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Kidderminster Road, Hagley AQMA Revocation Screening Assessment

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

November 2017

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Executive Summary

This report has been produced on behalf of Bromsgrove District Council (BDC) and represents a screening assessment of air quality at the Kidderminster Road, Hagley Air Quality Management Area (AQMA). The assessment has been carried out to determine whether the Kidderminster Road, Hagley AQMA can be considered for revocation. The assessment has not included a detailed dispersion model as available monitoring data is sufficient to provide a robust review of nitrogen dioxide levels at the AQMA over the past fifteen years. All available monitoring data held for the area from 2001 to 2016 has been reviewed.

Levels of nitrogen dioxide measured between 2001 and 2016 have generally followed a downward trend year on year discernible when viewed over the long term. There have only been three marginal exceedances of the NO_2 annual mean objective at relevant exposure observed in the past ten years (in 2007, 2010, and 2013).

It is considered to be very unlikely that a consistent exceedance of the nitrogen dioxide annual mean objective over future years will occur, as demonstrated by the lack of consistent exceedances between 2001 and 2016 and a consistent downward trend in NO_2 concentrations across that same period. It is therefore recommended that the Kidderminster Road, Hagley AQMA is revoked following the necessary statutory consultation.

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1 Introduction

This report has been produced on behalf of Bromsgrove District Council (BDC) and represents a screening assessment of air quality at the Kidderminster Road, Hagley Air Quality Management Area (AQMA) between 2001 and 2016. The assessment has been carried out to determine whether the AQMA can be considered for revocation. The assessment has not included a detailed dispersion model as available monitoring data is sufficient to provide a robust review of nitrogen dioxide levels at the Kidderminster Road AQMA over the past fifteen years.

The policy framework for air quality management in the UK is set out in The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Defra, 2007). The Strategy provides air quality standards and objectives for key pollutants designed to protect human health and the environment. The Strategy also sets out how local government can contribute to achieving the air quality objectives. The Local Air Quality Management (LAQM) regime is set out in the Strategy and requires every local authority to carry out regular reviews and assessments of air quality in its area to identify whether the air quality objectives have been, or will be, achieved at relevant locations by the appropriate dates. Where air quality objectives are not being met the local authority must declare an Air Quality Management Area (AQMA) and produce an action plan to identify appropriate measures that can be taken in pursuit of the objectives.

The Air Quality Strategy (Defra, 2007) sets out air quality standards and objectives for key pollutants. The standards are set as concentrations below which health effects are unlikely, or below which risks to public health would be very small (even in sensitive population groups). The air quality objectives only apply where “relevant exposure” exists, that is where members of the public are likely to be regularly present for the duration of the averaging time of the objective. For annual mean objectives relevant exposure is limited to residential proprieties, school and hospitals. The 1-hour objective applies to residential properties, schools and hospitals as well as any outdoor location where members of the public might reasonably be expected to stay for 1 hour or more, such as outdoor seating areas at eating establishments, parks, busy shopping streets etc. The statutory air quality objectives applicable to LAQM in England can be found in Table A.1 in Appendix A.

Technical Guidance for LAQM (LAQM.TG.16) sets out the approach for LAQM. When an exceedance of an air quality objective has been identified the local authority is required to

declare an Air Quality Management Area (AQMA). LAQM.TG.16 and LAQM.PG.16 also sets out the requirements for when an AQMA may be revoked.

2 Background to the Kidderminster Road, Hagley AQMA

The Kidderminster Road, Hagley AQMA was declared by BDC on the 17th February 2010. A copy of the sealed order, including a location plan, can be found in Appendix B. The AQMA was declared following a detailed assessment carried out in July 2009 that was undertaken due to monitored exceedances of the annual mean objective for NO_2. This assessment included detailed dispersion modelling utilising ADMS Roads dispersion model (2.3). This assessment made recommendation for declaration of the AQMA based on predicted exceedances of the annual mean objective at locations of relevant exposure. There was also a recommendation for installation of an automatic air quality monitor to provide more robust monitoring data.

Since declaration of the AQMA in February 2010 monitoring of NO_2 levels has continued using a network of diffusion tubes. An automatic monitor was also in operation between June and December 2010.

A countywide action plan for Worcestershire was produced covering all AQMAs within the County and formally adopted in the autumn of 2013. This identified many potential air quality solutions for each AQMA that were split between generic actions applicable to all areas and specific actions for each AQMA. With this in mind WRS conducted a “priority actions” process in 2014 for each AQMA including Hagley.

Source apportionment of roadside emissions of NO_2, carried out as part of the Further Assessment in 2012 following declaration of the AQMA, identified the dominant sources to be traffic related emissions and background concentrations. The source apportionment helped identify key areas to be addressed and enabled prioritisation of measures in a targeted fashion. Details of the prioritisation methodology can be found in the full Air Quality Action Plan for Worcestershire (September 2013) document and the Air Quality Action Plan for Worcestershire Progress Report 2013-2015 (October 2015), both available online at

http://www.worcsregservices.gov.uk/environmental-health/pollution/air-quality/airquality-action-plan.aspx

The prioritised actions for Kidderminster Road, Hagley AQMA are listed below:-

- KR5 - Review of signalised junction at foot of Hagley Hill of A456 and A491
- 5.1.1 - Alteration of phasing of traffic light systems

- 5.1.8 - Introduction of traffic signals at Hagley Island roundabout
- 5.1.4 - Variable Messaging Systems
- 5.2.2 - Freight Quality Partnership

Progress made with these actions is as follows:-

5.1.1 and KR5 – Alteration of the phasing of traffic light systems / Review of signalised junction at Kidderminster Rd/Birmingham Rd/Stourbridge Rd Junction - Worcestershire County Council has confirmed that this action has been completed: The signal set controller apparatus was updated on 20/04/2015 to MOVA which gradually optimises the signals operation according to observed demand. WCC further advised in July 2016 that 'The equipment at Hagley is the very latest technology, so further investment in signalling infrastructure here is not required' and 'traffic flow is starting to settle down now in Hagley, which suggests that the signal calibration process is nearing completion'.

5.1.8 – Introduction of signals at roundabouts - Worcestershire County Council has confirmed this action has been completed: "Developer led reconstruction of the Hagley Roundabout (A456/A491) with signals was opened to the public on the 22/01/2015. Minor alignment revisions were made to lining / destination lining on the 06/03/2015. Revisions were made to the A491 northbound access onto the roundabout on the 21/08/2015. Each set of signals is operating using MOVA (WCC June 2015)."

5.1.4 – Variable Messaging Systems to redirect vehicles away from AQMA (and other relevant messages) - No progress at this time: In October 2015 Worcestershire County Council confirmed plans to install Variable Messaging Systems (VMS) signs across the County. The strategy is to complete a ring of VMS signs around Worcester City in 2016 then replicate this in Bromsgrove and Kidderminster areas as funding is identified.

5.2.2 – Freight quality partnership - On-going: This action is designed to encourage freight vehicles to avoid the AQMA and find alternative routes. Further discussion with County Highways in 2014 identified two separate approaches:

1) Use of paper HGV route maps is now outdated, work should focus on updating data with Sat Nav companies to ensure route planning avoids AQMAs.

2) A wider FQP that potentially restricts HGV access to AQMAs could form part of a wider Transport Strategy for Worcester. In 2015 Worcestershire County Council confirmed they provide update information for Sat Nav technology providers on an on-going basis.

Other non-priority actions have been progressed as part of district or countywide initiatives. These are detailed within the Air Quality Action Plan Progress Report for Worcestershire April 2015 to March 2016 available online at

http://www.worcsregservices.gov.uk/media/2294583/WRS-AQAP-Progress-Report-2015-16.pdf.

Levels of measured NO_2 between 2001 and 2016 have generally followed a downward trend year on year with only three measured exceedances of the NO_2 annual mean objective at relevant exposure observed in the past ten years (in 2007, 2010 and 2013).

3 Detailed Review of Data

3.1 Air Quality Monitoring

BDC undertakes air quality monitoring of nitrogen dioxide (NO_2) across the district using non-automatic passive diffusion tubes. In 2016 monitoring was undertaken using 12 diffusion tubes in the Hagley area at 10 locations. 7 of these were located within the boundary of the AQMA, and 3 outside. Monitoring point 9/a/b is a triplicate location (three diffusion tubes located together). Data is also held for three historic monitoring locations that have since been discontinued and for the automatic air quality monitor in operation in 2010. All available monitoring data held in and around the Kidderminster Road, Hagley AQMA has been subject to review.

The data range held spans from 2001 up until 2016, presenting a long history of monitoring data. Some monitoring points present more reliable data than others based on location. An overview and assessment of data from each location is presented later in this report. All available data has been reviewed as part of the assessment.

Details of all monitoring locations are presented in table 1.0 below.

A map detailing all the monitoring locations referred to in this report is presented in figure 1 below.

