2013 Air Quality Action Plan for AQMA 1/2011 Rushcliffe Borough Council

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

Date: 30th January 2014

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Report Reference number	Air quality action plan for AQMA 1 2011, Stragglethorpe Road/A52
Date	30th January 2014

Executive Summary

Rushcliffe Borough Council is required to produce an Air Quality Action Plan (AQAP) following the declaration of an Air Quality Management Area. The area concerned with this AQAP is AQMA 1, 2011, at the Junction of the A52 and Stragglethorpe Road, Radcliffe on Trent. This AQMA has also been referred to as AQMA 4 in previous LAQM reports.

This AQAP has been subject to consultation within Rushcliffe Borough Council, the Highway Agency and the Nottinghamshire County Council Local Transport Planners. Residents in the affected area have been made aware of the AQMA at all stages and have also been consulted on the draft AQAP. A list of consultees is contained in the appendices. Any comments received have been considered carefully before this final submission.

The reason for the AQMA is the exceedance of the air quality standard for the annual mean NO_2 at group of properties adjacent to the A52 at this junction. Along other lengths of this road, although NO_2 is elevated, levels do not exceed the AQS at façade locations. It is thought the reason for this is due to traffic stopping and accelerating away of the traffic from the lights as levels of traffic and composition are comparable to other locations along the A52.

The measures proposed are therefore looking at maintaining a more continuous and steady flow of traffic through the junction and other measures to generally reduce car usage and negative effects from future development that might add generally to the amount of traffic in this area.

The AQAP has examined measures that would have a more dramatic effect at the site, but these measures would require substantial funding to implement and may also have negative effects on other aspects of the operation of this area of the strategic road network. As such these measures have not been supported by the Highways Agency at this time. The Highways Agency has committed to a study of the environmental effects of the A52 and this will include the new AQMA.

The measures that have been proposed are contained in Chapter 7. These measures will be reported on annually and will require data and information from the Highways Agency and the Nottinghamshire County Council LTP prior to April each year until the AQMA is in compliance. It is expected that a combined progress report will be produced annually, due to Rushcliffe having two other existing AQMA"s.

In addition to these additional measures the government has implemented a number of national measures to reduce NO_2. This principally relies on the introduction of emission standards for new vehicles. As the vehicle fleet is replaced by newer less polluting vehicles it is expected that the NO_2 levels at this site will fall below the

annual NO_2 AQS limit. It is predicted that the site will be in compliance by 2019/20 based on data produced by Defra on the future trend in NO_2 emissions from traffic. However such data from Defra has been over optimistic in the past

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1 Introduction

Rushcliffe Borough Council has declared an air quality management area at the junction of the A52 and the Stragglethorpe Road for the exceedance of nitrogen dioxide (NO2) from vehicle emissions. The required detailed assessment reports and further assessment reports have been produced and submitted to Defra. The next stage in the review and assessment of local air quality process is the development of an air quality action plan which will aim to introduce measures to lead to the reduction in NO2 to below the air quality standard at relevant receptors in the AQMA. This AQAP will be submitted as the final AQAP and has been consulted on with stake holders and other relevant bodies. Any comments received have been considered prior to the submission and implementation of the final AQAP.

1.1 Local air quality management

Section 82 of the Environment Act 1995 provides that every local authority shall review the air quality within its area, both at the present time and the likely future air quality. Section 83 requires local authorities to designate an air quality management area where air quality objectives are not being achieved, or are not likely to be achieved within the relevant period, as set out in the Air Quality (England) Regulations 2000. Once an area has been designated Section 84 requires the local authority to carry out an assessment and then to develop an Action Plan for the air quality management area.

Following designation of an air quality management area, an air quality Action Plan should be completed between 12 – 18 months following the date of designation. Subsequently progress being made with the implementation of the action plan requires the submission of a progress report on an annual basis until compliance is achieved and the AQMA is revoked. This plan is already later that than the timescales set out above. Primarily this is due to delays in communications with the Highways Agency.

1.2 Air Quality Objective for Nitrogen Dioxide

The air quality objectives applicable to Local Air Quality Management (LAQM) in England are set out in the Air Quality (England) Regulations 2000 (SI 928), and the Air Quality (England) (Amendment) Regulations 2002 (SI 3043). They are shown in Table 1. This table shows the objectives in units of micrograms per cubic metre $\mu g/m^3$. Table 1 includes the number of permitted exceedences in any given year.

Table 1 Air Quality Objective for NO_2 included in Regulations for the purpose of Local Air Quality Management in England.

Pollutant		**Date to be**

	Concentration	Measured as	achieved by
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005

1.3 Description of Local Authority Area

The Borough of Rushcliffe covers 157 square miles (around 400 sq. km) and has a population of 111,100. It stretches from the River Trent to the Leicestershire borders and eastwards along the Trent Valley, to within a few miles of Newark. Rushcliffe BC is part of a two tier local authority administration with the Nottinghamshire County Council having responsibility for significant areas of public service delivery including transport issues such as the Local Transport Plan.

The largest town is West Bridgford, with a population of about 41,000. This is part of the Greater Nottingham conurbation, being separated from the City of Nottingham by the River Trent. The other major settlements within the Borough are Bingham, Cotgrave, East Leake, Keyworth, Ruddington and Radcliffe-on-Trent.

Several major roads cross the Borough, linking the Borough with both the M1 and the A1. The A52 being one of these roads. There are also high daily traffic flows in West Bridgford, from the major arterial routes into the Nottingham city centre. Although the Borough is predominantly rural in nature, it also contains some significant industrial processes. These include Ratcliffe-on-Soar power station and the British Gypsum plasterboard factory at East Leake.

Nottingham East Midlands Airport (NEMA) lies immediately to the south west of Rushcliffe, within the district of North West Leicestershire District Council. Although the flight paths for both approaching and departing aircraft pass directly over the Borough, the air quality impacts of the airport itself do not affect Rushcliffe residents.

1.4 Summary of Previous Review and Assessments

In 2000, Rushcliffe Borough Council reported the findings of its original review and assessment of local air quality. This was a 3-stage process, concluding that with the exception of particulates, there was no need to proceed beyond Stages 1 and 2.

