



Bracknell Forest Council

Air Quality Action Plan

2014

1. Introduction

- 1.1. This document comprises an Air Quality Action Plan of two areas in Bracknell Forest Borough which have been declared as Air Quality Management Areas (AQMAs).
- 1.2. Under the Environment Act 1995 the Council has a duty to designate Air Quality Management Areas (AQMAs) where the defined air quality standards and objectives are not being met. The Council must also prepare a written plan, an Air Quality Action Plan (AQAP) outlining the measures to be taken to pursue the objectives.
- 1.3. The Council declared two AQMAs in 2011, the initial boundaries of the AQMAs were amended in 2013 following the Further Assessment report undertaken in 2012.
- 1.4. The purpose of the Action Plan is to:
 - Provide the context to the national requirements for assessing and managing air quality in declared AQMAs.
 - Outline the measures delivered and/or proposed by the Council in its aim to improve the local air quality to meet the air quality standards and objectives, within the AQMA areas.
- 1.5. As the Action Plan is mainly transport based, the majority of the delivery of the plan will be integrated with the delivery of the Local Transport Plan already adopted by the Council. It is also important to recognise the link between air quality and climate change and the action plan will seek to provide an integrated approach to local air quality and the impacts of climate change.
- 1.6. The plan focuses primarily on the two declared Air Quality Management Areas which are:
 - Bracknell (Area 1) – see Appendix 1
 - Crowthorne (Area2) – see Appendix 2

However it is recognised that improvements in air quality Borough wide can also have a positive effect upon air quality within the two areas.

2. National Air Quality Regulations

- 2.1. The local air quality has a vital role not only in protecting public health and the environment, but also by enhancing quality of life for society. There is evidence which has demonstrated that exposure to air pollution can be associated with a number of adverse health impacts and can reduce life expectancy by an average of 7 – 8 months. Poor air quality particularly affects the most vulnerable in society, the very young and older people and those with heart and lung conditions.
- 2.2. The strategic framework for air quality management in the UK is contained within the Air Quality Strategy (AQS) which DEFRA released in July 2007. This strategy contains the national air quality standards and objectives established by the Government to protect human health. See table 1
- 2.3. The AQS objectives take into account EU Directives that set limit values which member states are legally required to achieve by their target dates. The objectives for ten pollutants (benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, sulphur dioxide, particulates - PM10 and PM2.5, and ozone) have been prescribed within the Air Quality Strategy based on the Air Quality Standards (England) Regulations 2007.

- 2.4. The Strategy acknowledges there are links between air quality and climate change and in 2010 DEFRA published a further document entitled “Air Pollution: Action in a changing Climate” which acknowledged that air pollution often originates from the same activities that contribute to climate change e.g. road transport, it therefore makes sense to link air quality action plans with climate change and transport policies, by including objectives within these policies into this plan
- 2.5. All local authorities in the UK have statutory duties for managing local air quality under Part IV of the Environment Act 1995. Local authorities are required to carry out regular reviews and assessments of air quality in their area against standards and objectives prescribed in the Air Quality(England) Regulations 2000 (SI928) and the Air Quality (England) (Amendment) regulations 2002 (SI 3043).The objectives for the pollutants for the Local Air Quality Management (LAQM) are set by the regulations see table 1.
- 2.6. Bracknell is one of the 292 Local Authorities which has declared AQMAs based on the failure to meet the air quality objective for NO₂

Table1: Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m ³	Running annual mean	31.12.2003
	5.00 µg/m ³	Running annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m ³	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m ³	Running 8-hour mean	31.12.2003
Lead	0.5 µg/m ³	Annual mean	31.12.2004
	0.25 µg/m ³	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m ³	Annual mean	31.12.2005
Particles (PM ₁₀) (gravimetric)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m ³	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

3. Overview of Air Quality and Health

- 3.1. All combustion processes in air produce oxides of nitrogen. NO₂ and nitric oxide (NO) are both oxides of nitrogen and together are referred to as NO_x. It is NO₂ which maybe associated with adverse effects upon human health. Road transport accounts for about half of the total UK emissions of NO_x, with further major contributions from the electricity supply industry and the industrial and commercial sectors. Emissions are likely to decline further over the coming years as new technology and emission standards continue to be introduced
- 3.2. There is evidence to show that long-term exposure to NO₂ may affect lung function, and at relatively high concentrations NO₂ causes inflammation of the airways. Exposure to NO₂ also enhances the response to allergens in sensitised individuals (DEFRA 2004,).
- 3.3. The EU limit values and Air Quality Strategy Objectives for NO₂ are primarily based on health effects. In recent decades there has been increasing concern about the possible adverse effects of pollution by motor vehicles emissions. Among these concerns has been a belief that this type of air pollution may cause or aggravate asthma and other respiratory disorders (Department of health, 1997).
- 3.4. This Action Plan will outline the reduction measures in relation to NO_x as the other pollutants in the air quality objectives have been monitored in recent years and the levels do not pose a current health threat to those living within the AQMAs.

4. Local Air Quality in Bracknell

- 4.1. The previous air quality assessments undertaken in Bracknell Forest concluded that concentrations of carbon monoxide, benzene, 1, 3-butadiene, lead, sulphur dioxide and particulates (PM10) are compliant with UK objectives. However NO_x emissions as a result of road transport continue to effect air quality on the Borough.
- 4.2. The Updated Screening Assessment in 2009 recommended that a Detailed Assessment Report was undertaken into two areas within the Borough. This was submitted to DEFRA in 2010 and as a result two Air Quality Management Areas (AQMA) were declared in the borough; one in Bracknell and the other in Crowthorne. The 2012 Further Assessment modelled both AQMAs air quality in greater depth and advised the Council to change the AQMA boundaries.

The Bracknell AQMA (Area 1) encompasses 233 properties. This road network is commonly known as the M3/M4 corridor as it is the main road which links both motorways. The Crowthorne AQMA (Area 2) is a smaller area which includes 271 properties.

- 4.3. Since undertaking the Further Assessment, and to comply with the LAQM an Updated Screening Assessment (USA) was undertaken and published in 2012 This report examined air quality data collected during 2011 and concluded that Bracknell Forest Borough Council was not required to proceed to a Detailed Assessment for any pollutant. The report also concluded that the annual mean NO₂ objective continued to be exceeded in the Bracknell AQMA. However the closure of Crowthorne High Street to through-traffic between June and October 2011 had influenced measured concentrations and there were no exceedences of the annual mean objective recorded in the Crowthorne AQMA in 2011.
- 4.4. The information in this Action Plan will look at a variety of strategies which may be able to help reduce the NO₂ levels below annual mean objective of 40µg/m³. Some of these strategies are already in place as part of other initiatives in the borough; and as a secondary factor should have a positive effect on reducing the NO₂ in the AQMAs and across the Borough. The actions are closely linked to the Local Transport Plan and its implementation plan which was adopted by the Council in April 2011.

5. Sources of NO₂ in AQMAs

5.1. The Further Assessment report apportioned the source of the NO_x within both of the AQMAs. Government guidance in LAQM TG 09 which states that the sources must be separated into the following components

- Regional Background (which the LA is unable to influence)
- Local background (which the LA should have some influence over) and
- Local Sources (which will add to the background to give rise to the hotspot area of exceedences)

The Action Plan aims to target the local sources therefore these are further separated:

- Stationary sources (if relevant)
- Vehicle type (potentially cars, vans, lorries, buses; age and /or local/through traffic (if there are significant issues)
- Vehicle emissions, split between moving and stationary traffic
- Other relevant factors

5.2. The Further Assessment Reports considered that within the Bracknell AQMA (Area 1) the significant local source was moving and queuing traffic. It was not possible to split the background component into regional and local components; however the local sources were split into the components of light and heavy vehicles, as well as queuing and stationary traffic. See Appendix 3.

5.3. Similarly in the Crowthorne AQMA (Area 2) the Further Assessment report highlighted the local source to be moving traffic. The traffic was split in to the component types of light and heavy vehicles. See Appendix 4. The main local source identified in this area is that from Light Delivery Vehicles(LDVs)

5.4. The results show that the predominant source of NO_x in both areas is from the background. As already stated the background is made up of both local and regional background levels of NO_x and there is little that the Council can do to influence the regional background, however the local background is often influenced by local sources. The local sources identified contribute to the emissions in particular from queuing traffic in the Bracknell AQMA (Area 1) and from the movement of light vehicles within the Crowthorne AQMA (Area 2)

6. Monitoring within the AQMAs

6.1. The current legislation governing air quality outlines that air quality action plans need to demonstrate progress towards achieving the national air quality objectives and standards. In This will be evidenced by the continued monitoring within the AQMAs and through annual progress reports. Data and evidence may also be obtained from others parties to establish if the objectives of the Action Plan are being achieved.