Table 1.0 – Details of all locations monitored for NO_2 in Hagley area

Site ID	Site Address	X Coordinates	Y Coordinates	In AQMA	Relevant Exposure	Distance to Kerb	Years Monitored
10	77a Park Road, Hagley	391137	280638	Yes	Yes	17m	2004 – 2016
11	74 Worcester Lane, Hagley	390295	280043	No	Yes	2.75m	2003 – 2016
HL	20 Birmingham Road Road sign	391551	280999	Yes	No - 13m	2m	2012 – 2016
8	9 Market Way, Hagley	391452	280947	Yes	Yes	13.8m	2004 – 2016
9/a/b	78 Kidderminster Road, Hagley (*Triplicate*)	391210	280668	Yes	Yes	8.3m	2004 – 2016
KR62	62 Kidderminster Road	391182	280631	Yes	Yes	7m	2012 – 2016
RES 1	26 Stourbridge Road, Hagley Downpipe Front of Property	391445	281179	Yes	Yes	15m	2014 – 2016
RES 2	21 Birmingham Road, Hagley, DY9 9JZ	391556	281042	Yes	Yes	15m	2014 – 2016
RES 3	104 Kidderminster Road South, Hagley Downpipe Front of Property	389827	279590	No	Yes	14.3m	2014 – 2016
RES 4	23 Worcester Road, Hagley DY9 0LF Downpipe Front of Property	390025	27965	No	Yes	14.5m	2014 – 2016
KR	Kidderminster Road, Hagley (roadside next to no 78 tube nos 9, 9a, 9b)	391277	280774	Yes	No – 7m	1m	2008 – 2011
KR2	10 Kidderminster Road, Hagley	390363	280044	No	Yes	13.6m	2010 – 2011
7	No.5 Stourbridge Road.	391437	281037	Yes	Yes	9m	2001 – 2011
CM	Kidderminster Road (Continuous Monitor)	391354	280919	Yes	No – 6m	2.5m	2010 (Jun – Dec)

Figure 1.0 – Map of monitoring locations

3.2 Monitoring Data and Long-term Trends

Measurements of NO_2 have been taken over a number of years in the area prior to declaration of the AQMA and since. As such a robust data set has been built up over a significant period of time. Available data from monitoring locations has been identified for the period 2001 to 2016.

The last exceedance of the annual objective was recorded in 2013 at triplicate location 9/a/b with a level of 40.2µg/m³. This was a minor exceedance of the 40µg/m³ objective. Prior to this the objective of 40µg/m³ was equalled in 2010 and exceeded in 2007 and 2005 with levels of 42.8µg/m³ at the same location. The annual mean objective was also exceeded at location 11 in 2003 with a recorded value of 40.7µg/m³. It should be noted that 11 is located outside the area declared as an AQMA. No other exceedances were measured at this location.

Historical data indicates that there were also a number of exceedances at monitoring location KR between 2008 and 2011. Concentrations here ranged between 54.4µg/m³ and 64µg/m³. However it should be noted that this monitoring point was located directly adjacent to the highway and did not represent relevant exposure. It is understood that KR was located roadside in front of the property 78 Kidderminster Road whilst tubes 9a/b were located on the façade of the property. Therefore 9a/b represents relevant exposure in this location and is considered to be a much more accurate representation of conditions. As KR does not represent relative exposure and given close proximity to the carriageway results here are not considered to be a relevant exceedance of the objective. Location KR was discontinued at the end of 2011 because it was not representative of relevant exposure.

In the last three years levels of nitrogen dioxide have been monitored below the annual mean objective by greater than ten percent (36µg/m³ or less) at all ten monitoring locations within or near to the AQMA.

Table 2.0 below shows the monitoring results for all locations from 2001 to 2016.

Table 2.0 – Monitoring results of NO_2 at location 2001 - 2016

Site ID	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
10				27.7	33.4	31.7	33.3	34	37	38	37.6	29.65	37	32.01	30.22	33.52
11			40.7	31.1	34.3	31.7	36.6	32	35	34	31.5	24.71	33	29.87	27.68	31.28
HL												21.49	34	25.48	25.92	28.65
8				25.8	28.7	26.6	30.3	23	25	28	22.1	16.17	27	20.42	20.01	21.88
9/a/b				39.3	42.8	38.6	42.8	39	38	40	37.2	27.51	40.2	33.65	32.44	34.49
KR62												28.24	33	31.76	32.17	33.86
RES 1														20.93	20.54	22.29
RES 2														31.31	32.26	34.72
RES 3														16.56	19.35	21.71
RES 4														31.43	32.70	35.67
KR*								61	63	64	54.4					
KR2										31	30.2					
7	30.2	33.4	31.7	23.5	27	23.5	28.9	24	26	29	22.5					
CM**										38						

KR* - Location next to highway and does not represent relative exposure

CM** - Continuous Monitor in use for 6 months not in location representative of relevant exposure

KEY	No Data	0-20	20-30	30-38	38-40	40+

The full set of available monitoring data has been assessed in relation to the number of exceedances of the annual mean objective for NO_2 (40µg/m^3) and observed levels within 5% of the annual mean objective (5% AQO) for NO_2 (38µg/m^3).

Table 3.0 provides details of the number of exceedances of the NO_2 annual mean air quality objective between 2001 and 2016 at relevant exposure.

Table 4.0 provides details of the number of concentrations observed within 5% of the NO_2 annual mean air quality objective between 2001 and 2016 at relevant exposure.

Table 3.0 – Number of exceedances of NO_2 annual mean AQO 2001 - 2016

Site ID	Site Description	No. exceedances of NO_2 Annual Mean Objective (40µg/m^3) at relevant exposure
11	74 Worcester Lane, Hagley	1 2003 – 40.7µg/m3
9/a/b	78 Kidderminster Road, Hagley	4 2005 – 42.8µg/m3 2007 – 42.8µg/m3 2010 – 40.0µg/m3 2013 – 40.2µg/m3

Table 4.0 – Number NO_2 concentrations observed within 5% AQO 2001 - 2016

Site ID	Site Description	Occurrences within 5% of NO_2 Annual Mean Objective (38µg/m^3) at relevant exposure
10	77a Park Road, Hagley	1 2010 – 38.0µg/m3
9/a/b	78 Kidderminster Road, Hagley	4 2004 – 39.3µg/m3 2006 – 38.6µg/m3 2008 – 39.0µg/m3 2009 – 38.0µg/m3

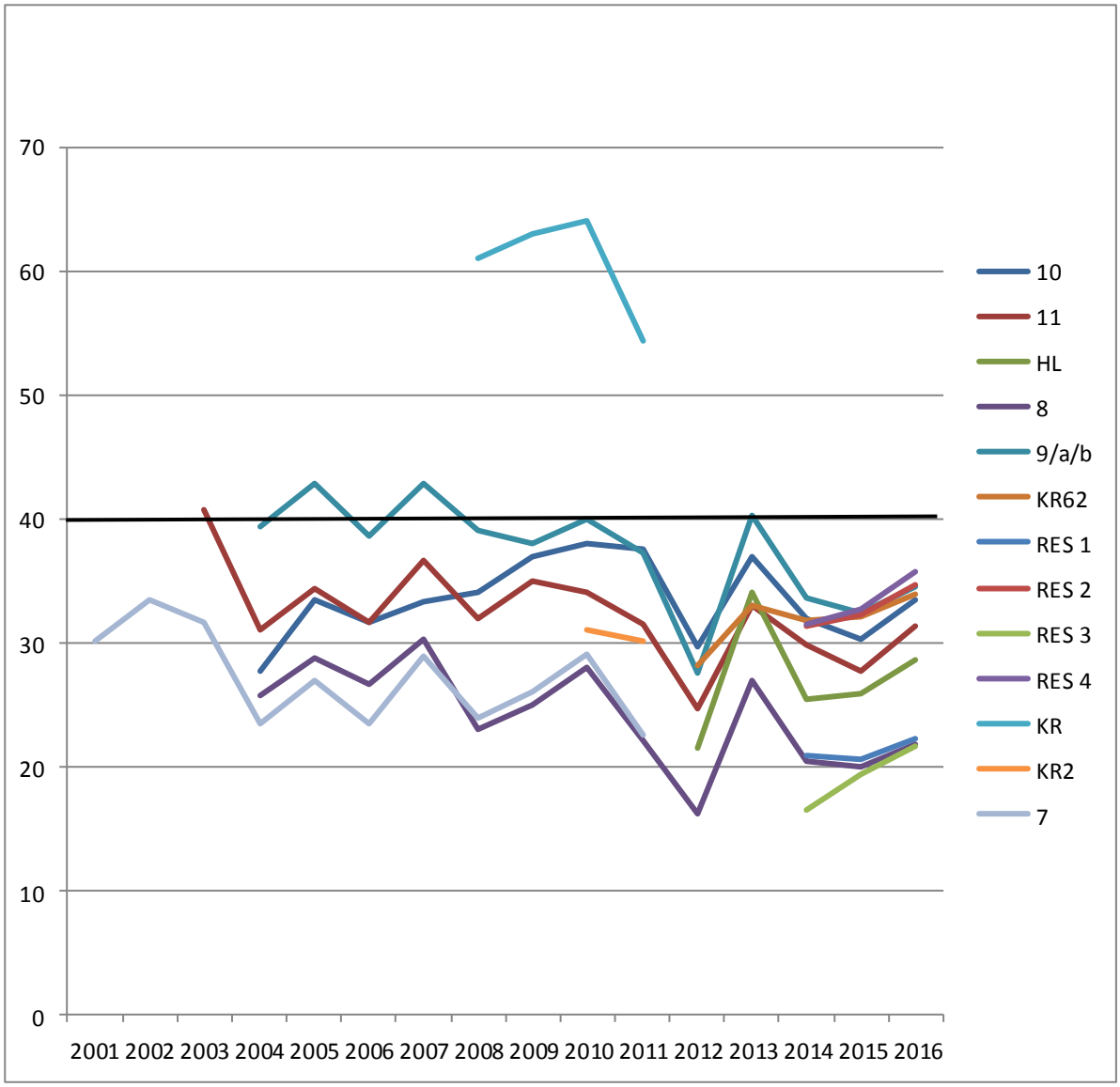
It can be seen that over the past fifteen years there have been five monitored exceedances of the NO_2 annual mean objective. These have occurred at location 11 in 2003, located outside the AQMA, and at 9/a/b in 2005, 2007, 2010 and 2013. These exceedances were only slightly elevated in nature, ranging between 40.0µg/m^3 and 42.8µg/m^3. It has also been a significant period of time since the majority of these exceedances occurred with the last being in 2013 with all others being in or prior to 2010.

