

3.3 Redditch Road, Bromsgrove AQMA - Bromsgrove District Council

Date of Detailed Assessment: July 2009

Date of Declaration: 17th February 2010

Date of Further Assessment: March 2012

Plan of AQMA (see over):

The current area of the Redditch Road AQMA consists of almost the entire stretch of the A38 in Bromsgrove designated as Redditch Road. The AQMA begins at the eastern end of this generally east-west single lane carriageway at the Stoke Heath/Morrison's superstore gyratory and continues west up Buntsford Hill to just short of the A38/B4094 Worcester Road gyratory.

At the eastern end of the AQMA the gyratory connects north to the residential areas of Charford and Stoke Heath via Austin Road. The A38 Stoke Road heads eastwards towards Redditch via the A448 at the Sideslow gyratory where the A38 turns north to Lickey End. To the south Buntsford Park Road provides access to Morrison's and its associated petrol station, Aldi superstore and also the industrial areas of Sherwood Road and Buntsford Park Road.

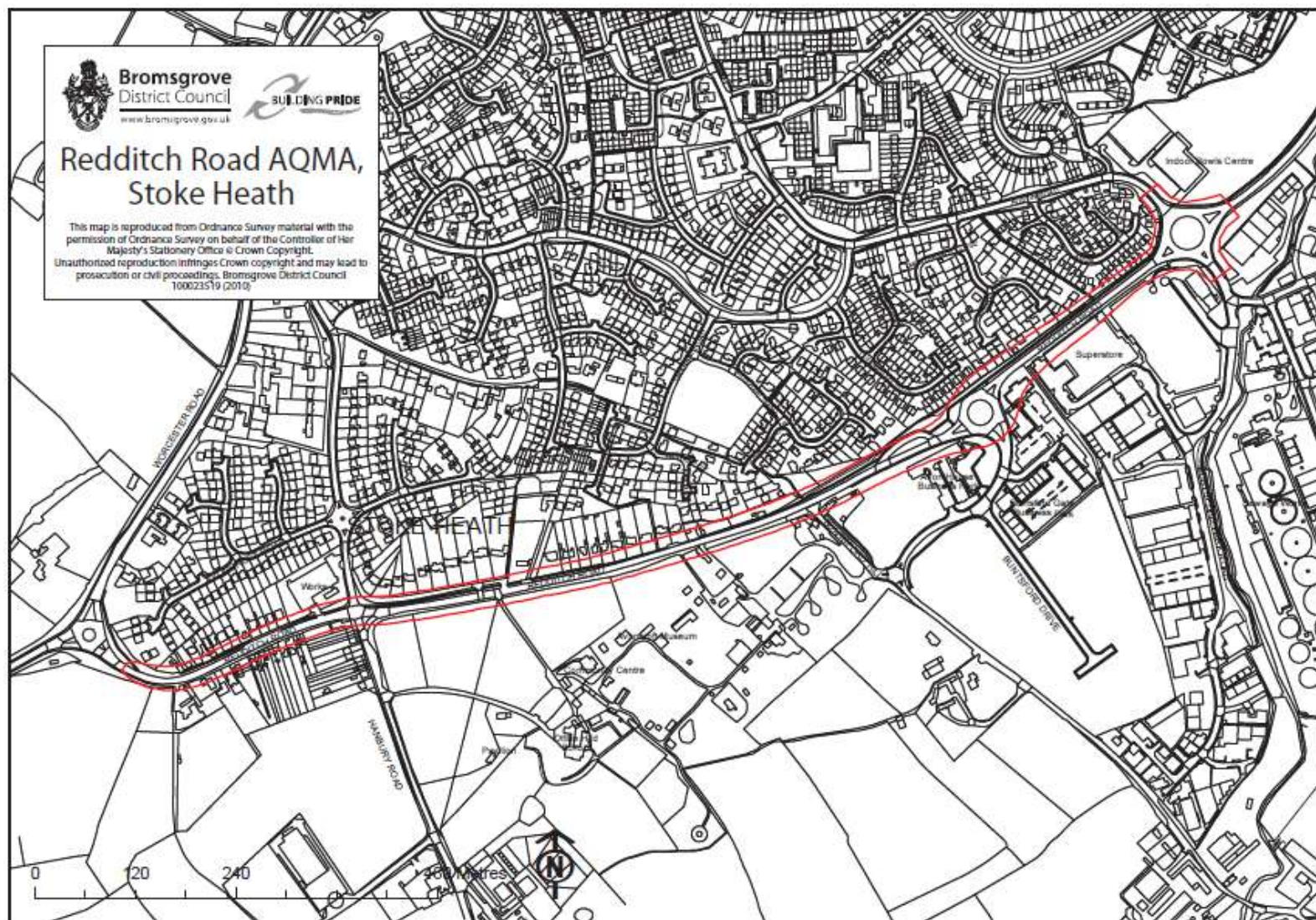
Avon House and Buntsford Gate Business Parks are accessed via Buntsford Drive from a further gyratory 290m to the south-west on Redditch Road. There are no further accessible roads along the AQMA until near the far western end at the cross roads with B4091 Hanbury Road. However there is one other inaccessible road on the southern side of the carriageway, Buntsford Hill, which is blocked from connecting to the A38 by bollards.