6.2. There are 40 sites within the Borough where diffusion tubes measure the air quality – see Appendix 5. Diffusion tubes are set at a position to replicate a human or human receptor (receptor locations). A number of tubes are placed at the roadside and a number are placed along the kerbside slightly away from the road side. This data is used to model the NO₂ levels at the nearest human receptor. The results from these tubes are analysed every month and ratified annually. Some sites have a single tube whilst others have triplicate tubes to ensure greater accuracy in the monitoring.

6.3. A permanent real time continuous monitor is situated within the Bracknell AQMA, this collects data every 15 minutes and in addition to this there is a continuous background monitor in place at Fox Hill School measuring the background levels.

6.4. Air Quality data has been collected within the Borough for many years as part of the Local Air Quality Management regime. As part of the on-going monitoring and assessment of air quality, the extent and location of the monitoring sites will be reviewed on an annual basis.

6.5. **Area 1 Bracknell AQMA**

In the Bracknell AQMA there are 14 sets of triplicate tubes. 7 of these tubes are at receptor locations and 7 are along the road side and kerbside. The Continuous monitor is located in Downshire Way and has triplicate diffusion tubes located adjacent to it. See Appendix 6 & 7

6.6. **Area 2 Crowthorne AQMA**

Within the Crowthorne AQMA there are 7 diffusion tubes in key places, 6 positioned at road and kerb side and 1 at a receptor location. A continuous monitor was located for a period of 9 months on the High Street, this monitor was used to obtain data to support the Further Assessment report, this has now been removed but the collated diffusion tubes are still in place. See Appendix 8 & 9

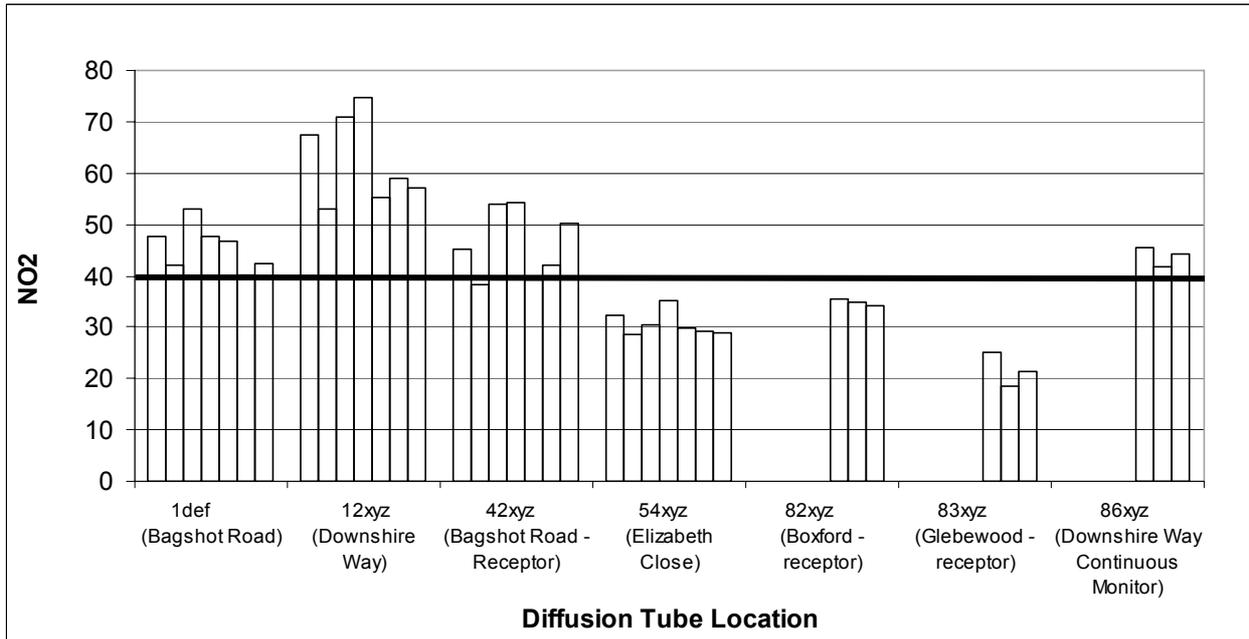
7. Trends in Air Quality within the AQMAs

7.1. The results from monitoring in the AQMAs show that the annual mean concentration recorded at diffusion tube sites between 2007 and 2011 decreased at the majority of sites compared to the 2010 annual mean. It is not possible to determine an overall trend in concentrations, but the results help to demonstrate that 2010 is likely to have been a high pollution year.

7.2. The trends within the AQMAs are set out in Figures 1 and 2 below using the annual mean concentrations.

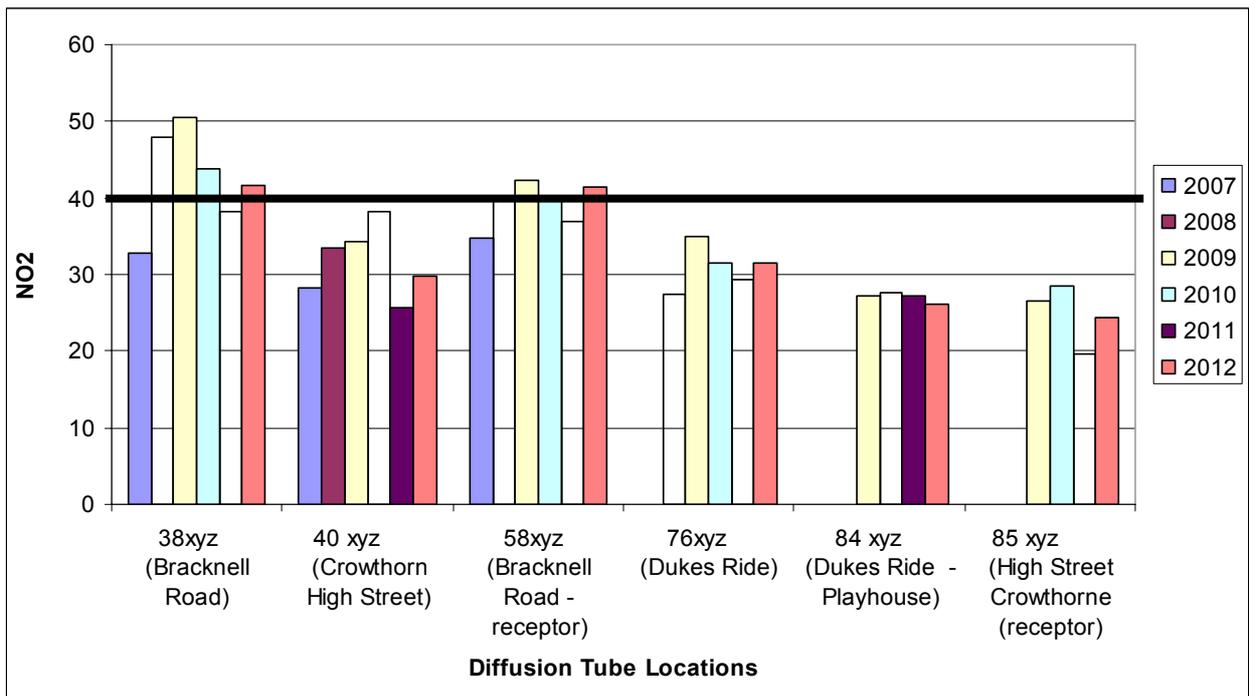
7.3. The results from the Bracknell AQMA have generally shown a decrease in concentrations between 2010 and 2011, with the exception of sites 12 and 42 (Downshire Way and Bagshot Road). At all sites in the Bracknell AQMA, the 2011 annual mean concentrations were lower than the 2009 annual mean concentrations..

Figure 1: Trends in annual mean NO₂ concentrations measured at diffusion tube sites in Bracknell AQMA (Air Quality Objective - 40µg/m³)



7.4. In the Crowthorne AQMA all sites recorded a decrease in concentrations between 2010 and 2011. However, the closure of the High Street between June and October 2011 due to major road works will have influenced these readings, with lower than typical concentrations occurring when the High Street was closed to through-traffic. As in the Bracknell AQMA, concentrations were generally lower in 2011 than in 2009 in the Crowthorne AQMA.