In addition there have been five occasions over the fifteen year period where NO_2 concentrations have been monitored within 5% of the NO_2 annual mean objective (i.e. above 38µg/m^3). These have occurred at tube location 10 in 2010, where a concentration of 38.0µg/m^3 was measured, and at 9/a/b in 2004, 2006, 2008, and 2009 with concentrations ranging between 38 and 39.3µg/m^3. It is useful to consider concentrations within 5% of the objective as an indication of how likely it is that the objective might be exceeded in future years. For example, an area with consistent NO_2 levels within 5% of the objective is more likely to see exceedances of the objective associated with meteorological fluctuations than an area where levels are consistently below 5% of the objective. All of these results referred to above occurred a significant period of time ago with the last being in 2010.

The above evaluation identifies that within the last six years there has been only one occasion where the objective has been exceeded and no other instances within 5% of the NO_2 annual mean objective. This indicates a significant improvement in air quality in the area over the duration of the monitoring period.

A series of graphs have been produced to illustrate long-term trends in measured NO_2 concentrations at relevant exposure. These are reproduced and discussed below.

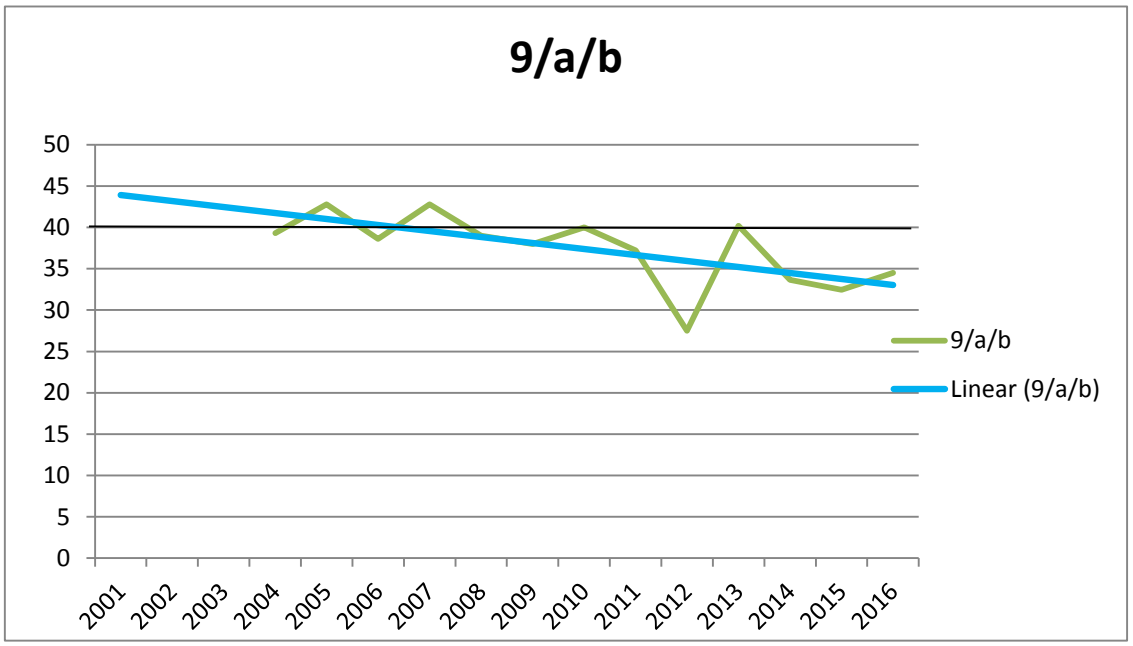
Figure 2.0 Monitored Annual Mean NO_2 at all locations



The graph above provides a diagrammatical representation of monitoring data held for all locations between 2001 and 2016 reviewed as part of this assessment. The black line represents the annual mean objective for nitrogen dioxide of 40µg/m³. It can be seen from the graph that the vast majority of data falls below the objective. This is with the exception of KR which was located next to the highway and was not considered to represent relevant exposure. This is discussed in more detail later in this section.

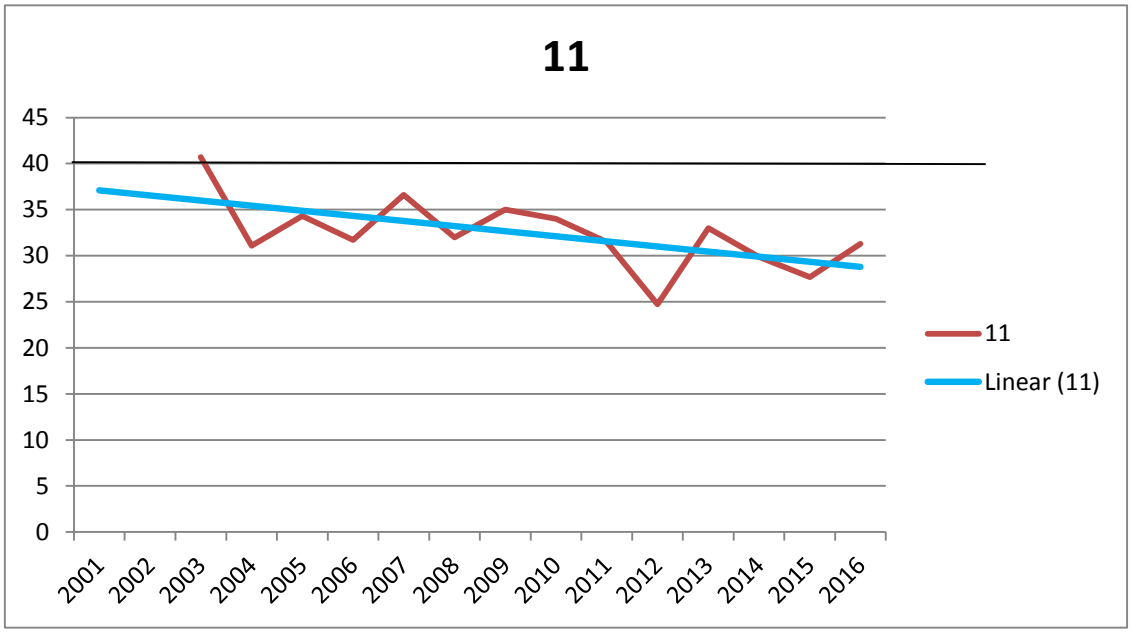
For clarity separate graphs have been produced for all locations and are presented below with commentary. Trendlines for the individual tubes have been produced in order to provide a graphical representation of trends in NO_2 concentrations at each monitoring location for the period of operation. It can be seen that generally there has been a consistent downward trend in NO_2 concentrations at the locations during the monitoring period.