The topography of the AQMA begins to rise from the Stoke Heath/Morrison's superstore gyratory to just beyond Buntsford Hill and not quite halfway along the AQMA. From here the topography plateaus before beginning to descend towards the Worcester Road gyratory from the Hanbury Turn PH at the junction with the B4091 Hanbury Road.

The western end of the AQMA ends just 45m east of the gyratory where the A38 changes name to Worcester Road and continues south-west to Wychbold and Junction 5 of the M5, and then onto Droitwich and Worcester City. The other arm of the gyratory is the B4094 Worcester Road which continues on towards the Worcester Road AQMA at the bottom of the Bromsgrove Town Centre.

The current boundary of the AQMA follows the contours of predicted pollution levels produced in the Detailed Assessment (July, 2009). However these straight contour lines cut through residential gardens, open fields and buildings which does not conform to best practice guidance from EPUK (NSCA, 2001b & 2004) as recommended by Defra guidance (LAQM.TG(09) and PG(09)) thus the AQMA boundary requires amendment.

Figure 3-7 Plan of Redditch Road AQMA



3.3.1 Prevailing Conditions

AM and PM peak traffic time site observations of the Redditch Road AQMA were undertaken in 2012 and 2013 to characterise existing conditions and identify issues in order to inform the focus of potential measures within the action plan. Photos from the site walkover are included at the end of this section.

The A38 Worcester Road/Redditch Road and B4094 Worcester Road are the major routes for local traffic journeying to and from Bromsgrove for southerly and westerly locations. Additionally as with the Lickey End AQMA the A38 Redditch Road is occasionally impacted by exponential increases in the volume of traffic bypassing incidents causing disruption between junctions 4 and 6 of the M5 and junctions 1 and 2 on the M42.

At the eastern end of the AQMA as mentioned above is Morrison's superstore including petrol station, Aldi supermarket and industrial areas which are major destinations for local traffic. Further eastwards are connections to and from Redditch to the east and the M42 and beyond to the north via the Sideslow gyratory. The A38 Redditch Road is therefore a major artery connecting these two busy junctions bypassing most of Bromsgrove along its southern edge.

In between the two major gyratories, Redditch Road is bounded by the residential area of Stoke Heath on its northern side. However no residential properties actually front onto Redditch Road on the eastern half of the AQMA along the hill. Most are greater than 10m back from the road and screened by fencing and hedges and the AQMA boundary dissects the rear garden areas. However the rear facades of properties on Austin Road closer to the Morrison's gyratory appear closer to the roadside.

On the southern side of the A38 Redditch Road the eastern end of the AQMA is dominated by commercial properties until the inaccessible Buntsford Hill turning where there are a few visible residential dwellings set back from the carriageway. The only other residential property on the southern side of the carriageway before the Hanbury Road junction is 84 Redditch Road (monitoring Loc. 18) a further 115m away. The remaining southern side of the carriageway up to the Hanbury Road crossroads is bounded by open spaces associated with the Avoncroft museum and Bromsgrove Prep school and nursery which are set back some distance from the roadside.