Figure 2: Trends in annual mean NO₂ concentrations measured at diffusion tube sites in Crowthorne AQMA (Air Quality Objective - 40µg/m³)



8. Integration with other policies

- 8.1. Bracknell Forest Council's Core Strategy is the main document in the Local Development Framework (LDF) portfolio. It contains the policy framework for delivering sustainable growth in the Borough up to 2026 to ensure future development strikes the correct balance between the Borough's economic, social and environmental needs.
- 8.2. This action plan has been developed initially within the Council by drawing upon the work undertaken in relation to the adoption of the Local Transport Plan 3¹. Consultation was undertaken on the production of Local Transport Plan 3 which resulted in a set of policies and measures being developed which can, amongst other transport related matters, improve air quality in the borough (including within the two declared AQMAs). Therefore a more focused consultation on this draft Air Quality Action Plan is not necessary.
- 8.3. Focusing on air quality matters, Local Transport Plan 3 is consistent with the governments transport objectives to improve local air quality by developing a set of local objectives including the objective to protect and enhance the quantity and quality of natural resources including water, air quality and the natural environment. These have led to a set of transport policies of which set a statement of intent and direction of travel in terms of achieving better air quality in the borough and in the AQMAs. Together, these policies will ensure improved air quality over time. The following provides examples of how the policies intend to positively deal with air quality issues across the Borough:
 - **Accessibility (Policy TP1)** – states the Council is committed to improving accessibility through developing a series of corridor route strategies to ensure a co-ordinated and forward thinking approach to network improvements. This is critical to improving the flow of traffic within and through the borough such along the A322/329 corridor which will keep traffic moving and reduce the stop/start impact of congestion which contributes towards poorer air quality.
 - **Buses (Policy TP3)** – encourages the use of alternative fuels and greener buses, which will minimise air pollution from this mode of transport in the AQMA areas.
 - **Rail (Policy TP4)** – encourages improvements to capacity as an alternative to car use.
 - **Taxi and Private Hire Vehicles (Policy TP5)** – encourages alternative fuels and low emission vehicles which will benefit the AQMAs in the longer term.
 - **Smarter Choices (Policy TP7)** - states that the Council will improve and promote walking and cycling options especially for short local trips. This could help ensure that unnecessary car trips through the AQMA areas are minimised
 - **Walking and Cycling (Policy TP8)** – aims to improve walking and cycling infrastructure which could improve provision through the Crowthorne Area 2 AQMA.
 - **Smarter Vehicle Use (Policy TP11)** – encourages up-to-date journey information which could influence traffic using the A322/329 corridor especially during congested periods.
 - **Traffic Management (Policy TP12)** – seeks to regulate traffic by facilitating the movement of traffic. This will minimise traffic congestion and its impact on air quality.

¹ Bracknell Forest Local Transport Plan 3 Core Strategy and Implementation Plan 2011-2026 (April 2011)
www.bracknell-forest.gov.uk/LTP3

- **Congestion Management (Policy TP13)** – states that the Council through works and measures will improve the capacity and functionality of junctions and route corridors. The proposed junction improvements along the A322/A329 corridor planned in association with the Council Infrastructure Delivery Plan² are an example of the intended improvements to be made to implement this policy which will have a positive impact on air quality issues in this area.
- **Intelligent Transport System (Policy TP14)** –states the Council will use Intelligent Transport Systems (ITS) technology to manage traffic flow through transport corridors. This will help to keep traffic moving and also help people to make informed decisions about their intended journey.
- **Movement of Freight (Policy TP15)** –. promotes preferred routes for freight movement, low emission vehicles and the provision of infrastructure to facilitate the use of low emission vehicle.
- **Parking (Policy TP16)** –.promotes electric charging points in parking bays.
- **Network Management (Policy TP18)** - states the Council will co-ordinate the response to congestion issue which will contribute to minimising the impacts of congestion on AQMAs.

9. Action Plan measures

9.1. Improving the flow of traffic and reducing queuing traffic

- 9.1.1. It is well recognised that queuing traffic can have a massive impact upon air quality and as such this is an area which needs to be considered in both AQMAs. The stopping and starting of traffic can also impact upon air quality and therefore any measures to ease congestion within the AQMAs will assist in improving air quality
- 9.1.2. The Further Assessment Report identified road transport having a significant contribution to NOx emissions within the AQMAs.
- 9.1.3. In particular within the Bracknell AQMA queuing traffic was identified as a problem, the report suggested that the NOx would need to be reduced by 50% in this area to achieve compliance with the national objectives
- 9.1.4. The A329/A322 corridor is the Borough's busiest route passing through Bracknell's urban areas, carrying in excess of 46,000 vehicles per day. Although the route serves as a primary means of access into Bracknell, it is also used by through traffic as an "outer orbital" link between the M3 and M4 motorways with up to 25% of the total vehicles in the PM peak travelling from the M3 corridor and onwards to the M4. This high percentage of through traffic puts a tremendous strain on the Boroughs highway network and contributes to creating delays at major junctions for residents of Bracknell
- 9.1.5. The Council have already undertaken a number of projects which will impact upon the day to day flow of traffic through the AQMAs and the Borough itself. The work in this area is being undertaken as part of the implementation plans of the LTP3; however it must be noted that during the construction phase there may be a worsening of the air quality in these areas due to the increase in queuing traffic.

² The Infrastructure Delivery Plan is a live document which is periodically updated to provide the details of necessary infrastructure to deliver the Council's housing needs as set out in the emerging Site Allocations Development Plan Document. It will also be an important tool for the production of the Council's forthcoming Local Plan review.

- 9.1.6. In order to establish the impacts of future development proposals on the highway network in 2026, a number of core journey time routes traversing the Bracknell area have been assessed using the Bracknell Forest Multi Modal Transport Model for the AM and PM peak periods. By assessing each junction along these routes it can be established the improvements required to maintain reliable journey times.

These routes included the B3348 and A322/A329 which both run through the Boroughs AQMAs. Some improvements have already been implemented on the A322 at the Horse & Groom and Sports Centre roundabouts. These improvements have shown anecdotally, a reduction in traffic queues and improved journey times for this section of the route. However the results of the detailed monitoring undertaken are yet to be analysed. These improvements have been adopted as part of improving the corridor as a whole (see Figure 3) and the use of urban traffic control. By taking this whole corridor approach, the Council have been able to deliver improvements to the traffic flow at a reduced cost thereby providing much better value for money than approaching this in a piecemeal way. The Council have also bid successfully for Department for Transport for funding to improve Twin Bridges see www.bracknell-forest.gov.uk/localpinchpointbid

- 9.1.7. Within the Crowthorne AQMA – it is recognised that the area is not a major through route and as a busy shopping area is used regularly by residents for access to shopping and retail units. However the presence of retail units means that there is an increase in delivery vehicles using the High Street on a regular basis. These vehicles in themselves can cause other vehicles to queue as they often reduce the road width when delivering in the area. Improvements have been made to the speed humps in the High Street, replacing them with speed cushions therefore reducing the stop/start driving style adopted for speed humps.