Figure 3.0 - 9/a/b monitored annual mean NO_2



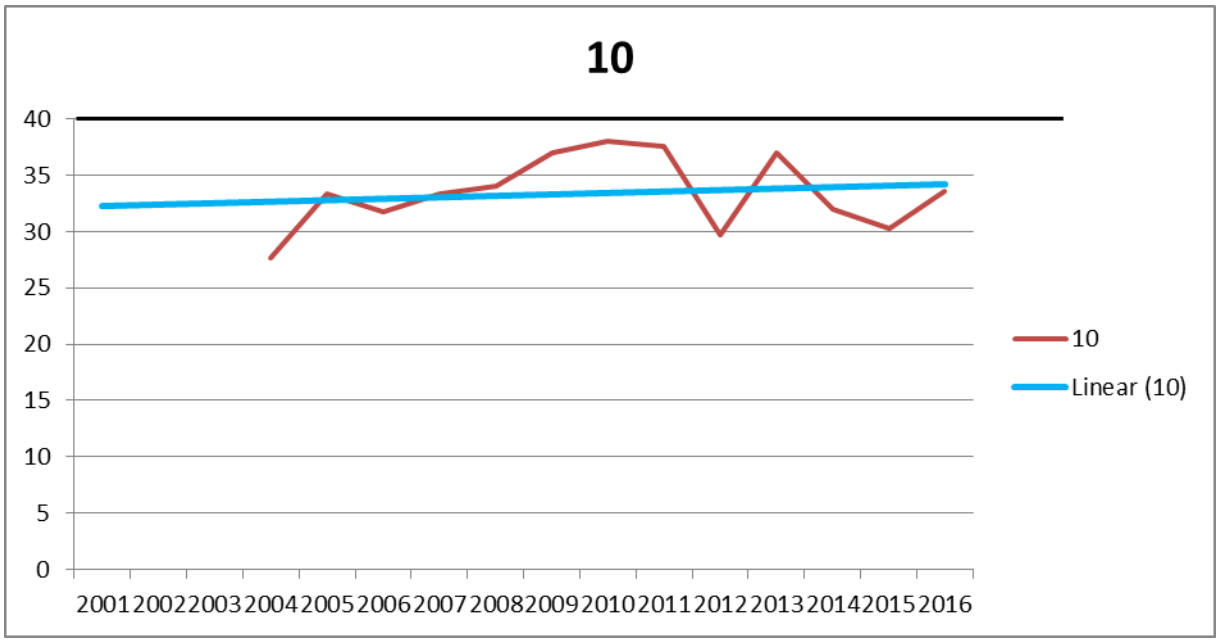
9/a/b – This monitoring location has been in place since 2004. Minor exceedances of the objective were recorded at this location in 2005, 2007, 2010 and 2013 ranging between 40µg/m³ to 42.8µg/m³. Levels have been recorded within 5% of the objective from 2004 to 2010. With the exception of 2013 levels of NO_2 have generally declined at this monitoring point within the last six years. This can be seen clearly from the trendline on the graph above.

Figure 4.0 - 11 monitored annual mean NO_2



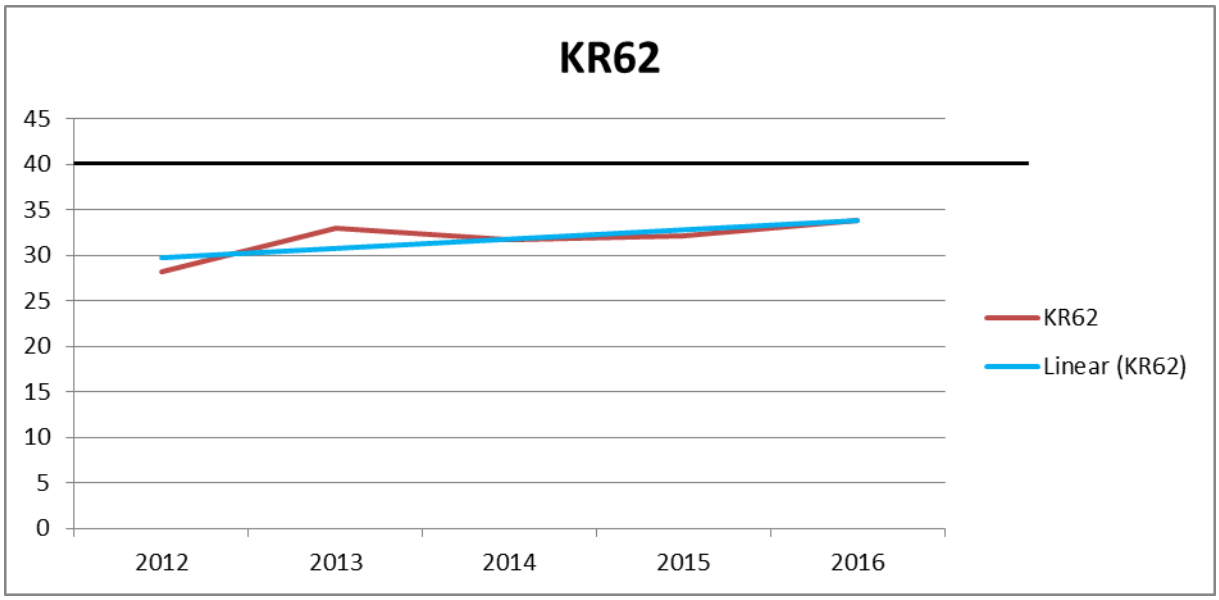
11 – This monitoring location has been in place since 2003. In this first year a minor exceedance of the objective was recorded with a level of 40.7µg/m³. Since then there have been no further exceedances at this location with only one occasion where the levels were within 10 percent of the objective, with a level of 36.6µg/m³ in 2007. For the last three years levels here have been recorded over 20% below the objective. The trendline on the graph above shows a clear decline in concentrations over the monitoring period. It should be noted that this location is outside of the area declared as an AQMA.

Figure 5.0 - 10 monitored annual mean NO_2



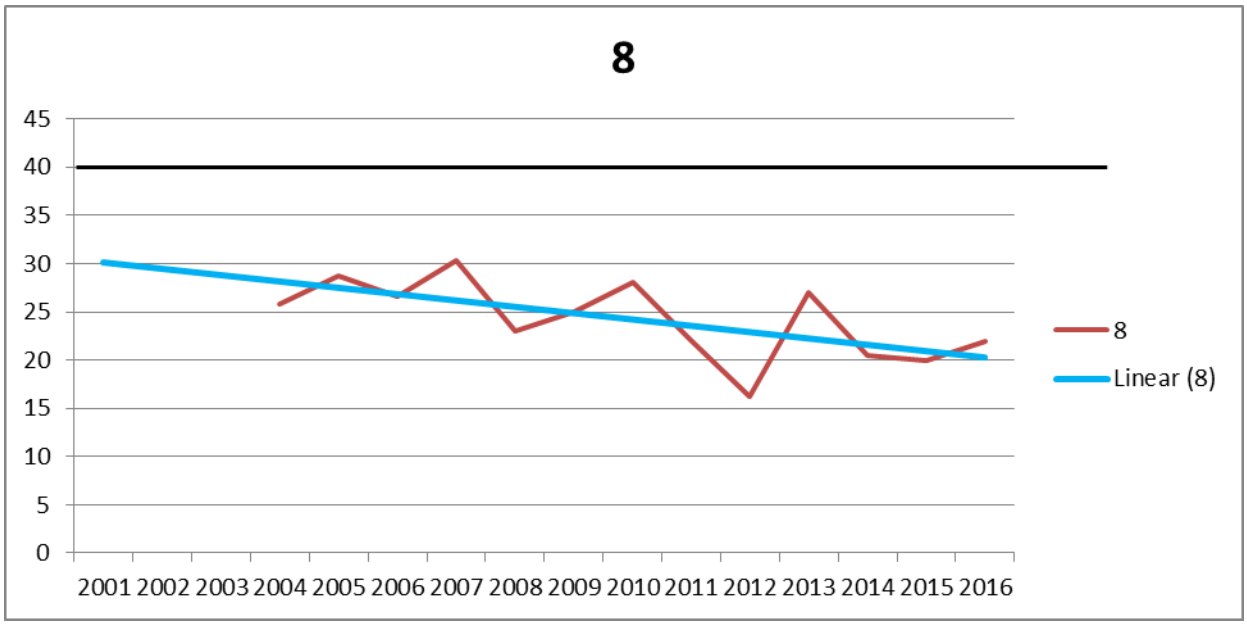
10 – This location has been monitored since 2004 with no recorded exceedance of the objective. The highest level recorded was 38µg/m³ in 2010. This was the only occasion where levels reached within 5% of the objective. The trendline on the graph above indicates that concentrations have remained reasonably stable at this location.

Figure 6.0 – KR62 monitored annual mean NO_2



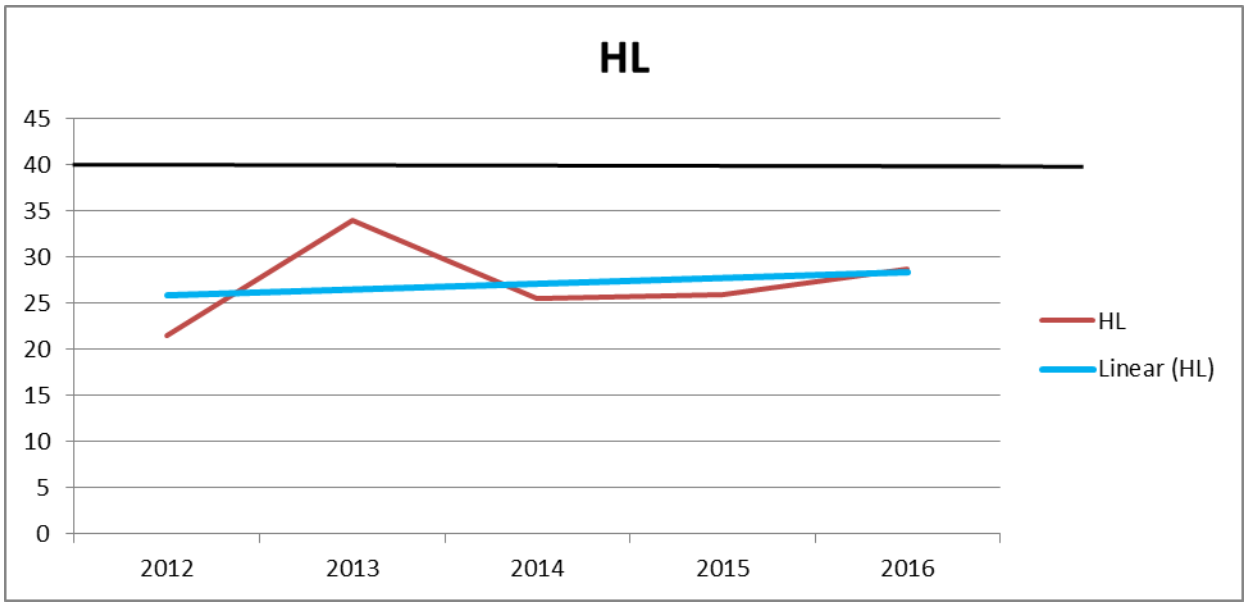
KR62 – This location has been monitored since 2012 with no recorded exceedance of the objective. The highest level recorded was 33.86µg/m³ in 2016. The trendline on the graph above indicates a slight increase in concentrations although in reality concentrations have remained largely constant at this location.