On the northern side of the carriageway residential properties fronting onto Redditch Road continue just west of Buntsford Hill to Hanbury Road and beyond. Three of the most immediate properties to Buntsford Hill are within the AQMA boundary and facades are just a few metres to the kerbside (minimum 2.7m at Loc.19/a/b). Here the road narrows forming a short street canyon effect with Loc.18 (just 1.6m from the kerbside) on the other side of the carriageway. The facades of the remaining detached properties up to a pedestrian pelican crossing point are increasingly distant from the kerbside, from 12.5m to 40m. The facades of the first three of these properties west along the Redditch Road are just within or on the AQMA boundary line. Beyond the pelican crossing to the Hanbury Road crossroads the facades of the residential properties decrease to a minimum of 15m away from the kerbside. These remaining properties are not within the AQMA boundary.

Immediately beyond the B4091 Hanbury Road/A38 Redditch Road crossroads and traffic lights is the Hanbury Turn Public House on the southern side and a commercial works (Barton Firtop Engineering) on the northern side. Beyond these are further detached or semi-detached residential properties on either side up to the western end of the AQMA boundary. About six properties on the northern side of the carriageway slightly set back and

a number of semi-detached properties more proximal to the kerbside (minimum 2.3m at Loc.16) on the southern side are within the AQMA boundary.

The B4091 Hanbury Road (south) connects to the further industrial areas and residential areas in Stoke Prior and Stoke Works. There is a feeder lane onto this road for traffic travelling westwards on Redditch Road immediately prior to the crossroads. There are also filter lanes at the traffic lights for vehicles turning onto Hanbury Road (south) from the west and for traffic exiting Hanbury Road (south) turning east. From Hanbury Road (north) there is a filter lane turning right towards the A38 Worcester Road gyratory.

In general traffic was observed during site visits to be moving quite freely within the AQMA. Some queuing was noted at the Hanbury Road crossroads in all directions but generally it was observed traffic cleared at each change of lights with the exception of traffic heading eastwards past Barton Firtop Engineering premises. As noted above this traffic is sitting on a slight incline. A high proportion of LGVs and HGVs and coaches (combined 20 to 30% of traffic) were noted on Redditch Road particularly at the Hanbury Turn crossroads and Buntsford Drive.

With the exception of the B4091 Hanbury Road crossroads and pedestrian pelican crossing to Avoncroft there are no other traffic lights within the AQMA and few other restrictions to traffic flow were noted. There are two bus stops, one on each side of the carriageway along Redditch Road at the brow of Buntsford Hill either side of monitoring locations 18 and 19/a/b. These could potentially cause traffic to pause in the vicinity of the street canyon at those points although no incidences were observed during the site visits. Bus routes were noted as 140 and 141.

Road restrictions; there are single white line on either side of the carriageway the length of the AQMA.

Little pedestrian traffic was observed during the site visit, usage of the Pelican crossing was infrequent. The character of Redditch Road AQMA does not meet the description of a location requiring assessment against any short term (i.e. 1 hour for NO₂) air quality standards, as outlined in LAQM.TG(09).

Few cyclists were observed within the AQMA and no cycle routes were observed.

There are few commercial properties with direct access onto the Redditch Road, most at the eastern end of the AQMA are accessed via the roads leading from the gyratorys. The Hanbury Turn PH has a car park accessible from the Redditch Road so should provide access to the PH for delivery vehicles without causing congestion.

Firtop Barton Engineering on the opposite side of the road has a relatively short access loading bay directly accessed from Redditch Road. It is that long HGVs accessing this could cause traffic congestion particularly if backing into the premises although this situation was not observed at time of site visits.