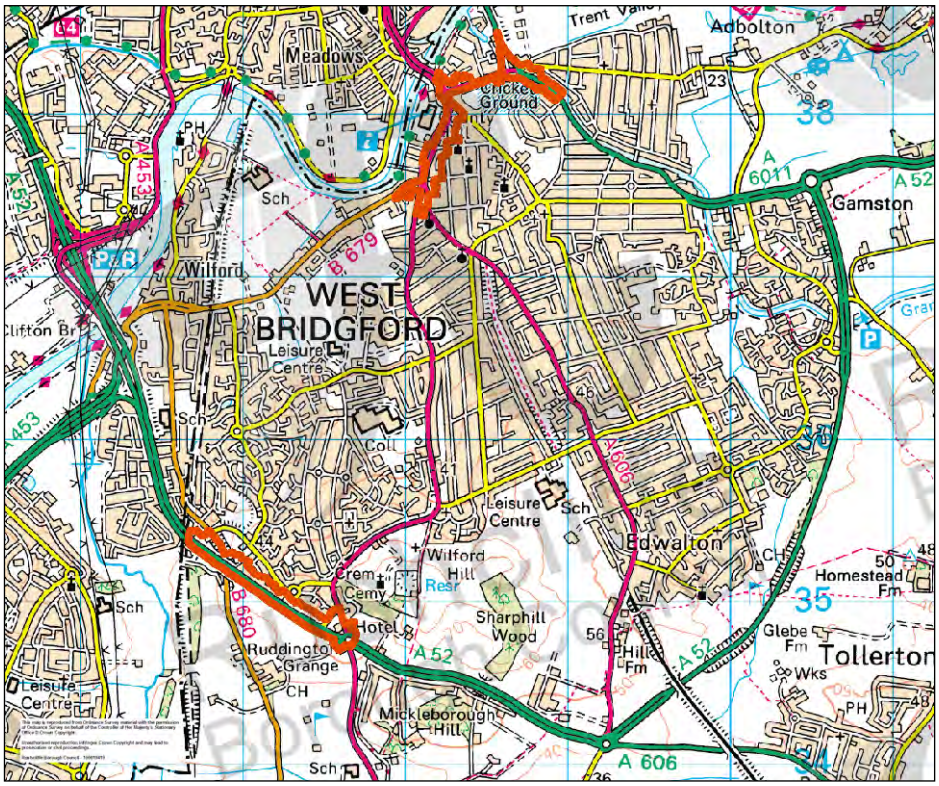
A more detailed Stage 3 assessment was carried out for particulate matter (PM10), due to both potential inaccuracies in the atmospheric dispersion modelling and the predicted concentrations being close to the objective. Monitoring data was used to validate the computer modelling. It determined that the objective would be unlikely to be exceeded. It was therefore concluded that there was no need to declare an AQMA.

The first phase of the second round of review and assessment (the USA), was completed in 2003 and this provided an update with respect to air quality issues within Rushcliffe. The USA concluded that the annual mean NO_2 objective might not be met at Wilford Lane, Trent Bridge, Lady Bay and A52/Botany Close and it was required to undertake a detailed assessment. The 24-hour, 1-hour and 15-minute mean objectives for SO_2 were predicted to be exceeded in the vicinity of the coal-fired kiln at

the Lafarge UK Ltd. cement plant at Barnstone and it was required to undertake a Detailed Assessment.

The Detailed Assessment undertaken in 2005 concluded that the annual mean objective for NO_2 would be exceeded. As a result, two AQMA"s were declared on 1st September 2005. AQMA1 included the areas around Wilford Lane, Trent Bridge and Lady Bay (see Map 1 below).

Map 1 of AQMA 1 & AQMA 2 boundaries



AQMA 2 included the area around A52/Botany Close (The AQS objectives were also found to have been exceeded in respect of SO_2 in the vicinity of Lafarge UK Ltd. cement plant at Barnstone and as a result, AQMA 3 was declared on 1st September 2005.

The 2006 USA determined that there were no exceedences of the AQS objectives identified within their local authority area outside the AQMA"s and therefore a Detailed Assessment was not required.

Due to the closure of the Lafarge UK Ltd. cement plant at Barnstone, SO_2 concentrations reduced in the local vicinity of AQMA 3 to below their AQS objectives. AQMA 3 was subsequently revoked on 27th April 2007

In 2008, the progress report concluded that NO_2 had not improved in 2007 with some sites experiencing higher than previous years results including outside of AQMA"s. The

results indicated that NO_2 at certain receptor locations continued to exceed the NO_2 AQS objectives and that the AQMA"s should remain in place. NO_2 in general increased over 2007 rather than decreased and the report predicted that it would be unlikely that the predicted reductions in NO_2 will see an improvement in NO_2 levels such that, all sites will be below the objective level by 2010 as predicted in the USA.

The diffusion tube site on the A46 (East Bridgford site) indicated that 2007 levels were above the objective levels at the façade to a domestic dwelling close to the road. However, the major road improvements to be undertaken and the relocation of the trunk road in the near future were expected to see an improvement in NO_2 exposure at this site.

The 2008 report concluded that there were no plans to declare a further AQMA at this site or to extend the AQMA"s already declared but sites close to exceeding or outside of the AQMA"s would be increased in tube numbers and each monitoring position reviewed to determine compliance with published guidelines. This led to a general review of existing monitoring sites with some changes over 2008. The response from Defra indicated that despite the imminent road building at the East Bridgford site, that the site should be closely monitored and proceed to a DA if necessary. The data acquired so far could be used as the preliminary for a DA.

In 2009 a separate USA and AQAP progress reports were produced. The USA being undertaken by consultants Bureau Veritas. The USA 2009 concluded that over 2008 the sites identified in the previous round had fallen below the objectives and there was no need to undertake detailed assessments at these sites. The A46 bypass at East Bridgford had also begun construction.

In addition, generally in 2008, NO_2 had fallen compared to the previous year"s results and the report concluded that there was no requirement to undertake a detailed assessment in the area. The report concluded that some existing diffusion tube sites were not at relevant receptor sites and should be relocated to better represent exposure to the public. This recommendation was undertaken for the start of the 2009 year.