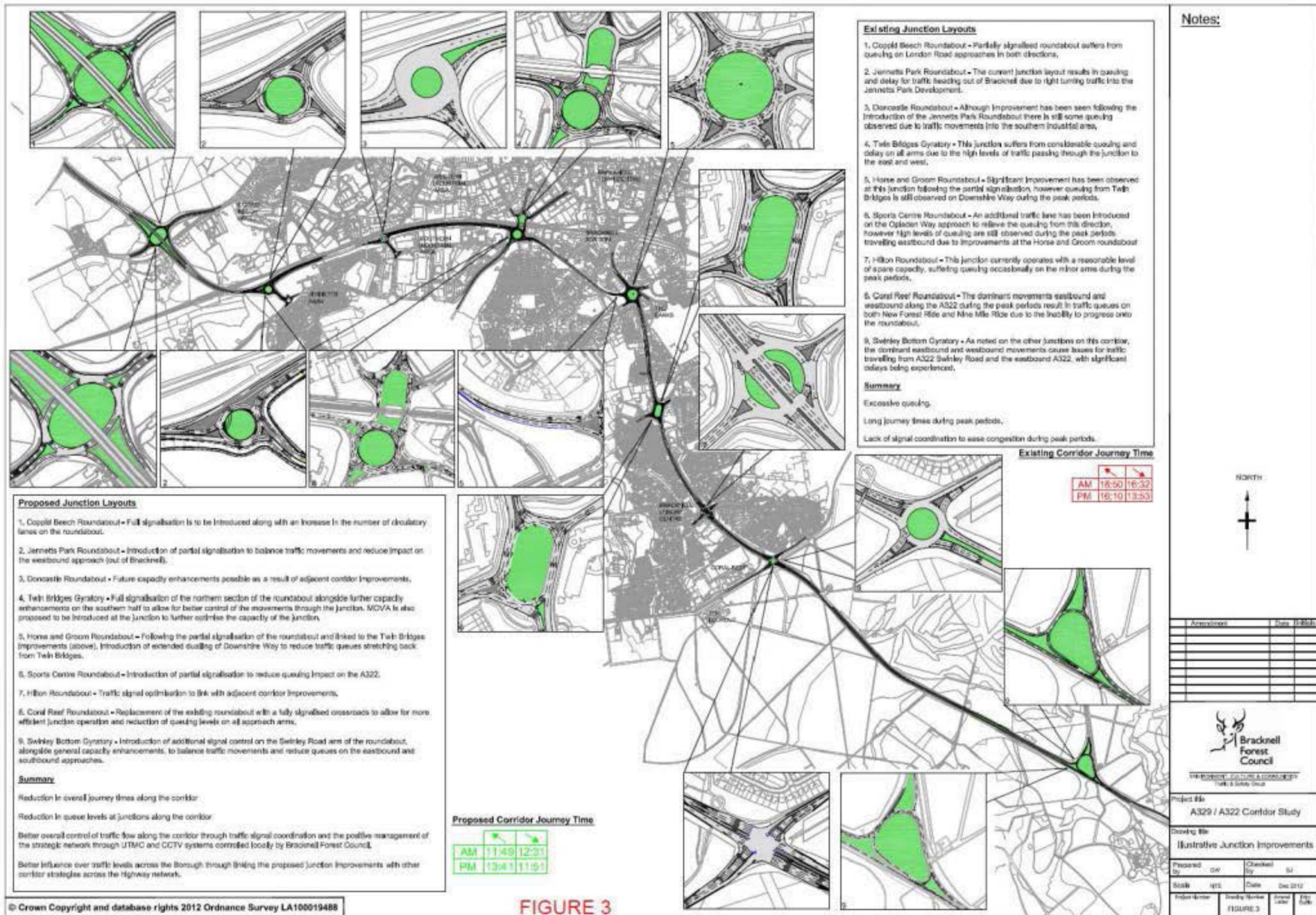


FIGURE 3

9.2. **Reducing the number of LDVs using the High Street, Crowthorne**

- 9.2.1. Within the Crowthorne AQMA, movement of Light Duty Vehicles (LDV) and the stop/ start and frequent acceleration and deceleration were a major factor in NO_x emissions. The reduction in NO_x emissions to achieve the Air Quality Objective in this area is 19%.
- 9.2.2. The Further Assessment apportioned a significant amount of NO_x to the Light delivery vehicles using Crowthorne High Street. The design and nature of Crowthorne High Street makes it difficult to provide loading/ unloading bays to the front of the retail premises. Thereby increasing the number of delivery vehicles unloading and loading on the High Street and causing traffic to queue. An alternative would be to provide a rear service road to the rear of the premises to allow for deliveries to be made at any time and not to impact upon the flow of traffic along the High Street.

9.3. **Improving travel choices**

- 9.3.1. The Council seeks to promote and enhance all modes of public transport across the Borough, this in itself will ensure that there is a wider choice of travel options available and single person car journeys could be reduced.
- 9.3.2. There are a number of sub strategies developed under the LTP3 relating to bus, rail, taxi and community transport. Bracknell has 77km of Public right of Ways which also assist with improved travel choices. In recent years the Council has seen an increase in the number of journeys undertaken by walking or cycling.

9.4. **Bus Travel**

- 9.4.1. The existing bus network provides services from residential areas into Bracknell Town Centre and also links between Bracknell and surrounding areas; as the Town Centre develops it is likely that there will be an increase in the demand for bus travel into the town for shopping and employment.
- 9.4.2. The Council promotes bus travel in a number of ways;
- by contributing financially towards a charity called New Neighbours who put together a new residents welcome pack for all new residents to the borough, bus timetables are included within this pack
 - through the planning process, by ensuring a travel plan is produced for all new developments which exceed certain (size) thresholds. Such plans include measures designed to encourage more sustainable travel modes, such as bus travel
 - Provision of bus information on the public web site, including a range of route maps not available anywhere else, which receive several thousand hits per month
 - Bus travel is promoted through Council promoted adverts across the Borough.

9.5. **Rail Travel**

- 9.5.1. There are 4 railway stations within the Borough which help with reducing the number of car journeys especially for those commuting into the Borough.
- 9.5.2. The Council is working to improve access to rail travel by:

- Providing real time information for travellers - Real Time Information is available via Network Rail's web site, which can be accessed via the rail page on the Council's web site.
- Investigating smart ticketing options.
- Officers continuing to monitor developments in this area, which due to the technology involved is a rapidly changing market place.

9.6. **Car Clubs – Travelshare**

9.6.1. Bracknell Forest Travelshare has been set up to provide a journey matching service for anyone who lives, works or travels in and around Bracknell Forest. Whether a resident currently drives alone, does not own a car but needs a lift, or even if walks or cycles.

9.6.2. This web site aims to reduce the number of cars on the road by maximising the number of people in each car. It also helps cyclists and walkers find someone to share their journey too.

9.7. **Improving Council's own transport emissions**

3.1.1 The Council currently has a fleet of 53 vehicles plus there are a number of contracts which the Council awards where transport is used extensively e.g. Refuse Collection, Landscape Services, Street Cleansing and Highways The new contract due to commence in October 2014 requires that all vehicles used shall meet not less than Euro 5 emissions standards and in the case of cars and vans have CO2 emissions below 120g/km.

9.7.1. Generally Council owned vehicles are replaced every five years with new vehicles thereby complying with current emission levels.

9.7.2. In 2010, 50 council drivers undertook training in the Energy Savings Trust's Smarter Driving campaign.

9.7.3. There are 3 cars which are used as pool cars by Council employees, the fleet will be reviewed in 2013 and the viability of using electric vehicles for the pool cars will be investigated with support from the Energy Savings Trust.

9.8. **Cycling and Walking**

9.8.1. Cycling and walking can play a significant role in reducing congestion on the road network. However to encourage and promote this mode of transport the routes that people use must be safe and well designed

9.8.2. The Council continue to try to ensure that

- The needs of pedestrians and cyclists are fully considered within new developments
- Where feasible, the walking and cycling infrastructure is improved. A number of schemes have been outlined within the LPT3 implementation. These schemes will only go ahead if appropriate funding can be secured.

9.9. **Encourage the use of alternative fuels/greener**

9.9.1. The Council has installed 2 electric car charging points in the High Street public car park, this is in partnership with Scottish and Southern Electricity.

9.9.2. The Council have also provided charging points in the Town Centre for a national distribution company who were trialling electric vehicles

9.9.3. The Council is encouraging supermarkets to have electrical charging points in their car parks eg Bracknell Waitrose

9.10. **Reducing emissions from new developments**

9.10.1. A Travel Plan is a package of measures aimed at promoting greener, cleaner travel choice with specific emphasis on reducing single-occupancy car journeys.