There is also a commercial premise, Stoke Health stores, just south of the crossroads on the western side of the B4091 Hanbury Road (south). The paved area immediately outside the premises is used to park refrigerated LGVs. These were not observed to be blocking traffic on the Hanbury Road but were observed to cause traffic to wait further back and had their engines running.

Photo 1: Looking NW at Hanbury Turn crossroads layout



Photo 2: Looking SW from Redditch Road at queuing traffic at Hanbury Turn crossroads. PH and Loc.16 just right of centre



Photo 3: Looking S across crossroads along B4091 Hanbury Road south



Photo 4: Looking W across crossroads to Redditch Road west of traffic lights



Photo 5: Looking E back to crossroads. Loc.16 in foreground right, Firtop Eng. on left



Photo 6: Looking E on Redditch Road at top of Buntsford Hill to bus stops and street canyon. Loc.18 is on the right and Loc.19/a/b on the left



Photo 7: Looking W at Buntsford Hill and Business Parks



Photo 8: Looking NW across Morrison's gyratory to Buntsford Hill residential properties in Austin Rd on right are eastern extent of AQMA



3.3.2 Summary of any Further Assessment report

A Further Assessment to confirm the requirement for an AQMA in Redditch Road, Bromsgrove and undertake modelling to inform potential solutions was completed by independent consultants Air Quality Consultants (AQC, 2012b) on behalf of BDC and WRS in March 2012. A summary of the findings of the Further Assessment are outlined below.

- The model results are consistent with the monitoring data and modelling carried out for the Detailed Assessment.
- The results indicate that the annual mean nitrogen dioxide objective is being exceeded at several properties near to the west of Hanbury Road/Redditch Road crossroads and at two properties further east along Redditch Road where the properties are very close to the kerb. At the majority of relevant locations the annual mean objective is being achieved.
- The highest predicted concentration in 2010 is $46.2 \mu\text{g}/\text{m}^3$, at 21 Redditch Road (R3). Concentrations are also predicted to exceed the annual mean objective at 22, 36, 58, 84 and 93 Redditch Road (R4, 5, 7, 10 and 11).
- There are no predicted annual mean concentrations greater than $60 \mu\text{g}/\text{m}^3$ and therefore it is unlikely that the 1-hour nitrogen dioxide objective is being exceeded at these locations.
- The results demonstrate there are predicted exceedences of the annual mean objective within the existing AQMA and therefore the AQMA should be retained.
- AQC recommend that the AQMA boundary, as a minimum, be based on those residential properties where concentrations of $36 \mu\text{g}/\text{m}^3$ or greater are predicted to allow for the uncertainty in the measured and predicted concentrations.
- The modelling results demonstrated that there are two receptors, 255 Worcester Road (R1) and 46 Hanbury Road (R8), where predicted concentrations are greater than $36 \mu\text{g}/\text{m}^3$, but below $40 \mu\text{g}/\text{m}^3$, which are outside of the current AQMA boundary. AQC recommend that additional monitoring is carried at those properties to identify if the objective is being exceeded and consequently if the AQMA boundary needs to be extended. Accordingly WRS arranged and implemented two new appropriate monitoring positions during 2012.

3.3.3 Source Apportionment Data

Sources contributing to the objective exceedences within the AQMA have been identified within the Further Assessment. The data presented below have been calculated in line with guidance provided in LAQM.TG(09) (Defra, 2009).

Table 3-10 and Figure 3-7 (AQC, 2012b) set out the relative contributions of traffic emissions to the total predicted nitrogen dioxide concentration at two receptor locations.