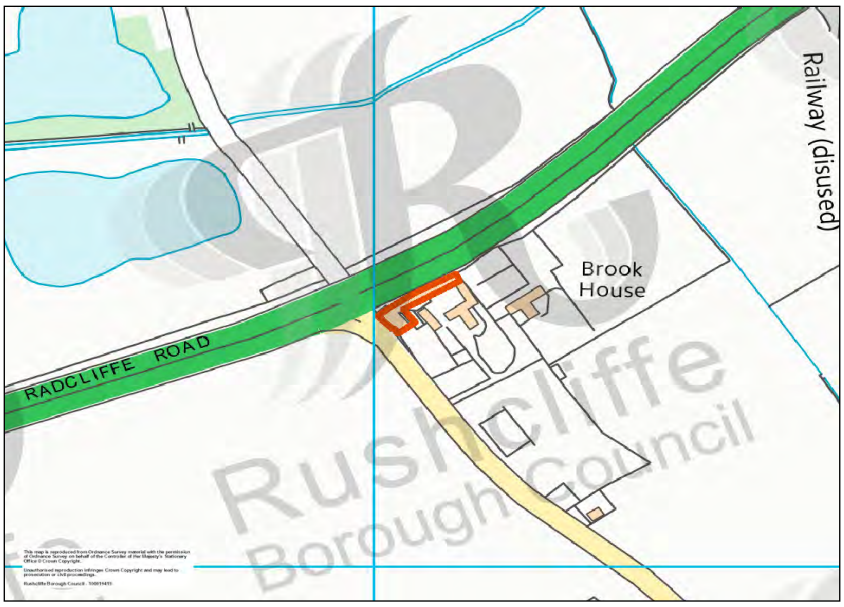
During 2009, additional sampling using diffusion tubes was undertaken at Holme House on the A52 at the Junction of Stragglethorpe Road. This monitoring was reported on in the 2010 progress report with a conclusion that a detailed assessment should be undertaken for this junction. The detailed assessment confirmed the exceedences for NO_2 at this site and subsequently AQMA1 2011 was declared. In September 2012 the further assessment was completed by the University West Of England (UWE) which undertook the source appointment exercise using the latest available emission factors recently published by Defra and again concluded it was right to declare the AQMA.

Table 1 shows the previous review and assessment reports published to date all of which can be viewed on line at:

http://www.rushcliffe.gov.uk/environmentalhealth/pollution/airquality/airqualityreports/

Map 2 below show the AQMA 1, 2011 boundary area and Map 3 shows the location within the Borough boundary.

Map 2 of AQMA 1 2011



Map 3 Map of borough boundaries

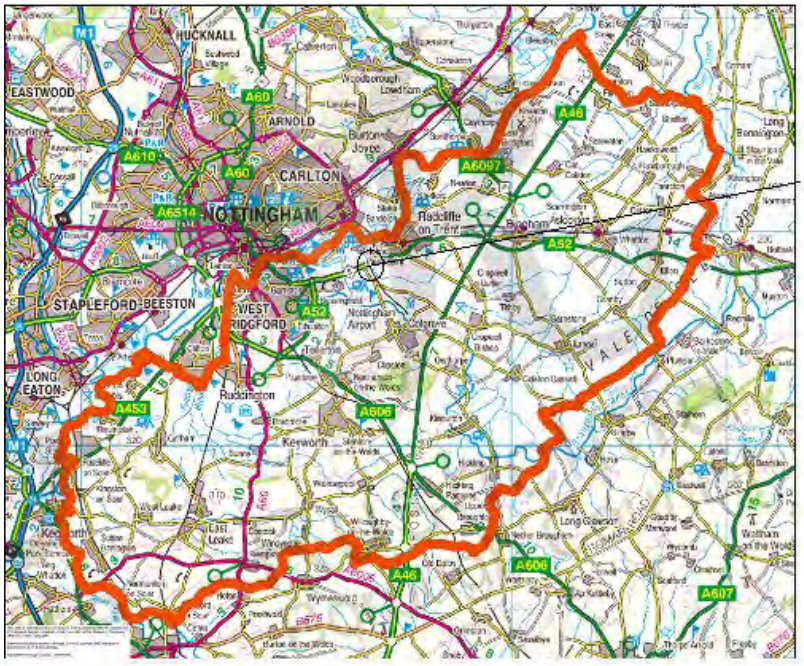


Table 2 Showing previous review and assessment reports

Report title	Date Produced
Progress Report	June 2013
Further Assessment	September 2012
Detailed assessment	May 2011
Updating and Screening Assessment Review and Assessment of Local Air Quality (2011)	June 2011
Air quality Progress Report 2010	May 2010
Air Quality Action Plan 2009 Progress Report	July 2009
Updating and Screening Assessment Review and Assessment of Local Air Quality (2009)	July 2009
Air Quality Progress Report 2008	June 2008
Air Quality Review: Assessment Progress Report June 2007	June 2007
Air Quality Action Plan: May 2007	May 2007
Air Quality Management No 3 Order Revocation order (2007)	April 2007
Updating and Screening Assessment, Review and Assessment of Local Air Quality 2006	April 2006
Progress report 2005	April 2005
Detailed assessment of Sulphur dioxide and nitrogen dioxide	February 2005
Updating and Screening Assessment Review and Assessment of Local Air Quality (May 2003)	May 2003
Annual Report on Air Quality (2002)	2002

2 Requirement and purpose of the air quality action plan

The purpose of this action plan is to put in place measures that will achieve or progress towards the air quality objectives laid down in the National Air Quality Strategy in cases where an exceedance is declared; or to improve air quality (and local public health) in cases where there are no exceedences.