9.10.2. The planning process now ensures that all major new developments within the Borough must implement such a plan. The Council actively encourage developers to ensure that bus travel/services are effectively provided in any new development

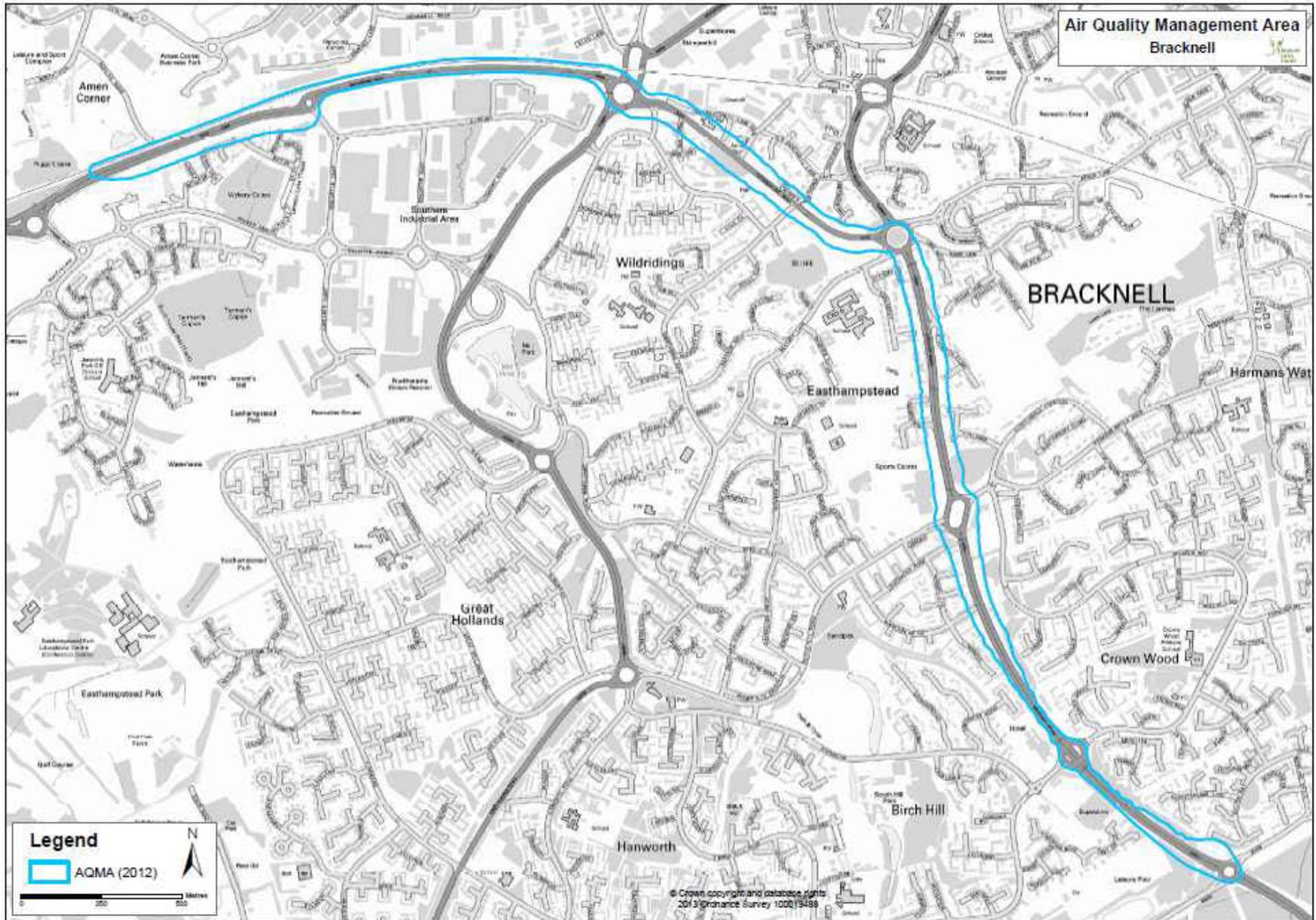
9.10.3. The Council will not only ensure travel plans are produced for developments within the Borough but for major housing developments contributions are secured specifically for providing bus services to serve the new developments.