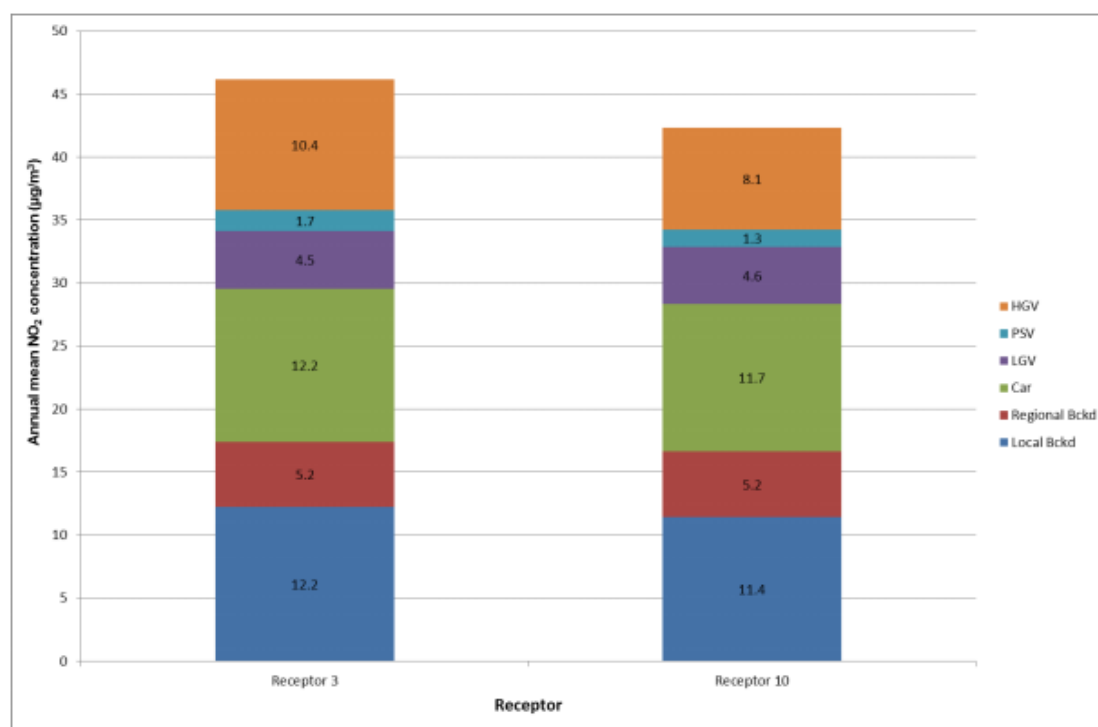
Table 3-10 Predicted Annual Mean (2010) Nitrogen Dioxide Concentrations and the contribution of Each Source Type to the Total

Receptor	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)						
	Local Bkgd	Regional Bkgd	Car	LGV	PSV	HGV	Total
R3	12.2	5.2	12.2	4.5	1.7	10.4	46.2
R10	11.4	5.2	11.7	4.6	1.3	8.2	42.3
	% Contribution to Total						
	Local Bkgd	Regional Bkgd	Car	LGV	PSV	HGV	Total
R3	26.5	11.2	26.3	9.8	3.7	22.5	100.0
R10	27.0	12.3	27.6	10.8	3.1	19.2	100.0

Two receptor locations identified previously have been used to provide an overview of source contributions. Table 3-10 and Figure 3-7 show that the most significant component

for both Receptors 3 and 10 is from Cars, Heavy Duty Vehicles (HDVs) (which are HGVs and PSVs (buses)) and background concentrations. HDVs, despite making up a relatively small proportion of the total traffic volume (between 3.0 to 4.5% on Redditch Road), have an almost equal impact on concentrations (22.5% at Receptor 3) as cars which make up the largest traffic proportion (86%). The background concentrations also contribute a significant proportion to the overall concentrations, at around 38 - 39% in total.

Figure 3-7 Relative Contribution of Each Source Type to the Total Annual Mean Nitrogen Dioxide Concentration ($\mu\text{g}/\text{m}^3$) at Receptor Locations where exceedences of the Annual Mean Objective are predicted (AQC 2012b)



3.3.4 Air Quality Improvement Required.

The degree of improvement, identified in the Further Assessment, required in order for the mean objective for nitrogen dioxide to be achieved is defined by the difference between the highest measured or predicted concentration and the objective level ($40 \mu\text{g}/\text{m}^3$). The highest NO_2 concentration at a relevant location is that modelled at 21 Redditch Road (R3) requiring a reduction of $6.2 \mu\text{g}/\text{m}^3$ in order for the objective to be achieved.