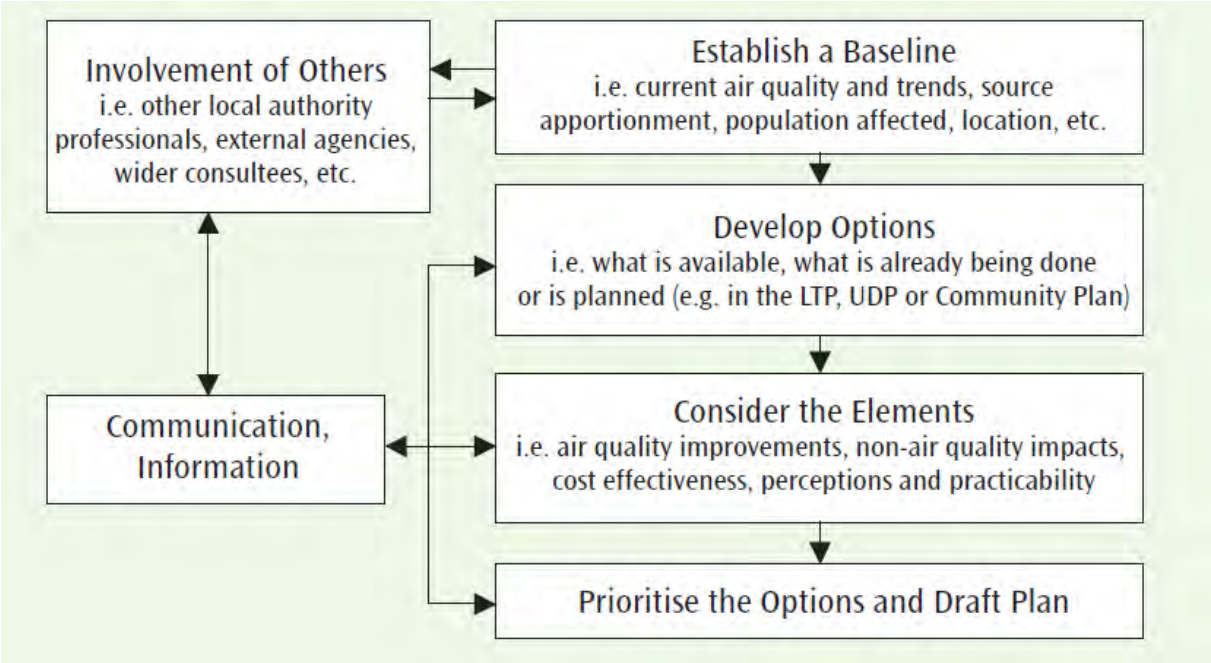
In producing an air quality action plan this authority is required to have regard to the guidance issued by the Secretary of State under section 88(1) of the Environment Act 1995. Policy Guidance PG (09) requires that an Action Plan must include the following as a minimum requirement:

- quantification of the source contributions to the predicted exceedences of the relevant objectives; this will allow the Action Plan measures to be effectively targeted;
- evidence that all available options have been considered;
- how the local authority will use its powers and also work in conjunction with other organisations in pursuit of the air quality objectives;
- clear timescales in which the authority and other organisations and agencies propose to implement the measures within its plan;
- Where possible, quantification of the expected impacts of the proposed measures and an indication as to whether the measures will be sufficient to meet the air quality objectives. Where feasible, data on emissions could be included as well as data on concentrations where possible; and
- How the local authority intends to monitor and evaluate the effectiveness of the plan.

During this process it is necessary to identify the potential options to achieve the objective set out above. This should include:

- consideration of a case without any policies or plans, i.e. the „do minimum" Scenario and,
- A wide ranging list of all the potential options available.

Guidance on developing an Air Quality Action Plan is contained in the EPUK (formerly the NSCA) guidance on the development of air quality action plans and local air quality strategies 2001. The basic strategy is shown in Figure 2.1 below. The following chapter details what nitrogen dioxide is and the national and local perspectives that need to be considered.



(EPUK (NSCA), 2001)

Figure 2.1 Basic stages of air quality action planning

3 Nitrogen Dioxide

3.1 National Perspective

Nitrogen dioxide is a brown gas, with the chemical formula NO_2. It is chemically related to nitric oxide (nitrogen monoxide), a colourless gas with the chemical formula NO. Together, NO and NO_2 are known as NO_X. NO_X is released into the atmosphere when fuels are burned (for example, petrol or diesel in a car engine, or natural gas in a domestic central heating boiler or power station).

NO_2 can affect our health. There is evidence that high levels of it can inflame the airways in our lungs and, over a long period of time, affect how well our lungs work. People with asthma are particularly affected. NO_2 can also affect vegetation

The concentration of NO_2 is measured in micrograms in each cubic metre of air ($\mu g/m^3$). A microgram (µg) is one millionth of a gram. A concentration of 1 $\mu g/m^3$ means that one cubic metre of air contains one microgram of pollutant. To protect our health, the UK Governments set two air quality objectives for NO_2 in their Air Quality Strategy, an hourly limit and an annual mean objective. (See Table 1)

Road transport is the largest source of NO_X emissions in the UK, contributing 49% of total emissions in 2000. However, emissions from road transport have fallen by 34% between 1990 and 2000. This is due to improvements in engine design and fitting three-way catalysts to petrol cars, to meet increasingly strict European standards. The importance of road transport is even greater in urban areas, but the UK Government expects these emissions to reduce greatly by 2010 NO_X emissions from burning fossil fuels are mainly as NO, but some sources can release a lot of NO_X as NO_2. These primary NO_2 emissions are particularly important from diesel vehicles (especially when moving slowly), and can make up as much as 25% of the total NO_X emissions from this source. One reason for this is as a side-effect of measures that have been developed to reduce emissions of particulate matter from diesel vehicles by treating the exhaust using diesel particulate filters. These primary NO_2 emissions can lead to high concentrations of NO_2 at the roadside, especially where there are many diesel vehicles. NO_2 is also formed in the atmosphere in a chemical reaction between NO and ozone (O3). Because this NO_2 is not released straight into the atmosphere, but is formed there by a chemical reaction, it is known as secondary NO_2.

Estimates of emissions to 2010 have been made both for London and for other UK urban areas, using projections of the fleet mix and estimates of emissions of both NOx and NO_2 from the different vehicle types. These calculations show a continuing fall in NOx emissions but almost constant, or even slightly increasing, values for NO_2 emissions over the period 2002 – 2005 and slight falls in NO_2 emissions over the period 2005 – 2010 with large uncertainty ranges.

Projections of future concentrations of NO_2 show that the expected increases in the primary NO_2 emission percentage between 2004 and 2010 are likely to increase the extent of exceedences of an annual mean NO_2 concentration of 40 µg m-3 relative to projections based on no change in primary NO_2 percentage. It is unclear, however, exactly how the balance between NOx emission reductions and increases in primary NO_2 percentages will influence the achievement of objectives and limit values in 2010 and beyond, because of the uncertainty associated with estimates of future primary NO_2 emissions. More recently revised emission factors have been released by Defra which better reflect the real world scenario. These factors have been used as the basis for the detailed assessment prior to this action plan. These factors indicate a gradual fall off of NO_2 in time.