Figure 7.0 - 8 monitored annual mean NO_2



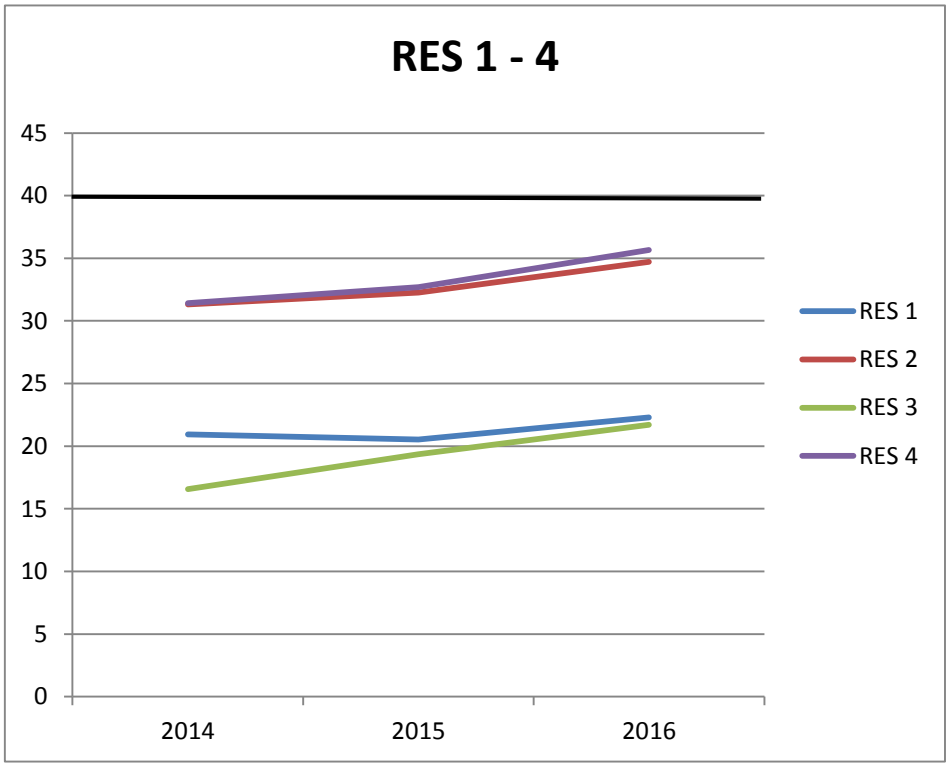
8 - This location has been monitored since 2004 with no recorded exceedance of the objective. The highest recorded level was 30.3µg/m³ in 2007. Levels of nitrogen dioxide have remained at least 25% and up to 50% below the objective for the majority of the monitoring duration. A significant decline in concentrations can be seen from the trendline shown on the graph above.

Figure 8.0 - HL monitored annual mean NO_2



HL - This location has been monitored since 2012 with no recorded exceedance of the objective. The highest recorded level was 34µg/m³ in 2013. The trendline indicates that concentrations have remained largely stable at this location.

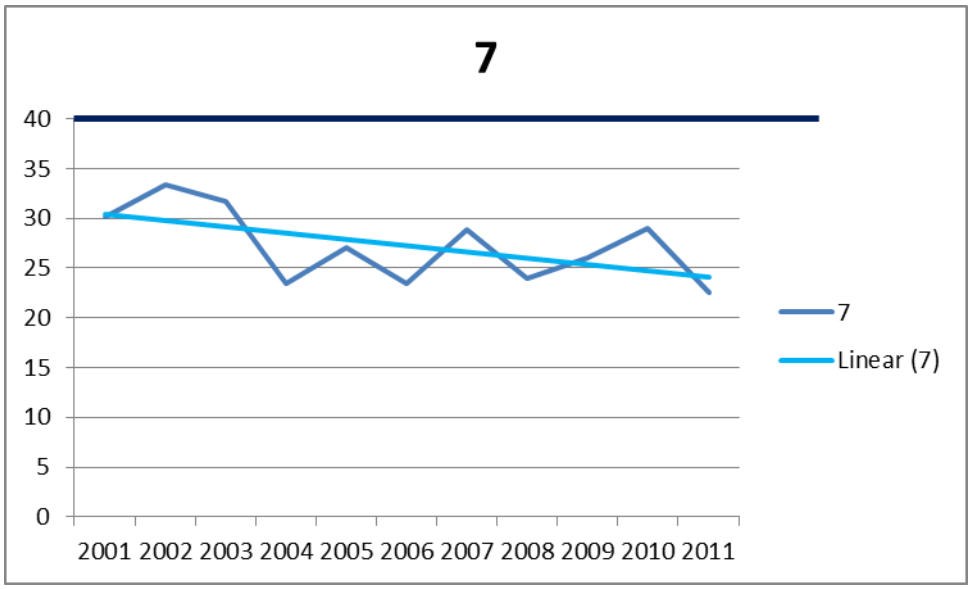
Figure 9.0 – RES 1 - 4 monitored annual mean NO_2



RES 1 – 4 – These monitoring locations were introduced in 2014. No exceedance of the objective has been monitored at any of these locations. The highest recorded value was 35.67µg/m³ at RES 4 in 2016. It should be noted that monitoring points RES 3 and RES 4

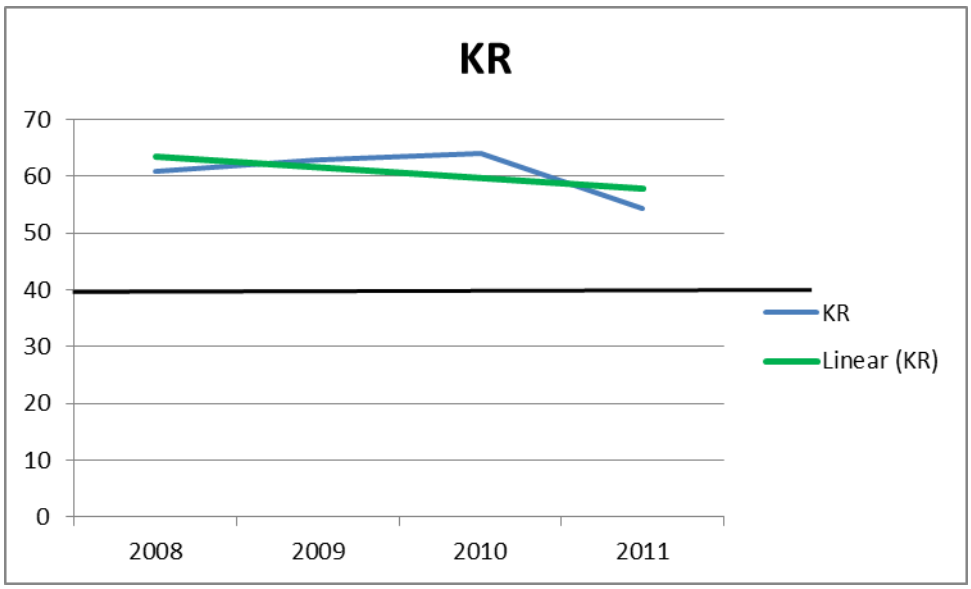
are located outside of the AQMA boundary. A trendline has not been included for these locations as they have only been in operation for a relatively short period of time. It can be seen that there has been a slight increase of concentrations at these locations however they are all 10% or more beneath the objective.

Figure 10.0 - 7 monitored annual mean NO_2



7 – This location was monitored between 2001 and 2011 and never breached the annual average objective with a highest concentration of 33.4µg/m³ in 2002 and a lowest of 22.5µg/m³ in 2011. A significant decline in concentrations can be seen from the trendline shown on the graph above.