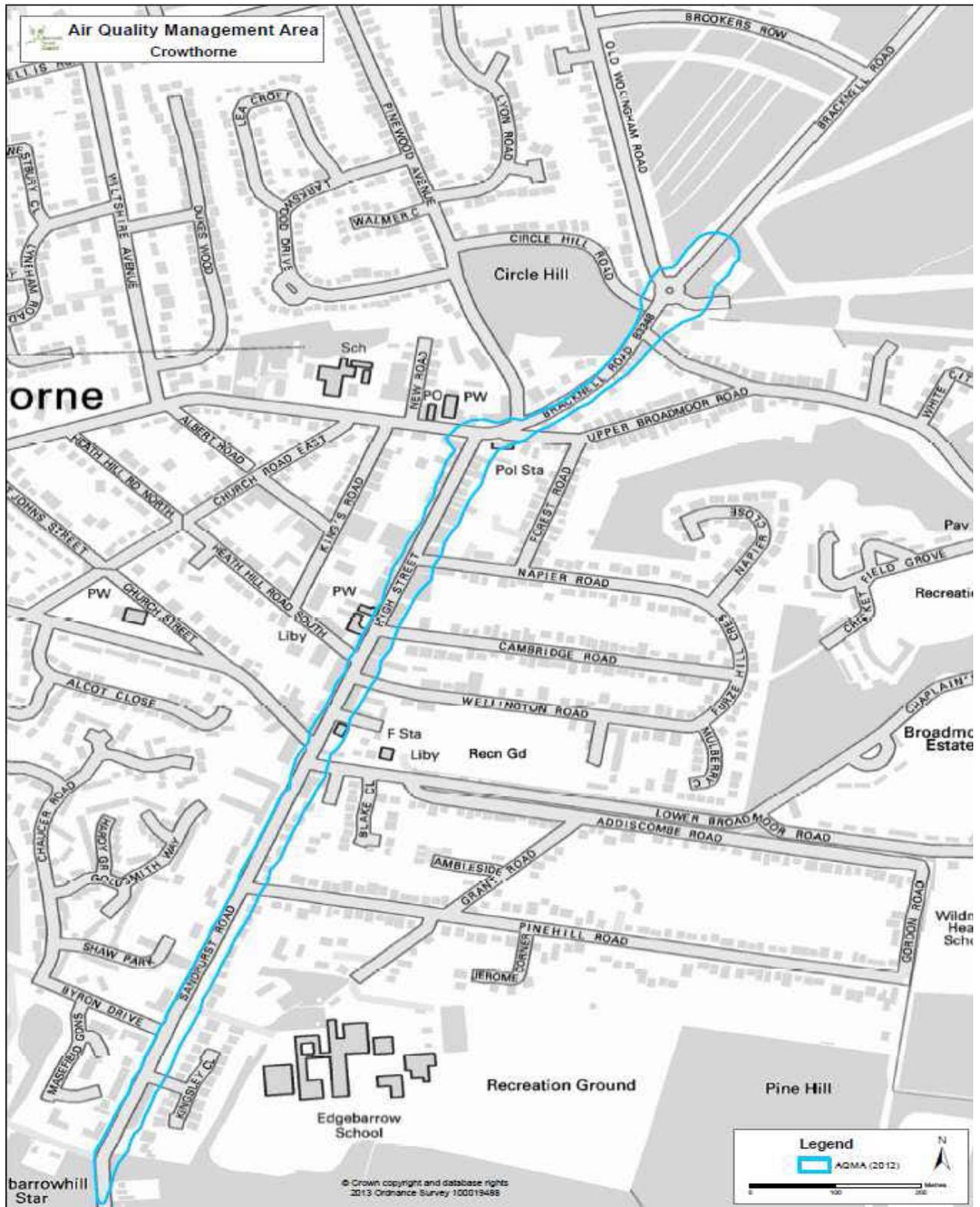
Delivery of Action Plan

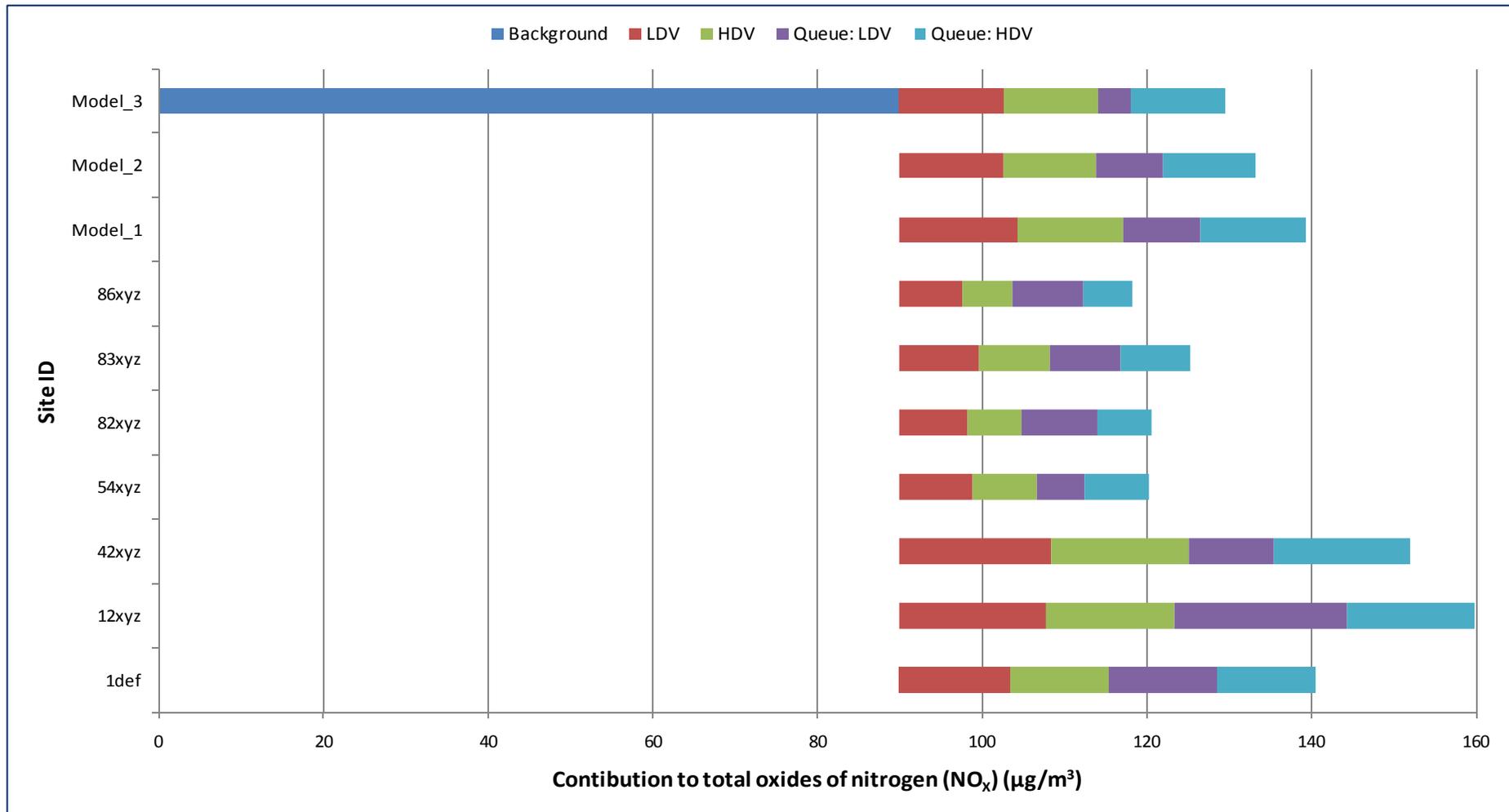
10.1 Following the determination of the AQMAs and the subsequent development of the AQAP an officer group has been set up and will meet regularly to ensure that the measures within this plan are implemented.

Action taken/ planned	Date implemented / planned	Impact following works on Air quality	Policy / strategy reference
Improvements to Horse and Groom Roundabout to increase capacity – reducing queuing on approach roads	2012	Reduction in queues – awaiting analysis of monitoring data	LTP3 Policy TP13 Implementation Plan Scheme 58
Improvements to Sports Centre Roundabout to widen carriageway and improve flow of traffic Phase III	2014	Reduction in queues – awaiting analysis of monitoring data	LTP3 Policy TP13 Implementation Plan Scheme 85
Capacity and safety improvements at Twin Bridges Roundabout and the extension of the widening of Downshire Way from Horse and Groom roundabout.	2013/14/15	Improved movement along Bagshot road and Downshire way for peak hour Traffic. The improvement in flow should reduce the stop/start of the traffic and therefore reduce the amount of NO _x emitted.	LTP3 Policy TP13 Implementation Plan Scheme 78 IDP Post Submission SADPD (October 2012) Table 6.1 ref. 3
Capacity and Safety improvements at junction with B3348 Dukes Ride and A321 Wokingham Road	2014/15	Improved traffic movement through junction in peak hour.	LTP3 Policy TP13
Crowthorne High Street improvements – speed cushions replacing flat top humps	2012	This should reduce the stop/start of the traffic and help maintain an even speed through the high street thus reducing the NO _x	LTP3 Policy TP12
Improvements to bus stops to aid flow of traffic and reduce queuing	2015	This should reduce the traffic queuing behind the bus stop and/or accelerating quickly to over take.	LTP3 Policy TP3 & TP6
Improvements to Dukes Ride/Bracknell Road junction	2015	Reduction in queues – awaiting analysis of monitoring data	LTP3 Policy TP13 Implementation Plan Scheme 87
Provision of rear service yard facilities in Crowthorne High Street to reduce number of delivery vehicles unloading	This is on-going as plans are submitted to the Council	This measure aims to reduce the need for on street loading/unloading of goods to the north Eastern part of the highway by 50 %	
Provision of real time information at all road side displays (currently only 1 route)	2012	Encourage people to use the bus thus reducing the amount of vehicles on the road	LTP3 Policy TP13 Travel in Bracknell 2009

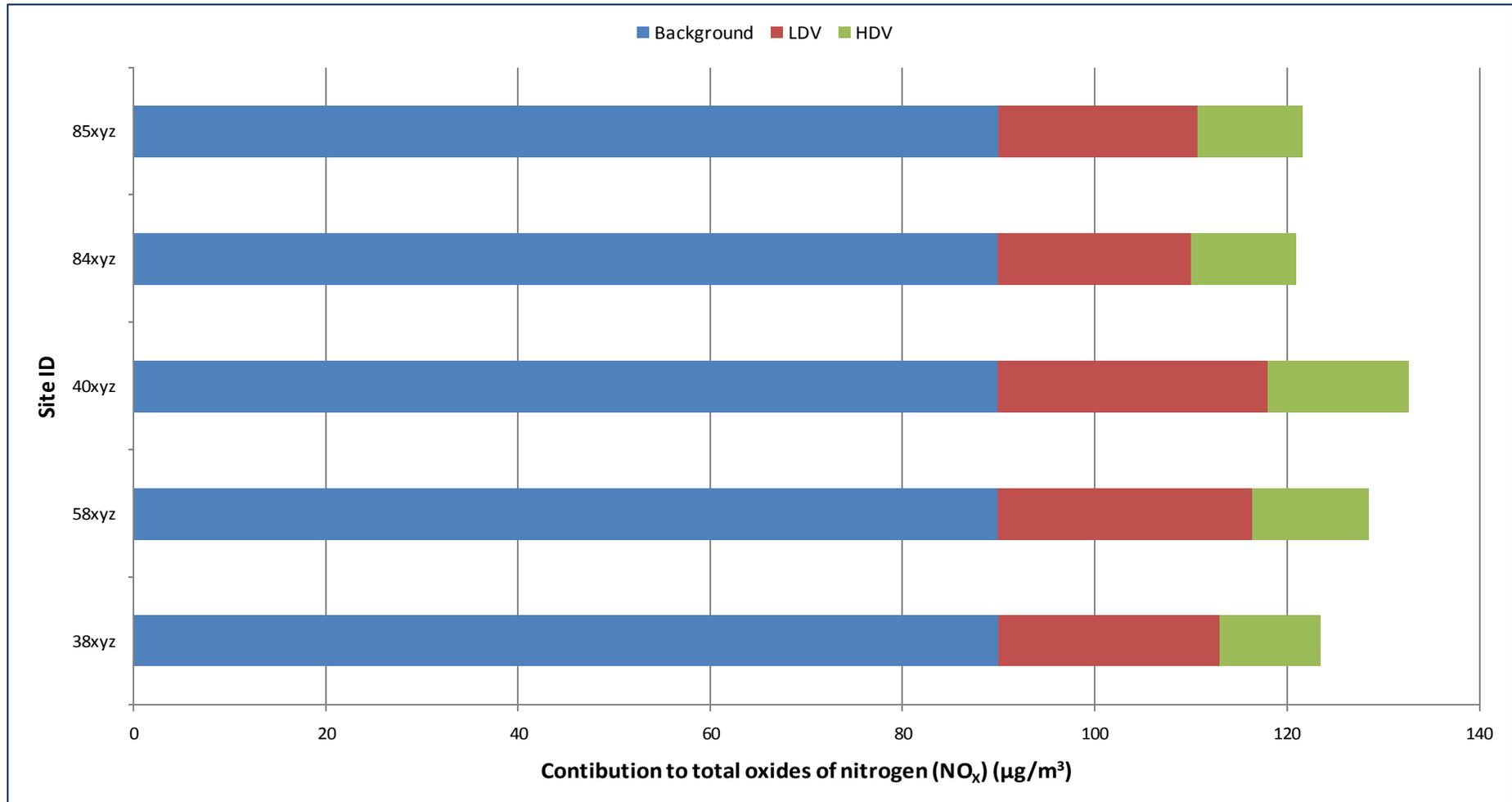
Action taken/ planned	Date implemented / planned	Impact following works on Air quality	Policy / strategy reference
Updating the Council's website to include rail and bus times in real time	2014	More journeys undertaken by public transport	LTP3 Policy TP6, TP7, TP13 & TP18
Commissioning further work with Government funding into smart ticketing	2014/15		LTP3 Policy TP4 Travel in Bracknell 2009
Improved signage along certain key cycle routes including Bagshot Road within the AQMA	2014	If people are made more aware and cycle paths are made safe and inviting the usage will increase	LTP3 Policy TP7 & TP8 Travel in Bracknell 2009
Undertaking targeted marketing to households and businesses within 150m of the key routes to encourage cycling and walking	2014	Cycling increased by 57% along the 'red route' which runs alongside Bagshot Road within the AQMA	LTP3 Policy TP8 Travel in Bracknell 2009
Through the programme of replacement ensure that fleet vehicles continue to comply with current emission levels	ongoing	Reducing the amount of high emitting NO _x vehicles	LTP3 Policy TP15
Consider introducing electric cars as pool cars.	2013	Will reduce the amount of NO _x producing vehicles	LTP3 Policy TP11
Secured funding from two major housing developments to provide bus services as part of travel plan for development	ongoing	Residents will have an alternative form of transportation to the retail sector and other amenities other than their own vehicle.	LTP3 Policy TP6 Core Strategy Development plan document 2008: <i>CS1 Sustainable Development Principles</i>
Development of travel plans by schools within the Borough	ongoing	Reduce the number of car journeys undertaken by parents to drop their children at school.	LTP3 Policy TP7, TP9 & TP10
Development of two programmes of personal travel planning to encourage more sustainable travel; one programme will be set in a residential area, and the other at large employer sites	ongoing		LTP3 Policy TP1 & TP14