(Source Air Quality Expert Panel, Trends in Primary Nitrogen Dioxide in the UK, 2007 & Nitrogen Dioxide in the United Kingdom Summary, 2004)

3.2 Local Perspective

The AQMA 1 2011 is the 3rd of three current AQMA"s that exist in Rushcliffe. The AQMA 1 2005 covers the West Bridgford area and the AQMA 2 2005 covers the A52 at the Nottingham Knight Island. These two areas already have an AQAP which is reported on annually and shows a slight downward trend in both cases for NO_2. The AQMA2 area currently does not exceed the AQS at any assessment point and consideration is being given to revoking this AQMA, as such the Highways Agency has not needed to undertake any additional measures at this particular site.

The AQMA 1 2011, which is the subject of this air quality plan is in the control and responsibility of the Highways Agency. The site is located away from the main urban area and high NO_2 levels are caused by the presence of the traffic junction along the A52 (slowing and accelerating traffic causing increased emissions) close to existing residential properties. A photograph of the junction is shown Figure 3.1 and Figure 3.2 below.

The Stragglethorpe junction area, the subject of this report, is situated east of the existing AQMA"s and on the A52 (a duelled carriage way) which carries some 40+ thousand vehicles each day. Closer to Nottingham the traffic stream splits at Gamston Island with routes toward AQMA1 (Trent Bridge/Lady areas) and toward AQMA2 (the Nottingham Knight Island).

The site is an isolated hotspot being several miles from the main urban areas. The A52 carries some 40-45000 Vehicles on an AADT basis. Although elevated, levels at other monitoring sites along this link of the A52 have not indicated exeedances, and given that the site is a major trunk road traffic significant traffic reduction is not possible locally to resolve the exceedance. Measures are therefore focused on preventing further worsening of levels at the site (via development control and strategic measures), emission reductions, congestion reduction, traffic management and junction improvements. Map 2 shows the AQMA boundary.

Given the isolated nature of the site, the air quality help desk has advised to develop a separate AQAP for this site and not to incorporate any new measures in the existing AQAP for other sites at this time although it is planned to combine the reporting in due course.

Figure 3.1 View of A52 traffic and Holme House complex (Grid reference 463011, 338213) in the back ground

Figure 3.2 Crossing on A52 with traffic stopped with Holme house clearly shown

The Stragglethorpe junction is controlled by traffic lights to allow traffic coming into and out of Nottingham to into Stragglethorpe Road, to provide a pedestrian crossing

at this point and provides access east and west to traffic leaving the Stragglethorpe Road. This causes frequent traffic queues directly adjacent to a group of properties next to the lights and is suspected to result in a surge in emissions as the traffic pulls away from the lights. Figure 3.1 and Figure 3.2 show photographs of the residential properties and the junction.

4 A52/Stragglethorpe Road Air quality Assessments

Rushcliffe Borough Council has undertaken assessments for air quality impacts that directly relate to this site on a number of occasions. A summary of the assessments is shown below:

4.1 Previous rounds of the Review and assessment process

Previous review and assessments rounds have not identified this particular area as an area likely to be an exeedence for any air quality pollutant. The A52 along its length through Rushcliffe has been assessed and in previous rounds the A52 at the Nottingham Knight Island was declared an AQMA. The USA 2003 concluded that:

“proceeding to a detailed assessment in respect of the following busy roads/road junctions: Wilford Lane, Trent Bridge, Lady Bay, and A52 Botany Close” was required but that ”There was no need to proceed to a detailed assessment for NO_2 in respect of any other emission sources/locations within Rushcliffe”.

This was confirmed in the subsequent detailed assessment 2005.

Subsequent R&A reports have not noted any increases in traffic or a change in circumstances to warrant further investigation.

However following planning applications for large developments at Cotgrave it was considered necessary to determine if resultant traffic would have a significant effect at this site. As such through the planning process such an assessment was requested. This indicated levels higher than anticipated but that the impact of the developments would be insignificant. As appropriate comments were made with regard to such developments and additional monitoring began to quantify this particular junction under the LAQM. The process is documented in recent R&A reports.

4.2 Detailed assessment 2011

The conclusion of the detailed assessment was that this area was identified in the Progress Report 2010 as an area that has the potential to breach the annual mean objective for nitrogen dioxide at relevant receptors around the junction.

Monitoring using diffusion tubes has indicated that the concentrations of nitrogen dioxide are above the air quality objectives at properties bordering the A52 close to this junction and for a short distance along Stragglethorpe Road. Real time

monitoring has been used to bias adjust the triplicate and single diffusion tube monitoring at the assessment site on the façade of residential dwellings.
Based on the detailed assessment and a review of the monitoring data within the assessment area the following recommendations are made:

- Declaration of a further Air Quality Management Area (AQMA) is proposed along a length of the A52 at the junction of the Straglethorpe Road. The declaration will be for NO_2 where exceedences of the annual mean objective are predicted at relevant receptor locations. The geographical extent of the AQAM will be subject to consultation with members, local residents and the Highways Agency. Options include declaring all properties in the immediate vicinity within the AQMA or focusing on the 36 $\mu g/m^3$ line as a means of determining an AQMA boundary.
- Monitoring of NO_2 will continue to be undertaken at current monitoring locations to ensure changes in air quality are detected.
- A further assessment will be undertaken within the required 12 month period following the declaration of the AQMA. The Further Assessment will supplement the information provided in this Detailed Assessment by the introduction of subsequent monitoring data. The Further Assessment will aim to confirm the exceedance of the NO_2 objective; define what improvement in air quality, and corresponding reduction in emissions is required to attain the objectives; and provide information on source contributions. Any information gathered from this assessment can be used to develop the Air Quality Action Plan, and assist in the targeting of appropriate measures.

4.3 Further assessment 2012

The further assessment stated that the NO_2 diffusion tube monitoring data indicated exceedances of the annual mean objective at two sites of relevant exposure on the facade of Holme House for at least two years, and another site in Straglethorpe Road which has been consistently within 10% of the annual mean objective for the preceding three years. Monitoring of PM_{10} between 15th April and 31st December 2011 at this location had not indicated any exceedances.