Figure 11.0 - KR monitored annual mean NO_2



KR – This location was monitored between 2008 and 2011. KR was located next to the Kidderminster Road approximately 1m away from traffic. As mentioned previously this

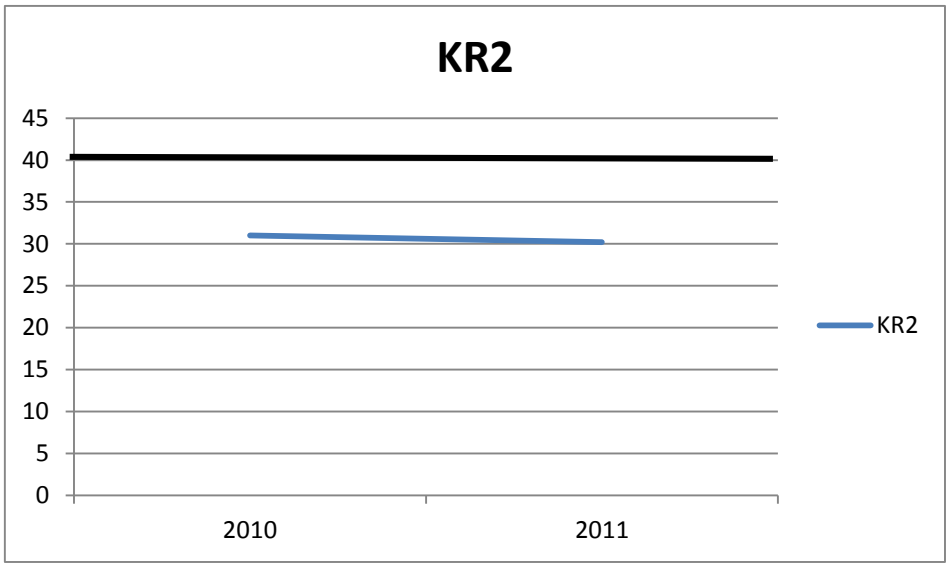
location did not represent relevant exposure as it was sited on a lamppost very close to the road and some distance from the nearest property. The highest level of NO_2 recorded at the site was 64µg/m³ in 2010.

The further assessment carried out in 2012 noted that there was no exceedance of either the annual mean objective or the 1-hour mean objective at this location because there was no relevant exposure. In addition the location was not used for verification of the modelling conducted as part of the further assessment, which stated:-

'The model output for the study area has been verified against five roadside diffusion tubes for 2010. Two of the monitoring sites have been excluded from the verification, i.e. the continuous monitor and diffusion tube site KR. These monitors were located close to the kerbside and it was considered these sites were not representative of distances from the road where there is relevant exposure' (Further Assessment, March 2012 - A2.2).

KR was discontinued at the end of 2011 as part of the yearly diffusion tube rationalisation program as it did not represent relevant exposure. It was also located near to 9/A/B, which is sited on the façade of a residential property and therefore did represent relevant exposure.

Figure 12.0 – KR2 monitored annual mean NO_2



KR2 – This location was monitored in 2010 and 2011 and there was no exceedance of the national objective. The highest recorded level was 31µg/m³. The site was decommissioned as part of the 2012 rationalisation as it was located in close proximity to 11, a long standing position, and recorded low values of NO_2.

Automatic Monitor – the continuous air quality monitor was in place between June and December 2010 with no exceedance of the annual objective. A level of 38µg/m³ was recorded following annualisation of short-term data in line with LAQM Technical Guidance. The analyser was located approximately 6m away from the nearest relevant receptor.

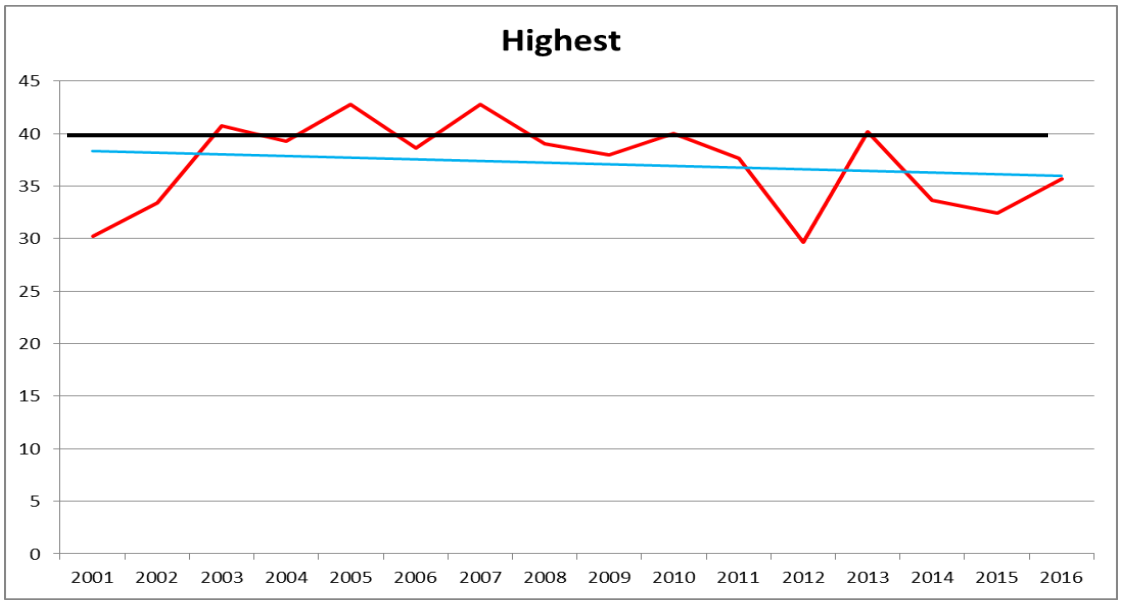
3.3 Results Discussion

Monitoring results have been assessed for the fifteen year period 2001 to 2016 at all available monitoring locations. As discussed above only five minor exceedances of the NO_2 annual mean objective have been measured during that time. There have also been five other occasions when measured concentrations fell within 5% of the NO_2 annual mean objective.

All of the above instances occurred in 2010 or prior to it with the one exception in 2013. It is noted that both 2010 and 2013 saw higher than usual concentrations of NO_2 both across Worcestershire and nationally. NO_2 concentrations are extremely susceptible to meteorological conditions. Generally higher concentrations are seen on cold, still days where NO_2 takes longer to volatise and disperse and lower concentrations on warm, breezier days where volatilisation and dispersion occur much more rapidly. In 2010 and 2013 the UK experienced cooler winters than in previous and subsequent years and as such it is very likely that the higher concentrations of NO_2 observed during these years can be attributed to meteorological conditions.

With the exception of the instances outlined above, monitored concentrations of NO_2 within the Kidderminster Road, Hagley AQMA have generally fallen well below the NO_2 annual mean objective of 40µg/m^3. On the whole levels have also not reached within 5% of the NO_2 annual mean objective over the past six years. The highest monitored levels of nitrogen dioxide recorded within the area for each year are presented in the graph below.

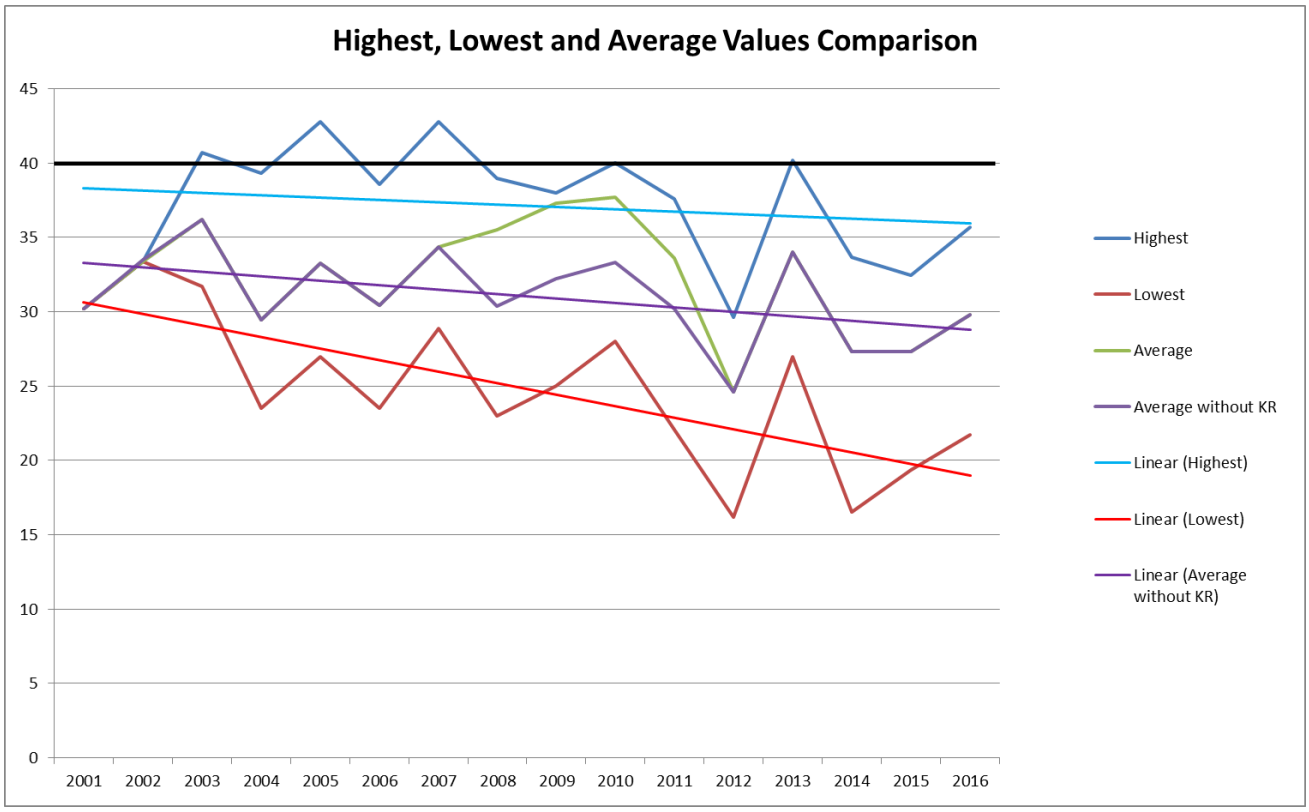
Figure 13.0 – Highest monitored annual mean NO_2



A consistent downward trend in monitored NO_2 levels within the AQMA can be observed over the past fifteen years when viewing all locations. This downward trend may be attributed to any number of factors however the most significant is likely to be the general trend of increasingly mild winters combined with minor improvements in emissions associated with a modernised vehicle fleet. In addition factors such as improvements made to the local highway network and changes in travel behaviours, such as small increases in uptake of cycling and walking, will have also contributed to any improvement in NO_2 concentrations.

