.6	
DT96	552371	155345	54.3	50.9	37.8	35.9	33.5		36.1	35.0	39.2	37.1	48.1	44.9	41.2	30.9	
DT96	552371	155345	54.3	50.9	37.8	35.9	33.5		36.1	35.0	39.2	37.1	48.1	44.9	41.2	30.9	
DT96	552371	155345	51.6	54.3	0.0	37.2	33.1		35.2	36.5	37.2	36.1	48.2	45.1	41.2	30.9	
BC1	553603	156774	27.5	22.6	19.5	18.8	13.6		11.5	11.1	16.1	18.2	24.2	*2.9	18.3	13.7	
BC2	553603	156774	20.2	20.7	17.6	18.7	12.5	11.0		11.0	15.5	17.7	26.6	12.0	16.7	12.5	
BC3	553603	156774	27.3	22.9	20.3	18.7	12.2	11.8	11.8	11.9	16.4	17.6	26.7	19.9	18.1	13.6	
BC4	553044	156690	33.9	38.6	36.0	31.2	26.5	28.2	27.4	31.3	30.5	33.6	42.5	29.4	32.4	24.3	
BC5	553044	156690	37.8	41.7	35.4	28.4	28.5	29.3	28.5	28.8		33.4	42.1	30.6	33.1	24.9	
BC6	553044	156690	39.8	40.4	35.4	33.2	32.5	29.0	29.3	29.7	32.0	30.1	43.8	34.2	34.1	25.6	

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☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

☒ **Annualisation has been conducted where data capture is <75%**

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

Notes:

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

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

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure where pre distance corrected concentration is 36 µg/m^3 or greater.

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

Distance Correction Calculations

	Tube Location	Distance from Kerb to measurement (in metres)	Distance from Kerb to receptor (in metres)	Local mean background NO2 concentration (µ/m3)	measured annual mean NO2 concentration (µ/m3)	The predicted annual mean NO2 concentration (in µg/m3) at receptor
DT02	High Street South 1 (Guitar) Sevenoaks	1.6	2.5	11.73	40.9	38.0
DT03	Garvock Drive Sevenoaks			11.72	10.0	10.0
DT05	Riverhead 2 (Laundry) North West	0.6	2.1	13.67	34.9	30.0
DT06	Riverhead 3 (Opp shops) East	2.5	10.3	13.67	35.3	27.7
DT07	High Street East 1 (Road Sign) Seal	0.6	0.8	11.12	37.1	35.7
DT08	High Street West 1 (Garage) Seal	2.4	6.1	11.7	24.0	21.2
DT12	Station Road (M25) Brasted	19	50	18.65	33.6	26.4
DT13	Wested Lane, Swanley	3.8	18.6	21.74	28.1	25.3
DT14	Wadard Terrace, Button St Swanley	114	108	18.55	25.6	27.3
DT23	Bat & Ball 1 Sevenoaks (Ferrari)	5.7	20.1	13.4	33.5	25.6
DT24	High Street, (Wells Close) Westerham	2	7.8	11.04	28.6	23.0
DT25	Vicarage Hill, Westerham	1	7.3	18.38	18.7	18.6
DT26	Farningham Hill (A20)	5	23.4	17.73	35.3	27.2
DT27	High Street South 2 (Sev School) Sevenoaks	4	3.9	11.73	33.6	33.8
DT28	High Street North 2 (Sev Sennockian) Sevenoaks	2.7	3.5	11.73	31.9	30.6
DT29	High Street North 3 (Water Trough) Sevenoaks	2.7	7.1	12.51	24.1	21.3
DT30	Bat & Ball 2 Otford Road Sevenoaks	2	12.6	12.6	31.2	23.2
DT31	Bat & Ball 3 Seal Road Sevenoaks	2.1	6.5	13.4	44.2	36.0
DT32	Bat & Ball 4 St Johns Sevenoaks	1.3	1.5	13.4	41.3	40.5
DT33	High Street East 2 (Pizza) Seal	2.3	3.2	11.12	35.1	33.2
DT34	16 Main Road, Sundridge Dunbrik	2.5	19.8	12.33	23.8	17.9
DT35	Seal Hollow Road/ A25	2.8	23.1	11.7	30.4	20.4
DT36	Market Square, Westeham	0.7	4.7	18.38	34.0	28.4
DT39	Bartholomew Way, Swanley	2.8	16.9	16.46	35.3	26.7
DT40	London Road 1(traffic lights) Swanley	0.2	3.8	16.46	38.0	28.3
DT41	London Road 2 (Bus) Swanley	1.6	8.8	17.95	33.0	27.3
DT42	62 London Road Riverhead	3.2	5.1	13.67	27.8	26.1
DT43	Miners Arms, London Road, Dunton Green	2.3	5.8	13.67	26.9	23.9
DT48	73 London Road(Brunch) Sevenoaks	2.8	2.9	11.72	20.2	20.1
DT49	20 London Road (Butchers) Sevenoaks	2.9	3	11.73	25.4	25.3
DT51	130 London Road (Opp Car Sales) Sevenoaks	2.2	4.3	12.74	30.6	27.7
DT52	142 London Road (Lulworth) Sevenoaks	2.5	9.8	12.74	29.9	24.1
DT54	57 London Road, Dunton Green	1.8	10.9	14.74	29.2	23.2
DT71	204 Main Road, Sundridge	1.9	9.2	11.7	26.0	20.8
DT74	Westerham Road, (Devon Cott) Bessels Green	1.4	18.2	14.58	31.1	21.9
DT76	Worships Hill/ Witches Lane, Riverhead	1.3	42	12.8	33.8	18.3
DT77	Montreal Cott/ Amherst Hill Sevenoaks	1.7	2	12.8	32.1	31.4
DT81	Farningham Hill Road, Swanley	51.2	51.8	18.55	26.1	26.0
DT83	Jessamine Terrace, Birchwood Road Swanley	1.1	2.6	16.09	43.0	38.2
DT84	West End Brasted	1.5	7.4	18.65	26.9	24.0
DT85	Chart Lane Brasted	1.8	2	12.71	36.2	35.6
DT86	59 Westerham Road, Bessels Green	1.9	10.7	14.58	31.2	24.6
DT87	Bradbourne Vale Road South	2.1	5.4	13.67	42.9	36.4
DT88	Bradbourne Vale Road North	1.7	12.5	13.06	23.1	18.6
DT90	4a St Johns Hill Sevenoaks	0.2	2.7	12.6	29.9	23.0
DT93	Pucknells, Birchwood Road, Swanley	2	12.4	16.09	26.2	21.9
DT94	Birchwood Road Junction London Road	2.5	3.7	16.09	29.0	27.7
DT95	Malvern, Birchwood Road, Swanley	2.3	16.9	16.09	30.6	23.6
DT96	Sevenoaks Station	1.8	4.7	12.74	30.9	26.9