Both the modelling and monitoring data indicate that the declaration of AQMA for exceedances of the annual mean objective for nitrogen dioxide at A52/Straglethorpe Road junction was valid.

Source apportionment has indicated that the main contribution of emissions is from Articulated HGVs and Diesel Cars, with significant additional contributions from Rigid HGVs and Diesel LGVs. The stop-start nature of the traffic flow due to the traffic lights at this junction are a key factor in contributing to elevated NO_2 concentrations at this location. Given that the A52 is a trunk-road it may be impractical to target HGVs exclusively. Rushcliffe Borough Council should therefore consider

improvements to the traffic flow consistency in order to reduce emissions across all vehicle classes.

At the site with highest monitored concentrations of NO_2, the reduction in NO_2 concentrations required to meet the annual mean air quality objective (40 µg/m^3) is 10.5 µg/m^3. This equates to a required reduction of 37.1% in local road NOx emissions.

According to Defra roadside NO_2 projection factors, NO_2 concentrations at this monitoring site are predicted to meet the annual mean objective by 2016, though concentrations are predicted to remain within 10% of the objective until 2018. Sensitivity testing on the projection factors, however, has indicated that they are optimistic, especially considering historical monitoring trends and that the site with the highest monitored concentrations may not be located at a worst case location.

Rushcliffe Borough Council should continue to monitor concentrations of nitrogen dioxide at sites of relevant exposure to measure the impact of the implementation of their Air Quality Action Plan on concentrations of NO_2 at this location in order to determine when a revocation of the AQMA may be made. The further assessment undertook source apportionment which determines the break down of the contribution of NO_2 from various road sources within this area. This is discussed below.

4.4 Source apportionment

There are no industrial sources of NO_2 in this area and the general aspect in this location is open with the exception of a small group of properties in one area of the junction. The properties are established properties with some appearing to be barn type conversions and the main house (Holme House) being a listed building.

The area is not a smoke control area as the location is not an urban area and there is no significant coal/wood burning taking place. As such there should be no influence from domestic sources in this area.

The A52 is part of the strategic road network and is the dominant road/pollution source being a dual carriage way and operated by the Highways Agency and is the main easterly route into/out of and around Nottingham with connections to the A46 and leading to the M1 via the A453.

Source apportionment has therefore been undertaken with respect to road transport sources.

The Emission Factor Toolkit 5.1.2 was used to calculate the percentage road NOx emissions contribution by source. The EFT assumed a basic vehicle split based on standard fleet composition for the selected road type with only the percentage volume of Heavy Duty Vehicles (HDV) specified. Comparison with 12-hour manual vehicle classification data for 2009 for the Stragglethorpe junction indicates that this is not unreasonable for this location. The average percentage emissions contribution from HDVs and Light Duty Vehicles (LDV) respectively was 50%. The breakdown of

these classes is presented in Figure 4.1 below. The greatest contribution (30%) is from Articulated HGVs, closely followed by Diesel Cars (26%), with significant additional contributions from Rigid HGVs (17%) and Diesel LGVs (14%).

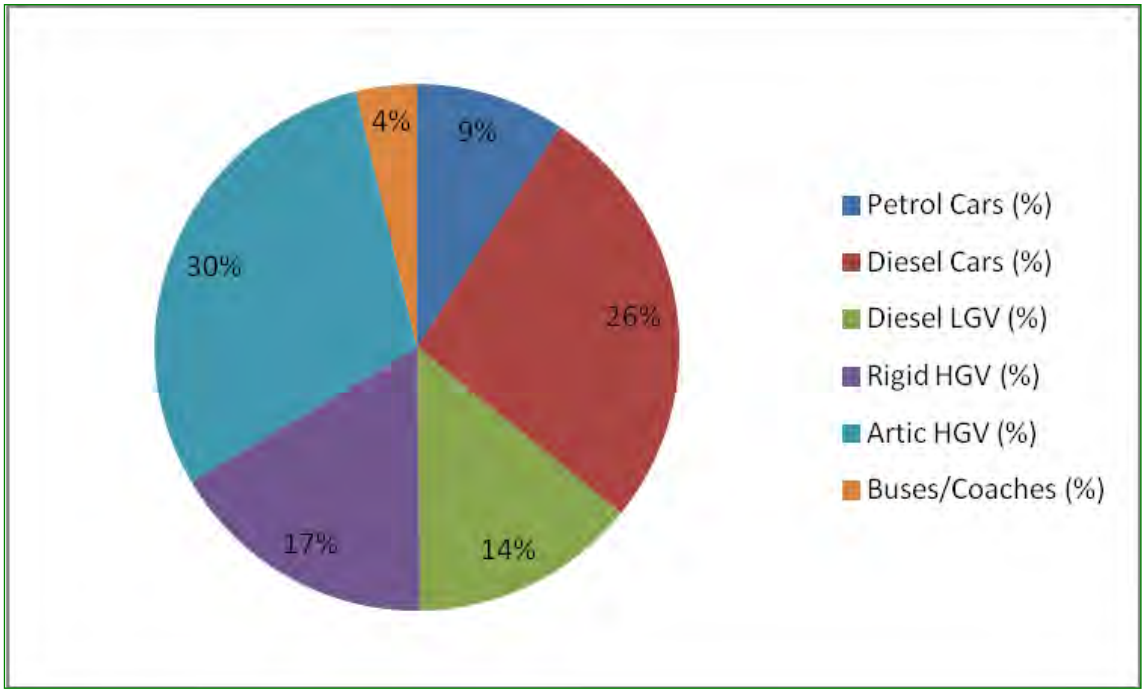


Figure 4.1: Percentage NOx emissions by source for the A52/Stragglethorpe junction as per the Emissions Factor Toolkit v 5.1.2

The percentage contribution of sources to NOx emissions was used to determine the relative contribution of sources in terms of NO_2 concentrations (Figure 4.2). Background NO_2 for this area (18.4 µg/m^3), taken from the 2010 background maps, contributes 36% to ambient NO_2 concentrations at this location. The remaining 64% of NO_2 is attributable predominantly to Articulated HGVs (19%), Diesel Cars (17%), Rigid HGVs (11%) and Diesel LGVs (9%) (Figure 4.2: Percentage NO2 concentration by source, based on road contribution NOx emissions proportions from the EFT 5.1.2 Figure 4.2).