Source apportionment (contribution to total NO_x), Bracknell AQMA



Source apportionment (contribution to total NO_x), Crowthorne AQMA

Results of nitrogen dioxide diffusion tubes (bias adjusted) – Borough wide

Site ID	Location	Which AQMA?	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)						Projected Annual Mean ($\mu\text{g}/\text{m}^3$)		
			2007	2008	2009	2010	2011	2012	2013		2015
1def	Bagshot Road	Bracknell (Area 1)	42.2	53	47.6	46.6	40.2	42.2	38.5	35.8	33.1
1xyz	Rectory Lane	Bracknell (Area 1)	23.3	27	29.1	33.1	23.1	24.1			
3	3 Broadway	N				19.6	19.1	16.5			
12xyz	Downshire Way	Bracknell (Area 1)	53.1	71	74.7	55.3	58.9	57.0	45.7	42.5	39.3
17/18/19	Fox Hill School (Background)	N	17.7	19.5	19.4	21.4	18.2	17.8*			
27x	3M R/about	N	36.7	47.9	53.9	52.5	42.7	38.4			
29x	Clintons Close	N	23.5	38.4	38.7	24.8	28.9	28.6			
32xyz	8 Old Bracknell Close	N	24.1	29.8	30.4	28.4	25.6	25.7			
38xyz	Bracknell Road	Crowthorne (Area 2)	32.8	47.9	50.4	43.9	38.2	41.7			
40xyz	Crowthorne High Street	Crowthorne (Area 2)	28.2	33.5	34	38.2	25.7	29.8			
41xyz	3M R/about	N	-	-	-	31.9	34.4	22.8			
42xyz	Bagshot Road receptor	Bracknell (Area 1)	38.4	54	54.3	39.1	42.0	50.3*			
54xyz	Elizabeth Close	Bracknell (Area 1)	28.5	30.3	35.1	29.7	29.2	28.9			
58xyz	Bracknell Rd receptor	Crowthorne (Area 2)	34.8	40	42.2	39.7	37.0	41.5			
65x	Binfield Road	N	-	-	-	29.6	30.6	27.2			
76xyz	Dukes Ride	Crowthorne (Area 2)	-	27.4	34.9	31.5	29.4	31.5			
77x	London Road	N	-	-	-	26.9	27.4	27.1			
78x	John Nike Way	N	-	-	-	32.7	30.3	27.6			
79x	Park Road (Celsius) receptor	N	-	-	-	29.7	34.3	31.8			
80xyz	Ring Road	N	-	-	-	27.0	29.0	-			
81xyz	Market Street	N	-	-	-	24.9	21.7	-			
82xyz	Downshire Way (Boxford) receptor	Bracknell (Area 1)	-	-	39.5	35.6	34.8	34.1			
83xyz	Bagshot Road (Glebewood) receptor	Bracknell (Area 1)	-	-	23.8	25.1	18.5	21.4			
84xyz	Dukes Ride (Playhouse) receptor	Crowthorne (Area 2)			27.1	27.6	27.3	26.1			

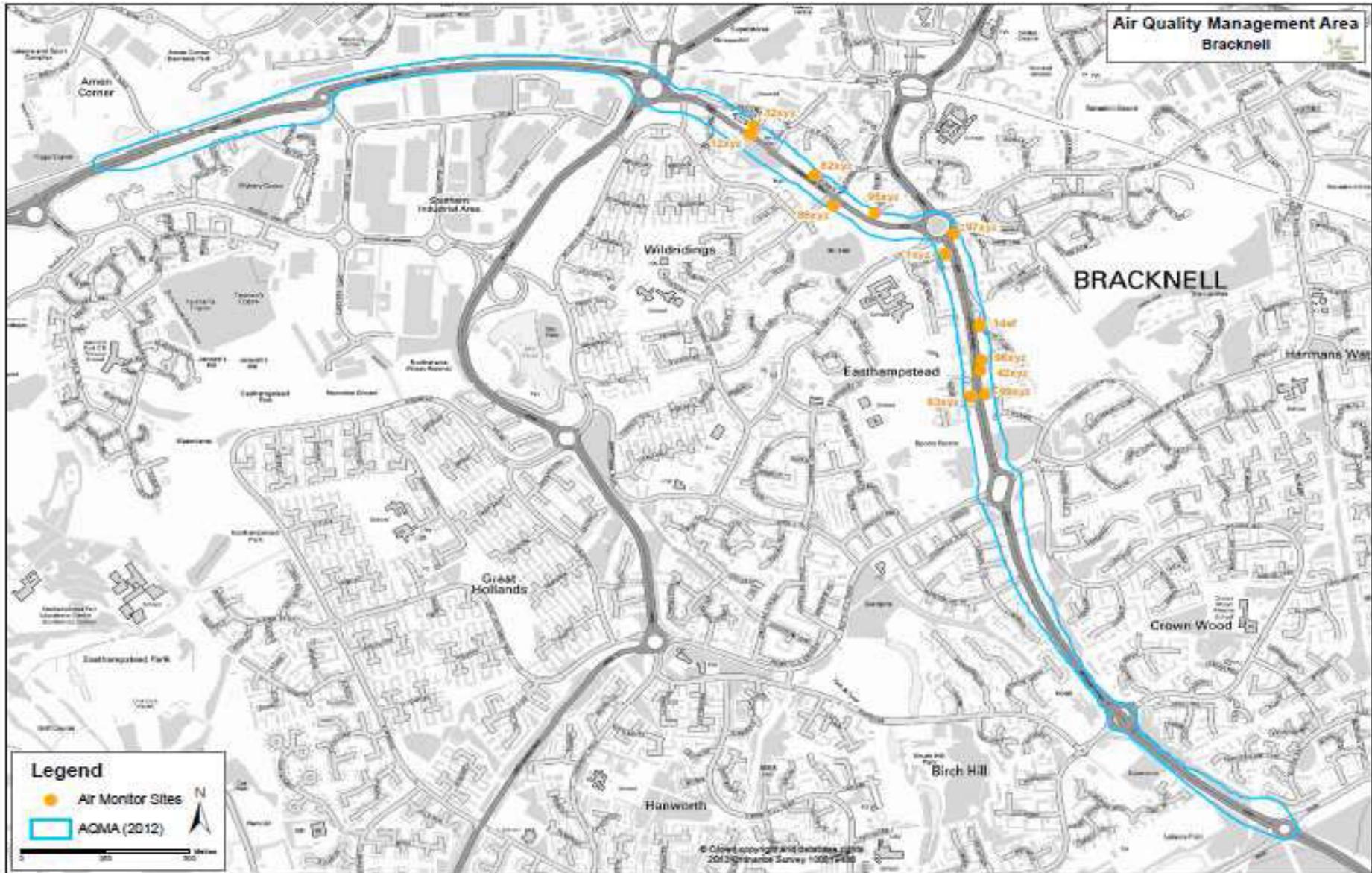
Site ID	Location	Which AQMA?	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)						Projected Annual Mean ($\mu\text{g}/\text{m}^3$)		
			2007	2008	2009	2010	2011	2012	2013		2015
85xyz	High Street Crowthorne receptor	Crowthorne (Area 2)			26.6	28.4	19.6	24.3			
86xyz	Downshire Way monitor	Bracknell (Area 1)				45.6*	41.6	44.3	37.7	35	32.4
90xyz	Past and present	Crowthorne (Area 2)				-	26.1	29.1			
91xyz	The Mount receptor	Crowthorne (Area 2)				-	30.3	30.2			
93xyz	The Prince Alfred	Crowthorne (Area 2)				-	20.3	27.6			
95xyz	3 Leverkusen Way (receptor)	Bracknell (Area 1)				-	21.6	23.1			
96xyz	Trotters Folly	Bracknell (Area 1)				-	25.2	23.7			
97xyz	Linden House	Bracknell (Area 1)				-	28.1	31.8			
98xyz	67 Elizabeth Close (receptor)	Bracknell (Area 1)				-	23.6	26.9			
99xyz	16 Firlands (receptor)	Bracknell (Area 1)				-	27.5	28.6			
100xyz	Continuous monitor Crowthorne	Crowthorne (Area 2)				-	21.2	26.0			
101xyz	14 Ambassador	N				-	-	21.4*			
102xyz	128 Southwold	N				-	-	22.8			
103xyz	43 Avebury	N				-	-	23.2			
104xyz	53 Neuman Crescent	N				-	-	22.7			
105xyz	69 Quintiles	N				-	-	28.8			
106 Road	19 Yorktown	N				-	-	32.6*			
107 Road	42 Yorktown	N				-	-	26.3*			