Diffusion Tubes:

NO2 diffusion tubes are supplied and analysed by SOCOTEC Didcot. This laboratory is UKAS accredited. The tubes were prepared by spiking acetone: triethanolamine (50:50) on to grids prior to the tubes being assembled. The laboratory confirms it follows the procedures set out in the Harmonisation Practical Guidance and that it is ranked 'Good' in the WASP inter-comparison scheme.

The tubes have been compared with the reference method by a triplicate co-location study with the chemiluminescent NOX analysers at Greatness Park and Bat & Ball, Sevenoaks. Using data from the Greatness and Bat & Ball automatic stations which are both part of colocation studies.

Greatness		**Bat & Ball**	
Automatic Mean	= 14.0	Automatic Mean	= 23
Triplicate Tube Means	= 17.7	Triplicate Mean	= 33.2
Correction Factor	$= \frac{14.0}{17.7} = \mathbf{0.79}$	Correction Factor	$= \frac{23}{33.2} = 0.69$

Greatness Correction Factor + Bat & Ball Correction Factor

$$= 0.79 + 0.69 = \frac{1.6}{2} = \mathbf{0.74}$$

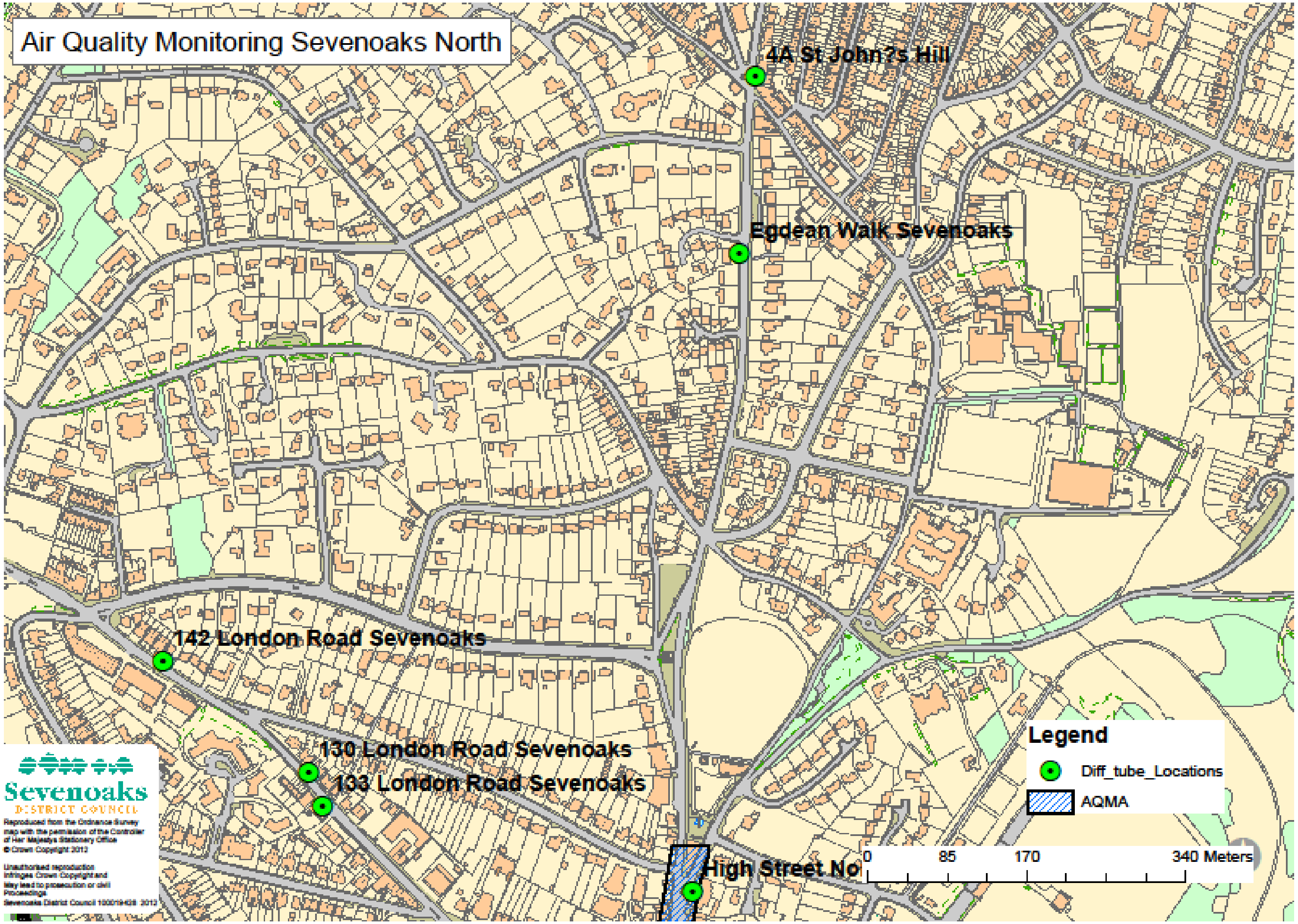
The nationally derived diffusion tube bias adjustment factor for 2019 is 0.75 as detailed below. The national factor was therefore used as it was more conservative.