Given that the A52 is a trunk-road any reduction in HGVs is likely to be impractical, therefore it is advisable to consider strategies that seek to reduce emissions from all vehicle classes.

While the source apportionment analysis identifies the relative contributions of the various vehicle classes to NOx emissions and NO_2 concentrations, the elevated concentrations experienced at Stragglethorpe junction are due primarily to the stop-start traffic flow patterns caused by the traffic lights at this location. In order to reduce traffic emissions across all vehicle classes it may be necessary to improve consistency of traffic flows.

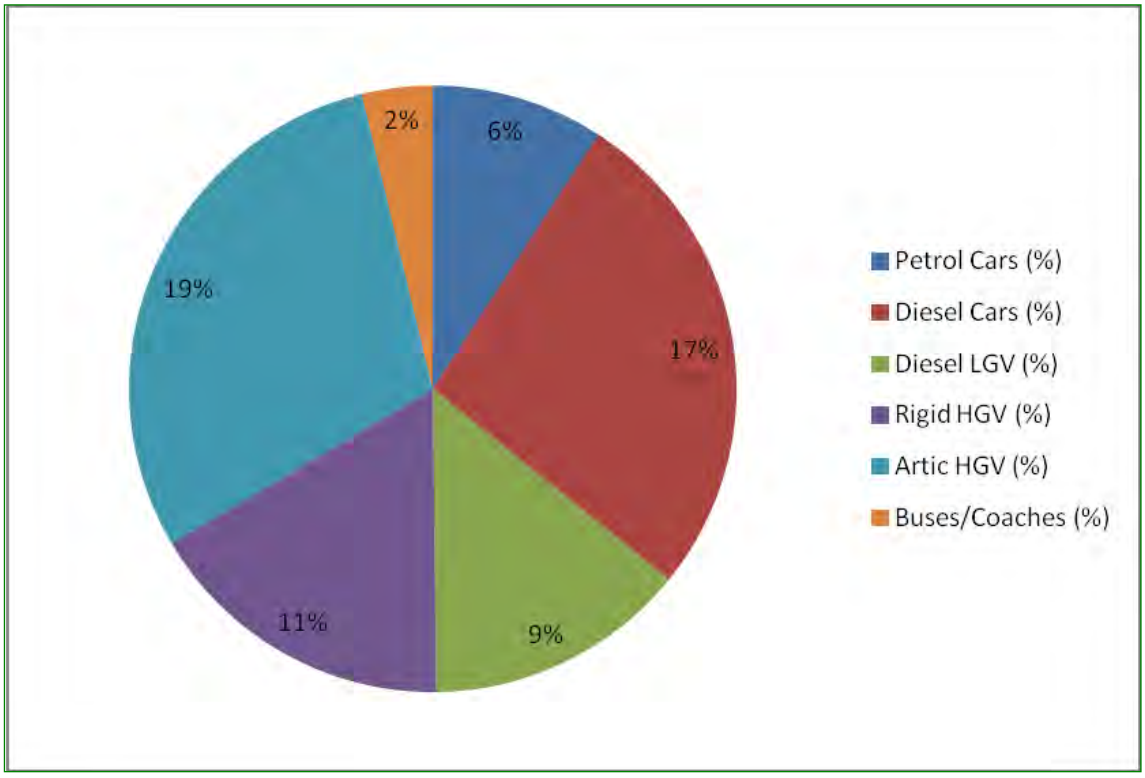


Figure 4.2: Percentage NO_2 concentration by source, based on road contribution NOx emissions proportions from the EFT 5.1.2

4.1 Required reduction in pollutant emissions

The further assessment had set out the reduction in emissions that is required to be achieved via the AQAP. The highest monitored concentration of nitrogen dioxide at the A52/Stragglethorpe junction is 50.5 µg/m^3 measured at site A52/HHF triplicate. Therefore the reduction in NO_2 concentrations required to meet the annual mean air quality objective (40 µg/m^3) at this location is 10.5 µg/m^3. This equates to a required reduction of 37.1% in local road NOx emissions. (Based on 2011 data)

4.2 Estimation of population exposure

Working on the assumption that each property will have an occupancy level of 4 it is estimated that population exposed above the annual Air Quality Objective for NO_2 is in the region of 12 persons. However occupancy levels can change over time.
No person is exposed to levels above the hourly objective.
There are seven properties in this area as listed in the following table.

1. Brook House, Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT
2. Holme House Cottage, Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT
3. Holme House, Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT
4. The Granary, Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT
5. The Haybarn, Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT

6. The Paddock Holme House Farm, Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT
7. The Stables, Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT

Monitoring and modelling has shown that the following properties are experiencing NO2 levels above the annual mean objective.

1. Holme House Cottage, Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT
2. Holme House, Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT
3. The Haybarn, Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT

5 Do minimum scenario

Under the do minimum scenario levels of NO_2 are expected to fall over time due to national measures that are in place. This does assume that traffic on the road does not increase to compensate for this reduction and also that the fleet composition changes in line with government expectations.

The further assessment concluded that without any additional action and with a number assumptions being made the monitoring site would show compliance as shown in the following table and chart. **The charts indicate that 2016 may show possible compliance** with a greater degree of certainty in 2017 (which would be reported on in year 2018 progress report). It must be understood however that such a fall off is not guaranteed and previous experience has indicated such fall offs have not materialised as predicted. In addition however, the monitoring site does not represent the entire building line and elements of the building toward the junction with the Stragglethorpe Road experience slightly higher levels, as such an adjustment in terms of additional time is required to account for this. **Consequently the projection should be treated as a best expectation and mostly likely compliance (assuming traffic growth does not take place) of being 2019/2020**.