However the Further Assessment explains that in terms of describing reductions in emissions required it is more useful to consider nitrogen oxides (NO_x) which has been calculated in line with guidance presented in LAQM.TG(09) (Defra, 2009). Table 3-11 below sets out the required reduction in local emissions of NO_x in Redditch Road AQMA to achieve the annual mean objective at two properties where an exceedence was predicted in 2010. At R3 local emissions would need to have been 26.2 % lower in order to meet the objective.

Table 3-11 Required reduction in Annual Mean Nitrogen Dioxide Concentrations and in Emissions of Nitrogen Oxides at Receptors in the Redditch Road AQMA in 2010

Receptor Number	Receptor	Required Reduction in Annual Mean NO ₂ Concentration (µg/m ³)	Required reduction in Emissions of NO _x from Local Roads (%)
R3	21 Redditch Road	6.2	26.2%
R4	22 Redditch Road	2.3	11.1%
R5	36 Redditch Road	1.4	6.9%
R7	58 Redditch Road	3.4	15.9%
R10	84 Redditch Road	2.3	11.2%
R11	93 Redditch Road	0.8	3.8%

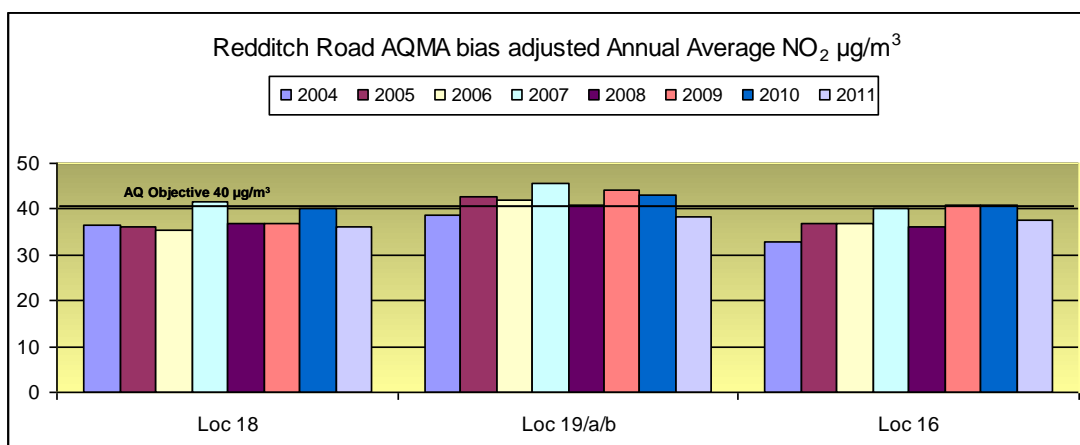
The results highlight that targeting individual types of vehicle on these local roads in isolation would not lead to the annual mean objective being achieved unless the reductions are very large. This is primarily because the background concentration, which is not influenced significantly by very local emissions, contributes a large proportion of total nitrogen dioxide concentrations. However reducing total vehicle emissions by around 25% would be a potentially effective measure for achieving the objectives at most receptor locations.

Measures within the Action Plan need to be proportionate to the scale of the exceedence of the objective and the number of people affected. In this case, 10 to 100 people are subject to exceedences of the annual mean objective (AQC, 2012b) and the magnitude of the exceedence ranges from relatively small to medium (0.8 to 6.2 µg/m³ above the objective).

3.3.5 Long term local trends in NO₂

As part of the AQAP process data has been collated from previous BDC yearly progress reports and screening assessments to produce meaningful picture of long term trends in monitoring results of nitrogen dioxide in Redditch Road.

The graph below depicts these long term trends from bias adjusted annual average results of NO₂ at relevant exposure receptor locations.

Figure 3-8 Bias adjusted annual average NO₂ monitoring results 2004 - 2011 Redditch Road AQMA

Loc 16 – 58 Redditch Road; Loc 18 – 84 Redditch Road, Buntsford Hill; Loc 19/a/b – 93 Redditch Road, Buntsford Hill.