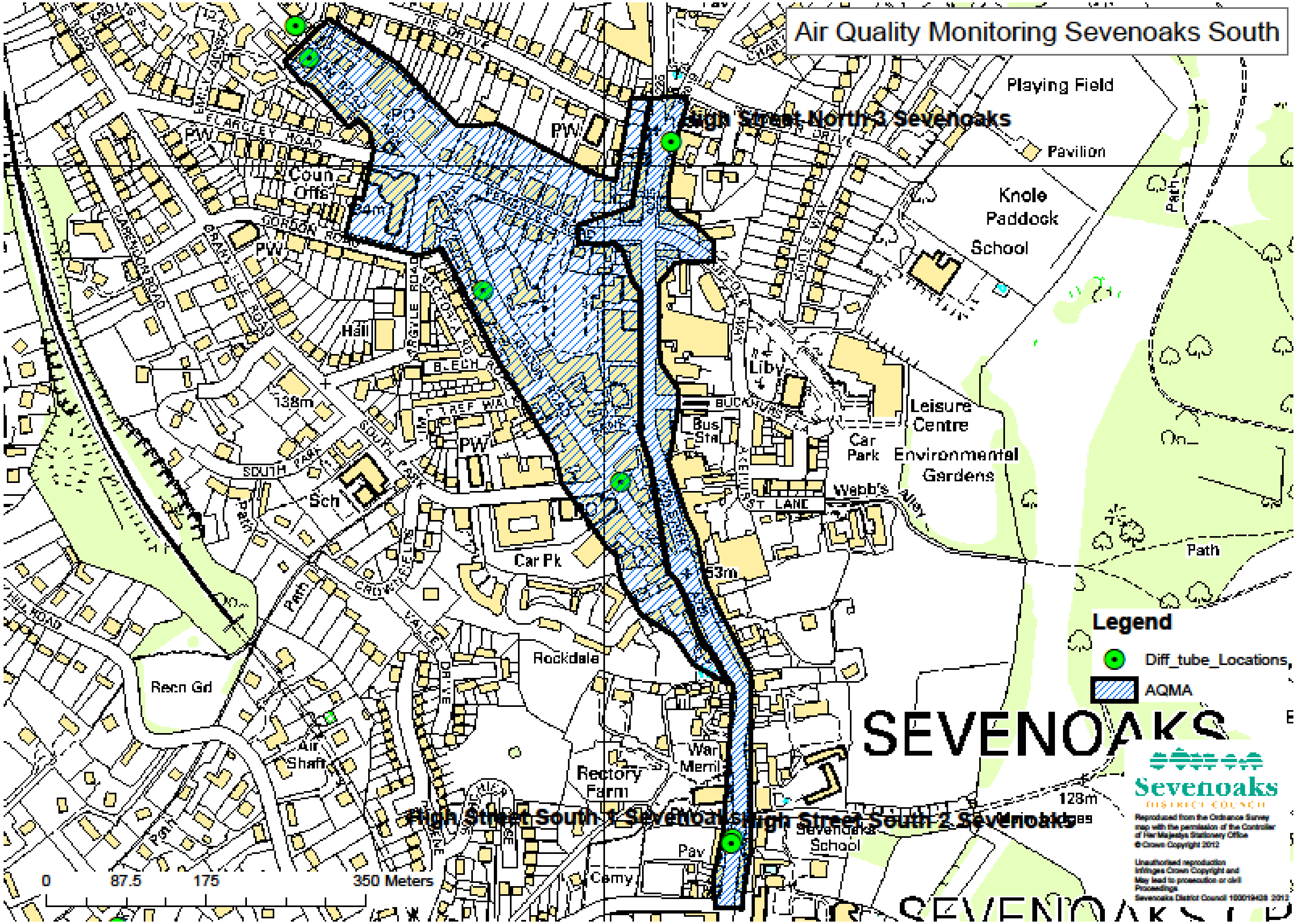
National Diffusion Tube Bias Adjustment Factor Spreadsheet											Spreadsheet Version Number: 06/20
Follow the steps below **in the correct order** to show the results of **relevant** co-location studies Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.										This spreadsheet will be updated at the end of September 2020 LAQM Helpdesk Website	
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.					Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.						
Step 1:	Step 2:	Step 3:	Step 4:								
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.								
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data[2]	If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953								
Analysed By[1]	Method To undo your selection, choose (All) from the pop-up list	Year[5] To undo your selection, choose (All)	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)	
Socotec Didcot	50% TEA in acetone	2019	R	Medway Council	12	33	24	35.1%	G	0.74	
Socotec Didcot	50% TEA in acetone	2019	R	Waverley Borough Council	10	38	30	27.5%	G	0.78	
Socotec Didcot	50% TEA in acetone	2019	R	Waverley Borough Council	12	35	24	44.7%	G	0.69	
Socotec Didcot	50% TEA in acetone	2019	KS	Caerphilly CBC	12	90	63	42.4%	G	0.70	
Socotec Didcot	50% TEA in acetone	2019	R	Caerphilly CBC	11	42	27	54.1%	G	0.65	
Socotec Didcot	50% TEA in acetone	2019	KS	Caerphilly CBC	11	34	24	41.5%	G	0.71	
Socotec Didcot	50% TEA in acetone	2019	R	Cambridge City Council	11	42	28	47.1%	G	0.68	
Socotec Didcot	50% TEA in acetone	2019	UB	Canterbury City Council	12	16	12	27.6%	G	0.78	
Socotec Didcot	50% TEA in acetone	2019	R	Canterbury City Council	12	34	25	35.5%	G	0.74	
Socotec Didcot	50% TEA in acetone	2019	R	Dacorum Borough Council	11	31	24	30.2%	G	0.77	
Socotec Didcot	50% TEA in acetone	2019	R	Derry City and Strabane District Council	12	39	32	20.1%	G	0.83	
Socotec Didcot	50% TEA in acetone	2019	UB	Derry City and Strabane District Council	12	15	11	40.4%	G	0.71	
Socotec Didcot	50% TEA in acetone	2019	B	Gravesham Borough Council	12	36	29	24.5%	G	0.80	
Socotec Didcot	50% TEA in acetone	2019	B	Gravesham Borough Council	12	27	25	10.9%	G	0.90	
Socotec Didcot	50% TEA in acetone	2019	R	Slough Borough Council	11	39	32	22.5%	G	0.82	
Socotec Didcot	50% TEA in acetone	2019	SU	Slough Borough Council	11	32	22	46.7%	G	0.68	
Socotec Didcot	50% TEA in acetone	2019	UB	Slough Borough Council	10	38	31	25.6%	G	0.80	
SOCOTEC Didcot	50% TEA in acetone	2019		Overall Factor[3] (38 studies)					Use	0.75	