When the highest recorded values are compared with the lowest recorded values and average concentrations from all monitoring locations a distinct pattern in year on year fluctuations can be observed. These patterns fit with the observations made above relating to changes in meteorological conditions. The peaks are seen in years with colder winters such as 2010 and 2013 with lower concentrations in years with more mild weather conditions. A distinct downward trend comparable across all values is particularly noticeable when plotted in a diagrammatic form as can be seen on the graph below. Average values have been presented with and without KR for comparison.

Figure 14.0 – Comparison of Highest, Lowest and Average NO_2 Values



4 Conclusions and Recommendations

Assessment of the available monitoring data from all monitoring locations in and around the Kidderminster Road, Hagley AQMA has been undertaken. A small number of marginal exceedances of the annual mean objective for nitrogen dioxide have been observed. All of these have taken place prior to 2010 with one exception in 2013. Therefore there has been one marginal exceedance of the objective from a maximum of ten monitored locations in the last six years. Analysis of all available data indicates a downward trend in concentrations of nitrogen dioxide.

The Kidderminster Road, Hagley AQMA declaration was made based on marginal exceedances of the NO_2 annual mean objective in 2010. It is likely that the advent of increasingly mild winters over recent years combined with modernisations of the general vehicle fleet have resulted in concentrations of NO_2 that consistently fall well below the NO_2 annual mean objective. It is possible that particularly cold winters may result in the occasional marginal exceedances of the NO_2 annual mean objective however current understanding of the UK climate suggests that milder winters are likely to continue. Therefore any marginal exceedance of the NO_2 annual mean objective associated with possible occasional colder winters will be isolated. Consistent exceedances of the NO_2 annual mean objective over future years are considered unlikely, as demonstrated by the lack of consistent exceedances between 2001 and 2016 and a consistent downward trend in NO_2 concentrations across that same fifteen year period.

In addition, measures that have been implemented in the area as part of the Air Quality Action Plan (detailed in section 2 above) should also continue to have a positive impact on air quality. Improvements have been made to the phasing of traffic lights in the area which has included upgrading to the latest technology available. Traffic signals have also been introduced at the Hagley Island roundabout with additional alignment revisions. Other actions, such as Variable Message Signage, are also due for roll out in the near future subject to the appropriate funding. All of which are considered to offer a gradual betterment to air quality over future years.

These improvement works have formed the basis of the Action Plan for the Kidderminster Road, Hagley AQMA and WRS will continue to be heavily involved to ensure that improvements to air quality are realised. This is in accordance with PG(16) para. 4.11 *"Following a revocation, ideally the local authority should put in place a local air quality strategy (para 2.12) to ensure air quality remains a high profile issue…"*

It is therefore recommended that Bromsgrove District Council consider revocation of the Kidderminster Road, Hagley AQMA.

LAQM Technical and Policy Guidance sets out some requirements in relation to revocation of AQMAs. These are summarised in the table below and evidence for each point provided.

Table 5.0 – Revocation Requirements LAQM.PG(16) and LAQM.TG(16)

LAQM revocation requirement laid out in PG(16) and TG(16)	Evidence in relation to Kidderminster Road, Hagley AQMA
PG(16) 4.9 "Demonstrate that air quality objectives are being met and will continue to do so… Confidence that the improvements will be sustained…Typically this is after three years or more of compliance.	There has been no measured exceedance of the NO_2 annual mean objective at relevant exposure in the last three years. There has been no measured concentration of NO_2 within 5% of the NO_2 annual mean objective at relevant exposure in the last three years. Generally concentrations of NO_2 have consistently been below the NO_2 annual mean objective at relevant exposure over the past fifteen years, with five exceptions. Marginal exceedances of 40.2µg/m^3 in 2013, 40.0µg/m3 in 2010, 42.8µg/m^3 in 2007 and 2005, and 40.7µg/m^3 in 2003. These concentrations are likely associated with cooler winters and are consistent with observed higher concentrations across the County and nationally in those years. Generally concentrations of NO_2 have consistently been below 95% of the NO_2 annual mean objective at relevant exposure over the past fifteen years, with a few exceptions. These occurred in 2010, 2009, 2008, 2006 and 2004. There has been a consistent downward trend in NO_2 concentrations at all monitoring locations within the AQMA over the past ten years.
TG(16) 3.46 & 3.47 "In most cases the decision to revoke an AQMA should only be taken following a detailed study….however, in some instances if compelling evidence exists, detailed modelling to support the decision to ..revoke an AQMA may not be necessary and an AQMA may be amended or revoked following a screening assessment	Detailed dispersion modelling has not been undertaken in this case. It is considered that the fifteen years of monitoring data available across numerous monitoring locations provides sufficiently robust evidence on which to carry out a screening assessment, particularly considering the very small number of measured exceedances of the

on the basis of robust monitoring evidence.	NO_2 annual mean objective. The Kidderminster Road, Hagley AQMA has only seen three exceedances of the NO_2 annual mean objective at relevant exposure in the past decade, and none since 2013. Since 2011 there has been only a single breach and no occasions where concentrations were within 5% of the NO_2 annual mean objective. It is considered to be disproportionate to carry out full detailed dispersion modelling in relation to any decision regarding revocation. As a result a detailed screening assessment has been undertaken and is presented in this report.
TG(16) 3.48 "… pollutant concentrations may vary significantly from one year to the next, due to the influence of meteorological conditions, and it is important that authorities avoid cycling between declaring, revoking and declaring again, due simply to these variations. Therefore, before revoking an AQMA on the basis of measured pollutant concentrations, the authority therefore needs to be reasonably certain that any future exceedances (that might occur in more adverse meteorological conditions) are unlikely. For this reason, it is expected that authorities will need to consider measurements carried out over several years or more, national trends in emissions, as well as local factors that may affect the AQMA, including measures introduced as part of the Air Quality Action Plan, together with information from national monitoring on high and low pollution years"	It is acknowledged that the influence of meteorological conditions is a significant factor when considering revocation of an AQMA. As discussed above it is considered likely that the most recent exceedances of the NO_2 annual mean objective observed within the AQMA are likely to be attributable to cooler winters in 2013 and 2010. The trend for higher concentrations in these years can been seen both locally and nationally. However, in considering that NO_2 concentrations in the AQMA are generally measured to be well below the NO_2 annual mean objective and well below 95% of the NO_2 annual mean objective, it is considered to be very unlikely that changing meteorological conditions would produce any consistent exceedance of the NO_2 annual mean objective that would require re-declaration of an AQMA in the future. Particularly considering the current understanding of climate and the predicted increase in warmer winters across the UK going forward. In addition the traffic signalling and roundabout improvements made to the road network in this area is considered to have improved traffic flow and reduced congestion through the existing AQMA area, having a positive impact on air quality. This planned improvement work formed the basis of the Action Plan for the AQMA and WRS will continue to be involved in it's development to ensure that air quality remains a high profile issue and ensure that improvements to air quality are realised.

In conclusion it is recommended that Bromsgrove District Council consider revocation of the Kidderminster Road, Hagley AQMA. There have been limited exceedances of the NO_2 annual mean objective between 2001 and 2016 with the majority taking place prior to and including 2010. Only one minor exceedance of the objective has been recorded in the last six years. This was a level of 40.2µg/m3 in 2013. It is considered to be very unlikely that any consistent exceedance of the NO_2 annual mean objective will occur in the future.

Air Quality will remain an important high profile issue in the area in order to ensure that concentrations of NO_2 remain below the objective. The area will continue to be an "air quality consultation zone" within the WRS Planning Checklist ensuring that air quality is given due consideration through the planning process. In addition WRS will continue to be involved in the development of measures throughout the wider Bromsgrove District as per the Air Quality Action Plan.

Appendices

Appendix A: Summary of Statutory Air Quality Objectives in England

A.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[1]	
	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

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

Appendix B: Kidderminster Road, Hagley AQMA Sealed Order

Environment Act 1995 Part IV Section 83(1)

Bromsgrove District Council
AQMA Order

Bromsgrove District Council in exercise of the powers conferred upon it by Section 83(1) of the Environment Act 1995, hereby makes the following Order.