3.3.6 Summary of progress of actions identified or implemented to date

No previous action plans have been produced for the Redditch Road, Bromsgrove AQMA.

3.3.7 Actions identified from Local Transport Programme 3 (LTP3):

A number of actions have been identified within the County Councils transport strategy as having a potential impact on Redditch Road AQMA. The LTP3 scheme code, brief description and current status as provided by WCC in February 2013 is shown in Table 3-12.

Table 3-12 LTP3 actions impacting Redditch Road AQMA.

LTP3 Scheme	Description of Improvements	Current Status
BR1 - Bromsgrove New Station Scheme	Indirect: Will allow longer trains to call at station, increased public transport capacity, increase to 350 car parking spaces	Public consultation underway. Programme date for opening 17th May 2015.
BR2 - Bromsgrove Eastern Bypass Enhancement Scheme (including AQMA remediation)	Directly Linked to AQMA: A package of enhancement measures, including major junction improvements and measures to improve accessibility to the railway. Integrated with other schemes in Bromsgrove	One of options for Bromsgrove Transport Package. No decision on what package will entail.
BR4 - Bromsgrove Traffic and Parking Management Study	Indirect: Study would identify where to focus investment to improve the operation of the local transport network.	One of options for Bromsgrove Transport Package. No decision on what package will entail.
BR5 - Bromsgrove Minor Transport Improvements Scheme	Indirect: Minor complimentary transport improvements to enhance safety, accessibility, information and travel choice.	One of options for Bromsgrove Transport Package. No decision on what package will entail.

3.3.8 Summary of key issues identified from review for consideration within actions

Issue RR1 - The A38 Redditch Road is a major artery connecting two busy junctions. At its western end the A38 and Worcester Road are the major routes for traffic journeying to and from southerly and westerly locations. At its eastern end is a busy retail and industrial destination.

Issue RR2 - The A38 Redditch Road is occasionally impacted by exponential increases in the volume of traffic bypassing traffic incidents on the M5 and the beginning of the M42.

Issue RR3 - The current boundary of the AQMA could be amended to comply with Defra and EPUK guidance e.g. along physical or administrative boundaries and exclude rear residential garden areas and sections of road not bounded by relevant exposure within identified $36 \mu\text{g}/\text{m}^3$ contour. Further extensions at the western end and potential reduction to the eastern extent require confirmation via additional monitoring positions.

Issue RR4 - The topography at the western and eastern extents is likely a contributing factor elevated emissions in those locations.

Issue RR5 - Some of the properties with the highest modelled and monitored results for nitrogen dioxide are very close to the roadside and in places create street canyons.

Issue RR6 - A number of industrial areas and business parks area accessed from the AQMA directly or further afield via Hanbury Road. High proportions of LGVs, HGVs and coaches were observed although this is not reflected in traffic data in the Further Assessment.

Issue RR7 - Two painted bus stops in vicinity of two receptors with exceedences of objectives potentially could cause congestion.

Issue RR8 - Access to the Bromsgrove Prep School and Nursery potentially impacts on traffic at the Hanbury/Redditch Road crossroads.

Issue RR9 - Difficult access to loading bay for commercial vehicles accessing Barton Firtop Engineering has potential to cause congestion at top of incline at Hanbury/Redditch Road crossroads.

Issue RR10 - Source apportionment in FA demonstrated HDVs (HGVs and PSVs), despite making up a relatively small proportion of the total traffic volume (between 3.0 to 4.5%) have an almost equal impact on concentrations (22.5% at Receptor 3) as cars (26% at Receptor 3) which make up the largest traffic proportion (86%). However, the ambient background concentration contributes a significant proportion (40%) to the overall concentration.

Issue RR11 - The results of modelling in the Further Assessment indicate 10 to 100 people are subject to exceedences of the annual mean and the magnitude of the exceedence ranges from 0.8 to 6.2 $\mu\text{g}/\text{m}^3$ above the objective. Reducing total vehicle emissions by around 25% would be a potentially effective measure for achieving the objectives at most receptor locations.