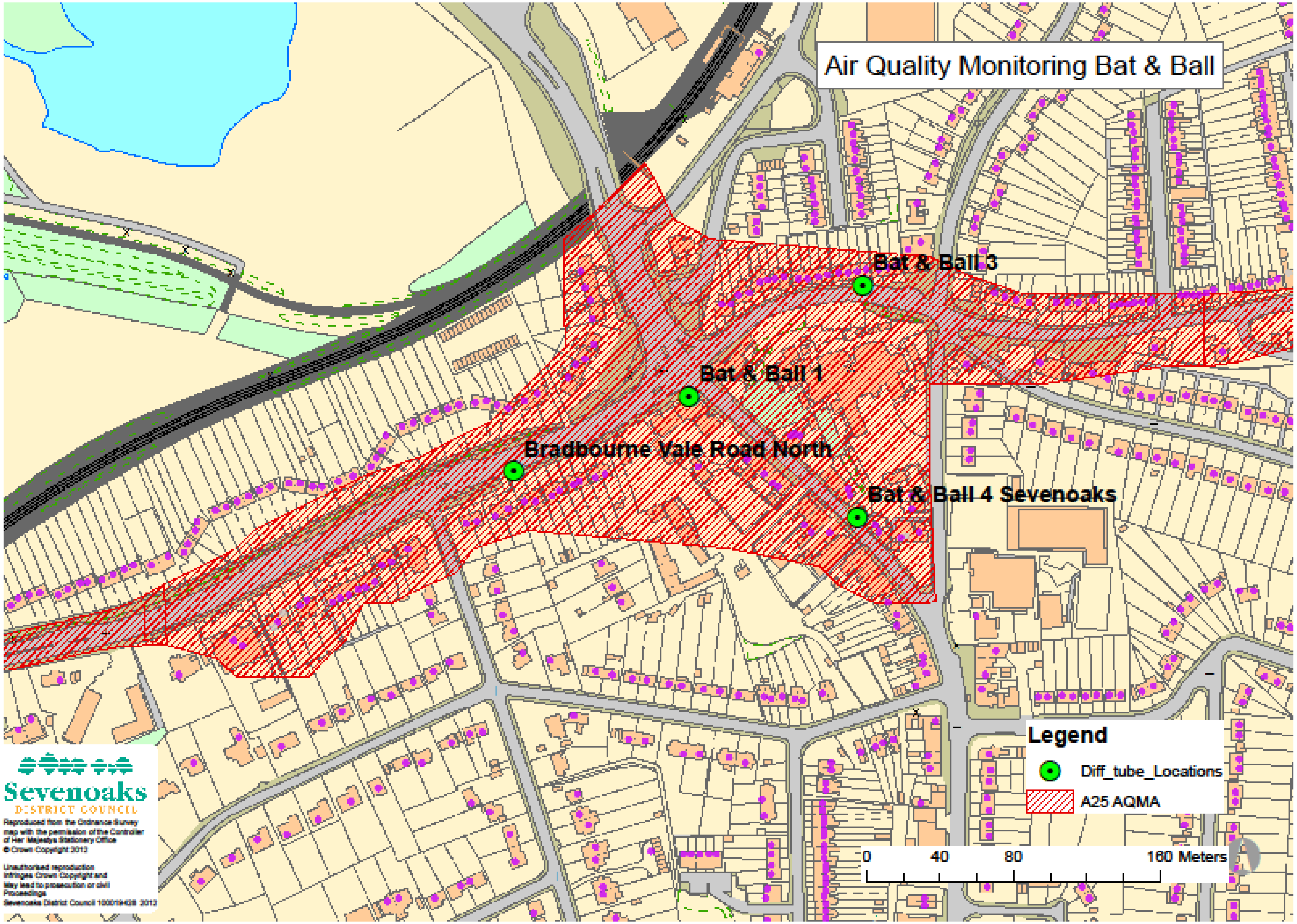
Annualisation Summary

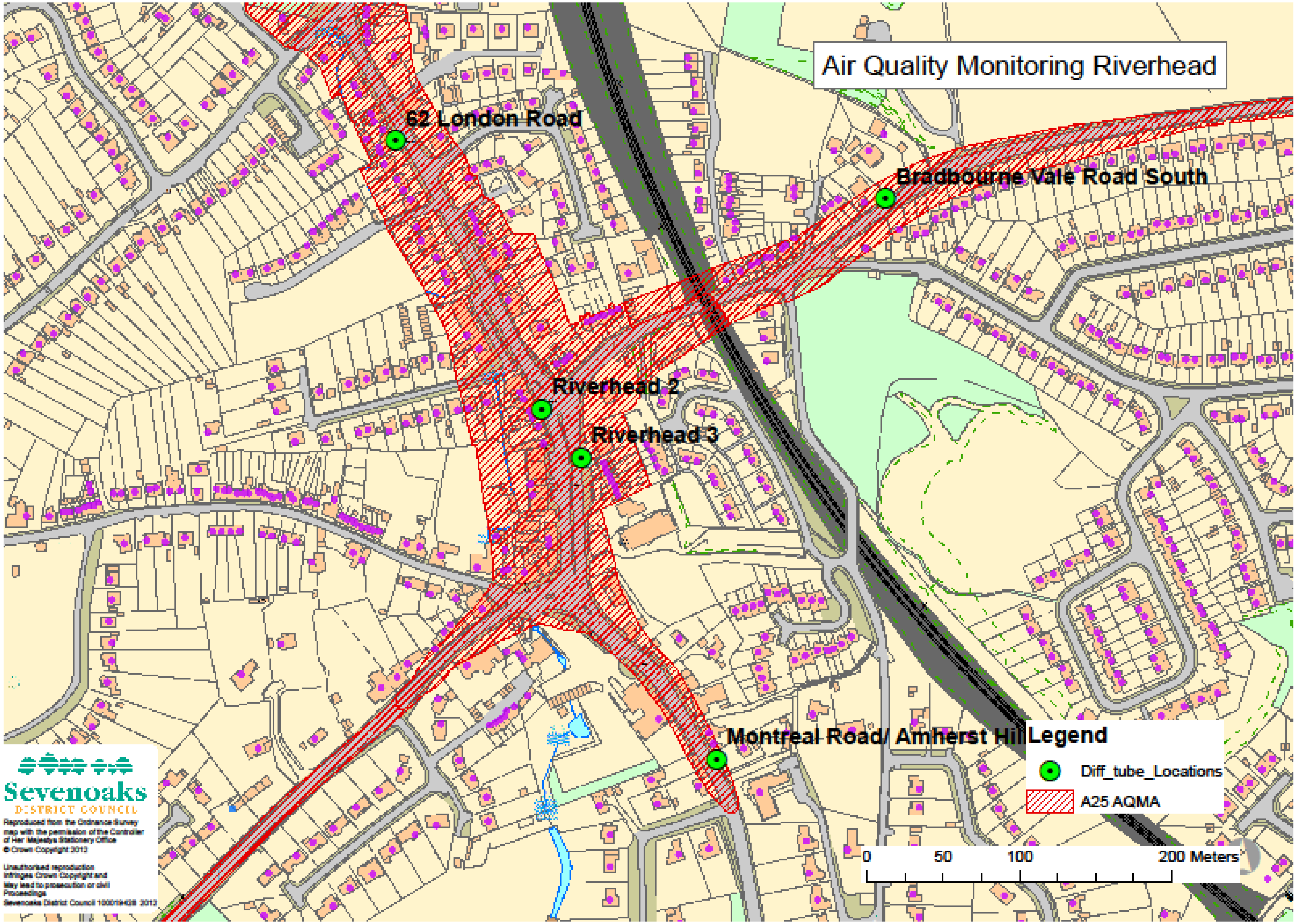
Diffusion Tube ID	Annualisation Factor SDC Greatness	Annualisation Factor Bexley	Annualisation Factor	Annualisation Factor	Average Annualisation Factor	Raw Data Simple Annual Mean (µg/m3)	Annualised Data Simple Annual Mean (µg/m3)	Comments
DT25	0.7901	0.7807			0.7854	31.7	24.9	Bias adjusted to 18.7 µg/m3
DT88	0.8156	0.8045			0.8101	38.0	30.8	Bias adjusted to 23.1 µg/m3