This Order may be cited/referred to as the Bromsgrove District Council Air Quality Management Area No 2, and shall come into effect on 17th February 2010

The area shown on the attached map in red is to be designated as an air quality management area (the designated area). The designated area incorporates part of Kidderminster Road, Stourbridge Road and Hagley Hill, Hagley. The map may be viewed at the Council Offices.

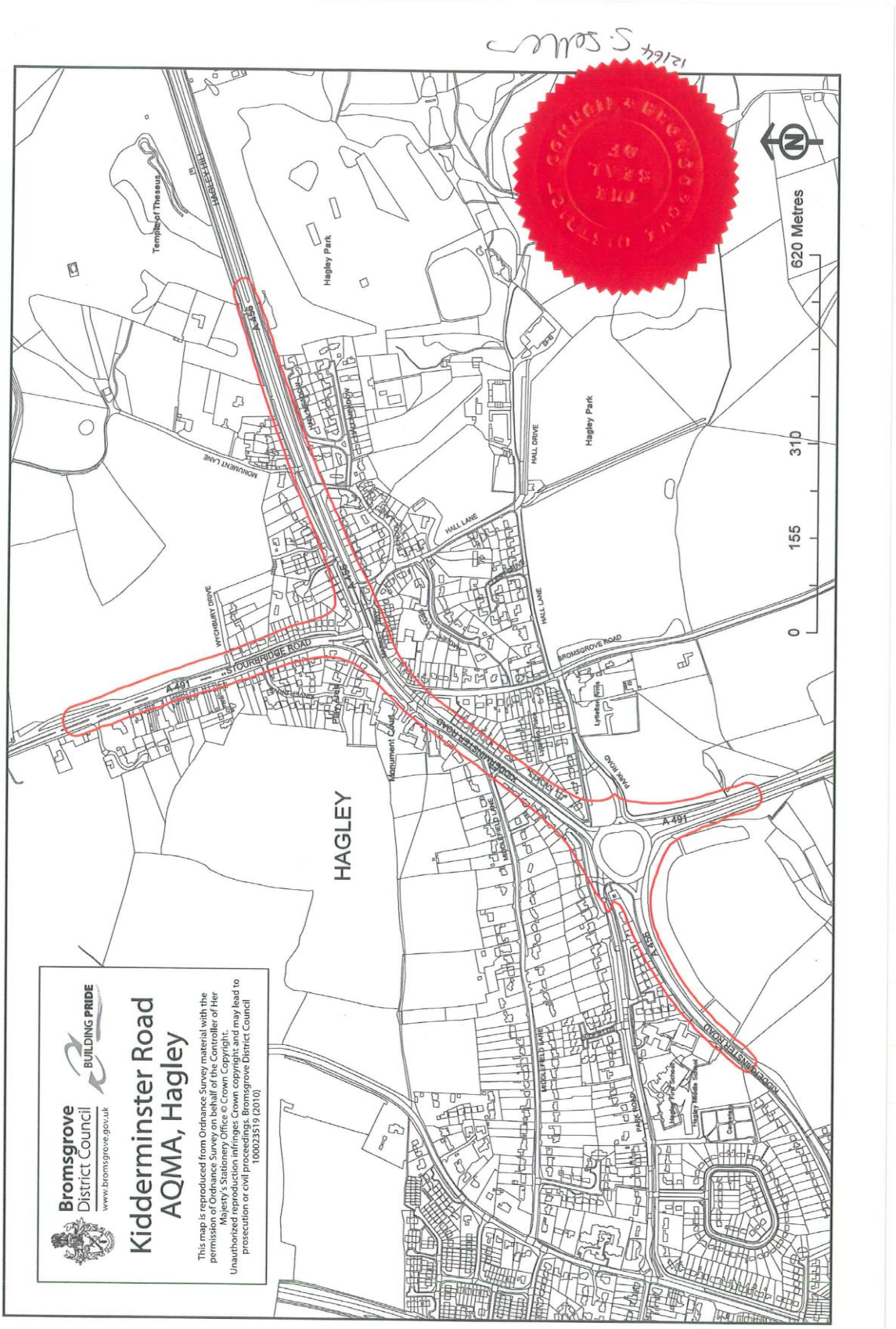
This Area is designated in relation to a likely breach of the nitrogen dioxide (annual mean) objective as specified in the Air Quality Regulations 2000

This Order shall remain in force until it is varied or revoked by a subsequent order.

The Common Seal of Bromsgrove District Council

was hereto affixed on 17/02/2010 and signed
in the presence of /on behalf
of said Council

S. Sellers
.....


Kidderminster Road
AQMA, Hagley
Bromsgrove District Council
BUILDING PRIDE
www.bromsgrove.gov.uk
This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright. Unauthorized reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Bromsgrove District Council 100023519 (2010)
HAGLEY
STOURBRIDGE ROAD
BROMSGROVE ROAD
HALL LANE
HALL DRIVE
Hagley Park
A491
A456
620 Metres
310
155
0

Appendix C: Diffusion Tube Monitoring

C.1 Details of Non-Automatic Monitoring Sites

Site ID	Site Description	Site Type	X OS Grid Ref	Y OS Grid Ref	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)
10	77a Park Road, Hagley	Urban Background	391137	280638	NO_2	Yes	0	17	N	1.93
11	74 Worcester Lane, Hagley	Roadside	390295	280043	NO_2	No	0	2.75	N	1.88
HL	20 Birmingham Rd Sign	Roadside	391551	280999	NO_2	Yes	13	2	N	1.88
8	9 Market Way, Hagley	Roadside	391452	280947	NO_2	Yes	0	13.8	N	1.88
9/a/b	78 Kidderminster Road, Hagley	Roadside	391210	280668	NO_2	Yes	0	8.3	N	1.98
KR62	62 Kidderminster Road	Roadside	391182	280631	NO_2	Yes	0	7	N	1.98
RES 1	26 Stourbridge Rd, Hagley	Roadside	391445	281179	NO_2	Yes	0	15	N	2.10
RES 2	21 Birmingham Road, Hagley	Roadside	391556	281042	NO_2	Yes	0	15	N	2.20
RES 3	104 Kidderminster Road South, Hagley	Roadside	389827	279590	NO_2	No	0	14.3	N	2.00
RES 4	23 Worcester Road, Hagley	Roadside	390025	27965	NO_2	No	0	14.5	n	2.10
KR	Kidderminster Road, Hagley (roadside outside no 78)	Kerbside	391277	280774	NO_2	Yes	7	1	N	

Site ID	Site Description	Site Type	X OS Grid Ref	Y OS Grid Ref	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)
KR2	10 Kidderminster Road, Hagley	Roadside	390363	280044	NO_2	No	0	13.6	N	
7	No.5 Stourbridge Road.	Background	391437	281037	NO_2	Yes	0	9	N	
CM	Kidderminster Road	Kerbside	391354	280919	NO_2	Yes	6	2.5	n/a	

C.2 Monitoring Data 2001 – 2016

Site ID	NO_2 Annual Mean Concentration ($\mu g/m^3$) (1,2)															
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
10				27.7	33.4	31.7	33.3	34	37	38	37.6	29.65	37	32.01	30.22	33.52
11			**40.7**	31.1	34.3	31.7	36.6	32	35	34	31.5	24.71	33	29.87	27.68	31.28
HL												21.49	34	25.48	25.92	28.65
8				25.8	28.7	26.6	30.3	23	25	28	22.1	16.17	27	20.42	20.01	21.88
9/a/b				39.3	**42.8**	38.6	**42.8**	39	38	**40**	37.2	27.51	**40.2**	33.65	32.44	34.49
KR62												28.24	33	31.76	32.17	33.86
RES 1														20.93	20.54	22.29
RES 2														31.31	32.26	34.72
RES 3														16.56	19.35	21.71
RES 4														31.43	32.70	35.67
KR								61	63	64	54.4					
KR2										31	30.2					
7	30.2	33.4	31.7	23.5	27	23.5	28.9	24	26	29	22.5					
CM										38						

(1) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%.

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
AQO	Air Quality Objective
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
QA/QC	Quality Assurance and Quality Control

References

1. Air Quality Consultants (2012) 'Further Assessment Kidderminster Road, Hagley for Bromsgrove District Council'

2. DEFRA (2016) 'Local Air Quality Management Policy Guidance LAQM PG.(16)'

3. DEFRA (2016) 'Local Air Quality Management Technical Guidance LAQM TG.(16)'

4. Worcestershire Regulatory Services (2013) 'Air Quality Action Plan for Worcestershire'

5. Worcestershire Regulatory Services (2015) 'Air Quality Action Plan Progress Report for Worcestershire April 2013-April 2015'

6. Worcestershire Regulatory Services (2016) 'Air Quality Action Plan Progress Report for Worcestershire April 2015 – March 2016'

7. Worcestershire Regulatory Services (2016) 'Annual Status Report – Bromsgrove District Council'

8. Worcestershire Regulatory Services Website http://www.worcsregservices.gov.uk/pollution/air-quality/