*Concentrations adjusted to represent an annual mean.

Results of nitrogen dioxide diffusion tubes (bias adjusted) – Area 1

Site ID	Location	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)						Projected Annual Mean ($\mu\text{g}/\text{m}^3$)		
		2007	2008	2009	2010	2011	2012	2013		2015
1def	Bagshot Road	42.2	53	47.6	46.6	40.2	42.2	38.5	35.8	33.1
1xyz	Rectory Lane	23.3	27	29.1	33.1	23.1	24.1			
12xyz	Downshire Way	53.1	71	74.7	55.3	58.9	57.0	45.7	42.5	39.3
42xyz	Bagshot Road receptor	38.4	54	54.3	39.1	42.0	50.3*			
54xyz	Elizabeth Close	28.5	30.3	35.1	29.7	29.2	28.9			
82xyz	Downshire Way (Boxford) receptor	-	-	39.5	35.6	34.8	34.1			
83xyz	Bagshot Road (Glebewood) receptor	-	-	23.8	25.1	18.5	21.4			
86xyz	Downshire Way monitor				45.6*	41.6	44.3	37.7	35	32.4
95xyz	3 Leverkusen Way (receptor)				-	21.6	23.1			
96xyz	Trotters Folly				-	25.2	23.7			
97xyz	Linden House				-	28.1	31.8			
98xyz	67 Elizabeth Close (receptor)				-	23.6	26.9			
99xyz	16 Firlands (receptor)				-	27.5	28.6			
17/18/19	Fox Hill School (Background)	17.7	19.5	19.4	21.4	18.2	17.8*			

*Concentrations adjusted to represent an annual mean.

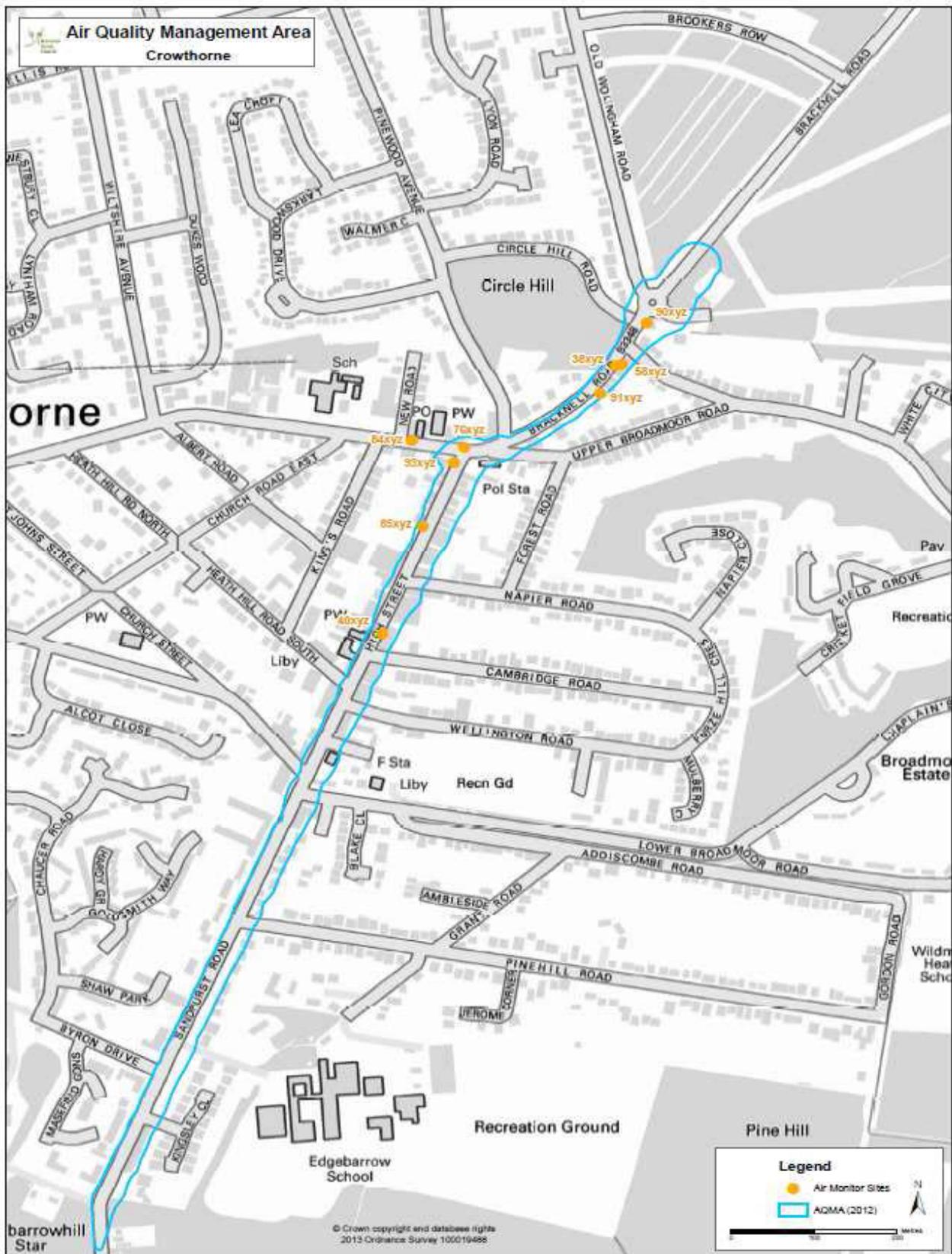


Monitoring Site locations in Bracknell

Results of nitrogen dioxide diffusion tubes (bias adjusted) – Area 2

Site ID	Location	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)					
		2007	2008	2009	2010	2011	2012
38xyz	Bracknell Road	32.8	47.9	50.4	43.9	38.2	41.7
40xyz	Crowthorne High Street	28.2	33.5	34	38.2	25.7	29.8
58xyz	Bracknell Rd (receptor)	34.8	40	42.2	39.7	37.0	41.5
76xyz	Dukes Ride	-	27.4	34.9	31.5	29.4	31.5
84xyz	Dukes Ride (Playhouse) receptor			27.1	27.6	27.3	26.1
85xyz	High Street Crowthorne (receptor)			26.6	28.4	19.6	24.3
90xyz	Past and present				-	26.1	29.1
91xyz	The Mount (receptor)				-	30.3	30.2
93xyz	The Prince Alfred				-	20.3	27.6
100xyz	Continuous monitor Crowthorne				-	21.2	26.0
17/18/19	Fox Hill School (Background)	17.7	19.5	19.4	21.4	18.2	17.8*

*Concentrations adjusted to represent an annual mean.



Monitoring site locations, Crowthorne