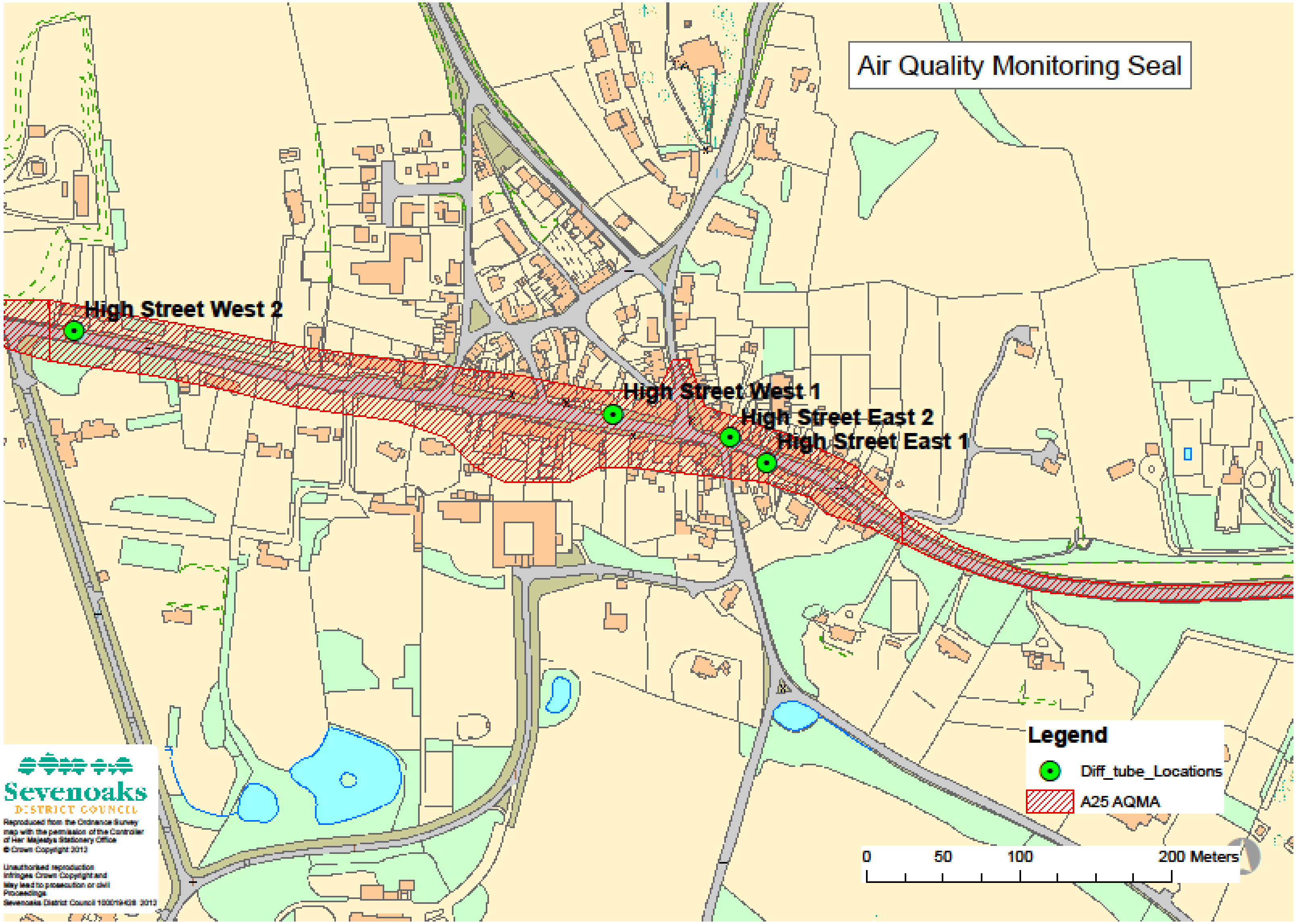
Appendix D: Map(s) of Monitoring Locations and AQMAs

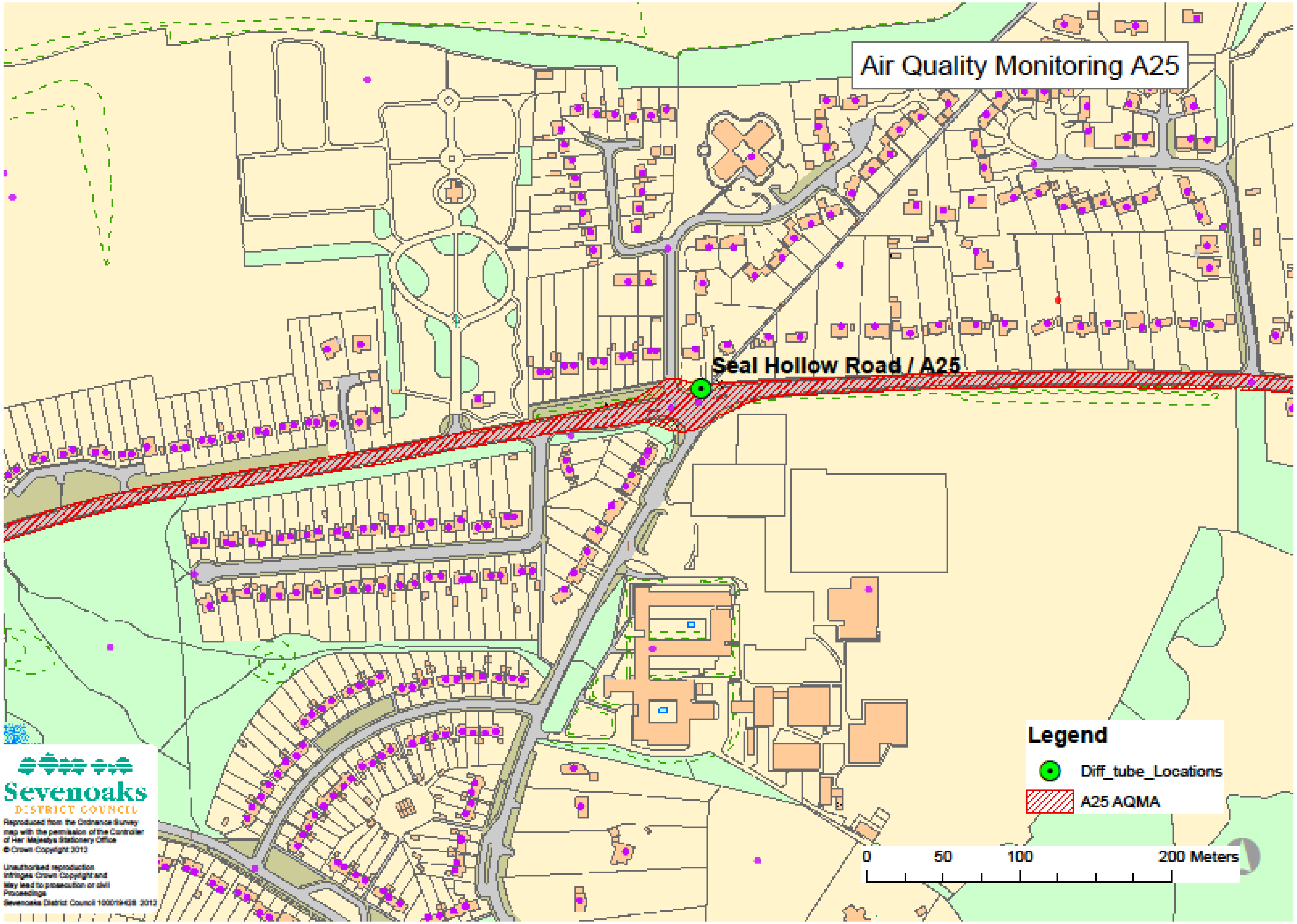


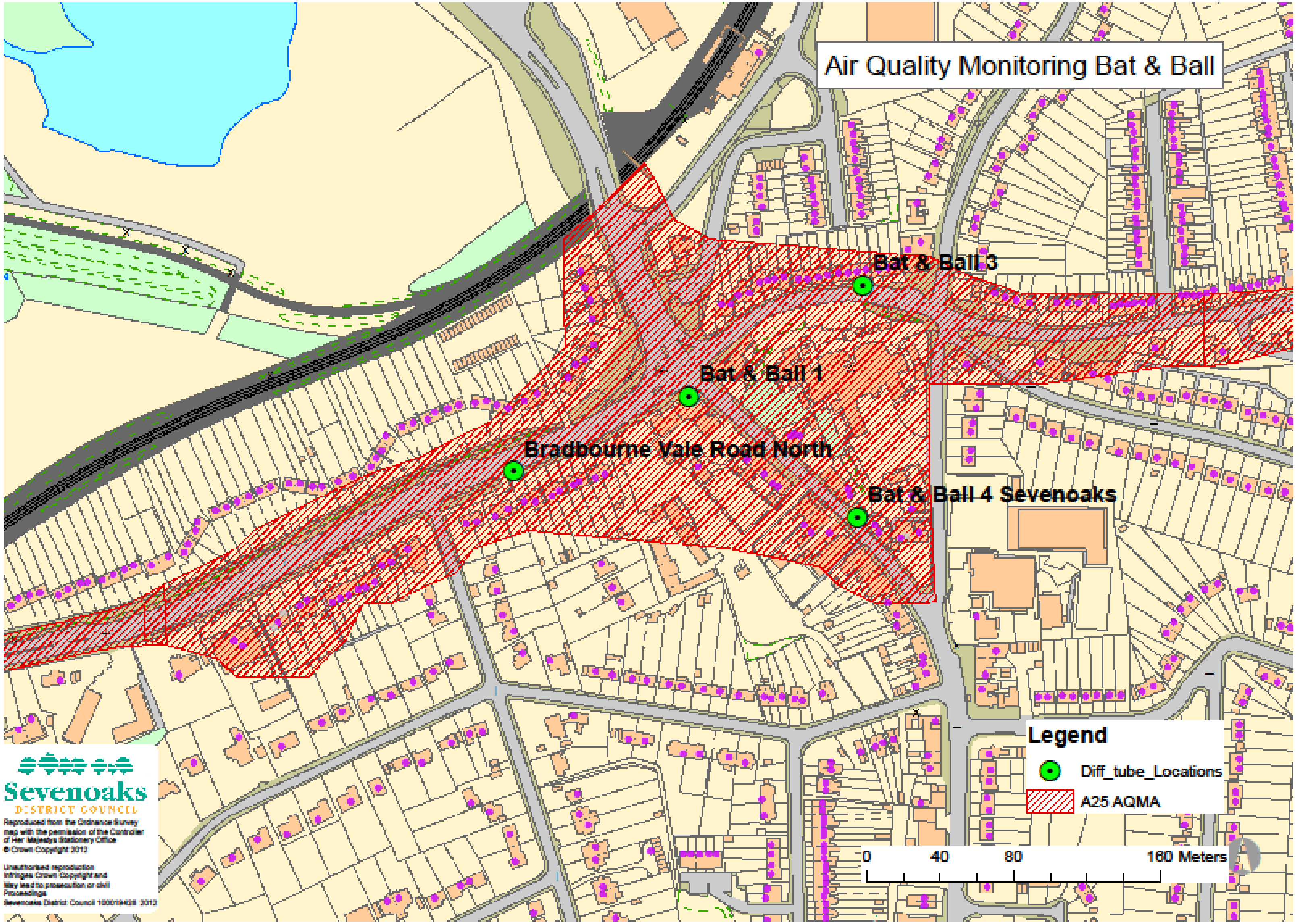

Air Quality Monitoring Sevenoaks South
High Street North 3 Sevenoaks
High Street South 1 Sevenoaks
High Street South 2 Sevenoaks
Legend
Diff_tube_Locations,
AQMA
SEVENOAKS
Sevenoaks
DISTRICT COUNCIL
Playing Field
Pavilion
Knole
Paddock
School
Leisure
Centre
Car
Park
Environmental
Gardens
Webb's
Alley
Path
Liby
Bus
Sta
Coun
Offs
PW
Hall
Sch
Car Pk
Rockdale
Recn Gd
Air
Shaft
Rectory
Farm
War
Meml
Sevenoaks
School
Pav
Cemy
138m
153m
128m
0
87.5
175
350 Meters


Air Quality Monitoring Bat & Ball
Bat & Ball 3
Bat & Ball 1
Bradbourne Vale Road North
Bat & Ball 4 Sevenoaks
Legend
Diff_tube_Locations
A25 AQMA
0
40
80
160 Meters
Sevenoaks
DISTRICT COUNCIL


Air Quality Monitoring Riverhead
62 London Road
Bradbourne Vale Road South
Riverhead 2
Riverhead 3
Montreal Road/ Amherst Hil
Legend
Diff_tube_Locations
A25 AQMA
0
50
100
200 Meters
Sevenoaks
DISTRICT COUNCIL


Air Quality Monitoring Seal
High Street West 2
High Street West 1
High Street East 2
High Street East 1
Legend
Diff_tube_Locations
A25 AQMA
0
50
100
200 Meters
Sevenoaks
DISTRICT COUNCIL


Air Quality Monitoring A25
Seal Hollow Road / A25
Legend
Diff_tube_Locations
A25 AQMA
0
50
100
200 Meters
Sevenoaks
DISTRICT COUNCIL


Air Quality Monitoring Bat & Ball
Bat & Ball 3
Bat & Ball 1
Bradbourne Vale Road North
Bat & Ball 4 Sevenoaks
Legend
Diff_tube_Locations
A25 AQMA
0
40
80
160 Meters
Sevenoaks
DISTRICT COUNCIL

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[6]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values’
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
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

Defra - Local Air Quality Management Technical Guidance (TG16) (2016)

Defra - Local Air Quality Management Policy Guidance (PG16) (2016)

Kent County Council - Local Transport Plan: Delivering Growth without Gridlock (2016)

NO2 Concentration and Distance from Roads AQC consultants Ltd (2008)

Cleaner & Greener Advisory Committee Work Plan 2021/22 (as at 21/05/21)

29 June 2021

- Net Zero 2030 Update – Low Emission and Electric Vehicle Strategy
- Air Quality

12 October 2021

- Net Zero 2030 Update
- Direct Services – Collection Review
- Service Update: Environmental Health

18 January 2022

15 March 2022

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