Table 3: Future year projections of roadside NO_2 based on 2011 monitored concentrations

		Measured concentrations			Projected Concentrations (based on 2011)						
Ref	**Monitoring site**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
A52/HHF triplicate	A52 Holme House (façade) triplicate	**51.3**	**52**	**50.49**	48.4	46.2	44.1	42.0	39.6	37.1	34.7
SR	Stragglethorpe Road	36.3	37.7	37.57	36.0	34.4	32.8	31.3	29.4	27.6	25.8
A52/HHF4	A52 Holme House (Façade) HHF 4		**41**	**42.93**	41.1	39.3	37.5	35.7	33.6	31.6	29.5
A52/HHG	A52 Holme House(Garden) HHG			23.51	22.5	21.5	20.5	19.6	18.4	17.3	16.1

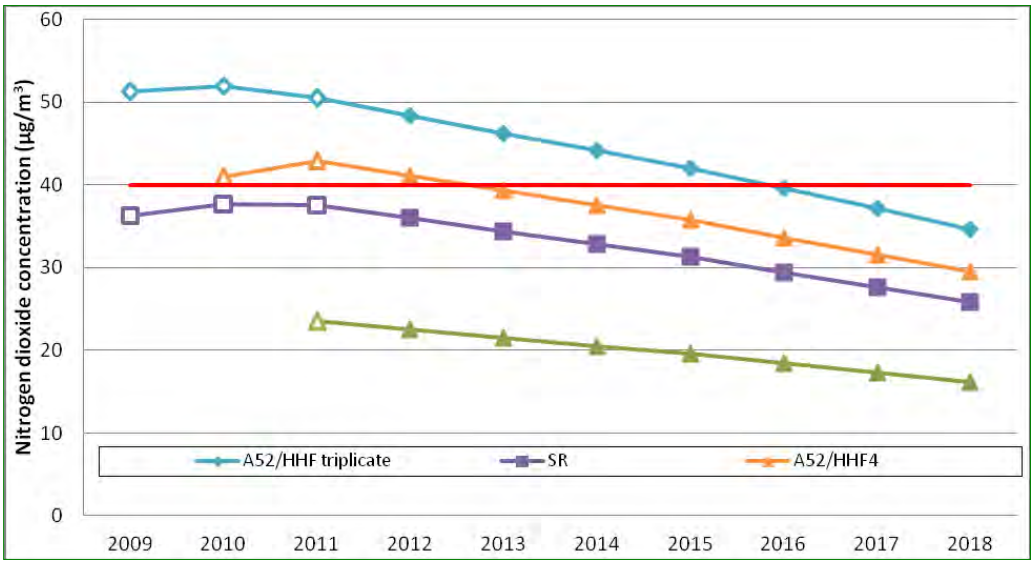


Figure 3: Future year projections of roadside NO_2 based on 2011 monitored concentrations (open symbols represent monitored concentrations, closed symbols represent predicted concentrations)

6 Development of the action plan

6.1 Initial Assessment of Options

EPUK/NSCA guidance describes the following stages for action planning:

- Establish baseline
- Involve relevant stakeholders
- Generate a list of options
- Consider the costs and effects of these options
- Prioritise options
- Evaluate and monitor the plan
- Continue consultation on the plan during its implementation

This chapter sets out how the options for the AQAP were initially selected and results in a list of options that are able to be reviewed for their cost implications and prioritised.

The Policy Guidance LAQM PG (09) states that Air Quality Action Plans must provide "evidence that all available options have been considered" and "how the local authority will use its powers and also work in conjunction with other organisations in pursuit of the air quality objectives".

Given that the area is outside of the direct control of the Rushcliffe Borough Council being part of the strategic road network and being several miles outside the main conurbation area, in order to improve air quality collaboration is required with partner organisations, principally the Highways Agency. The Highways Agency is also constrained by cost implications and resources to tackle air quality at this junction.

A range of potential options may be available to Rushcliffe Council and other stakeholders to improve local air quality within the newly declared AQMA 1/2011 at Stragglethorpe Road/A52. The size of the AQMA is however small and effects a small number of residents. The traffic and junction lay out that is the cause of the exceedance is also part of the strategic network and a main arterial route into Nottingham. Any changes to the road lay out for example, may require significant capital expenditure. The options to take action will therefore be reduced due to these factors.

However, at the start of the action planning process it is appropriate to consider all potential options and determine what measures should be retained for implementation and prioritisation. The initial list of measures was developed by

members of the Neighbourhoods service (formerly the Rushcliffe Environment and Waste Management service) with reference to existing measures in place in the Borough and across the County, in consultation with local councillors, from good practice published by Defra and by consultation with stake holders (the Highways Agency and the Nottinghamshire County Council Transport Planners).

Table 4 below shows the category of options put forward as broad categories to explore as measures. Those measures were then taken forward and developed further to produce specific actions that could be appraised (screened), prioritised and implemented in the following chapters.

Table 4 Potential options by category to be evaluated.

Option number	Measure	Comment
1	Remove receptors from the dwelling houses adjacent the A52	Currently moving occupiers is not a policy that any authority has adopted. In addition the Holme House is a listed building and cannot be demolished.
2	Remove the junction and provide alternative means of accessing/egressing Stragglethorpe Road	Radical solution that would require substantial funding and consultation.
3	Increase distance from traffic source to receptor	Restrict the lane closest to the house to use less polluting cars/reduce to one carriage way. Restrict access to the nearside lane in low peak times. Left turn only nearside lane.
4	Improve junction traffic flow, optimise. Prevent standing traffic on A52	At its basic this includes changing the traffic phasing, installing scoot/mova but may include consideration of a complete junction redesign and applying speed limits to maintain a consistent traffic flow to reduce acceleration emissions.
5	Strategic measures	Being a part of the strategic road network this is already in place but will need to be re-prioritised in light of the new AQMA. Preferred HGV routing.

		Traffic information.
6	Traffic reduction measures: leading to reduced emissions through behavioural changes and promotion of better travel choices	Ensuring the new AQMA receives due consideration by the LTP and integration in the LTP transport plan and becomes part of the county wide traffic reduction measure e.g. Smarter choices. Further Trent crossing to reduce traffic use of the A52 Creation of a delivery Hub to reduce HGV movements passed the site
7	Emission reductions through adoption of technical means	Idling enforcement Options to have a low emission zone in the area Implement a quality bus partnership.
8	Other e.g. development control measure to reduce impacts of new development on the area. Reduction of impacts from other sources e.g. smoke control, bonfires other industrial locations	Implement policies to ensure mitigation measures are applied where new developments lead to traffic increases in this area. E.g. travel planning, promotion of electric charging points or other emission reduction measures.

6.2 Screening of initial options

From Table 4 above it was considered that certain option measures were not considered viable and would not be explored in any further detail. This included the following in Table 5 with reasons provided:

Table 5 Measures not considered viable

measure	reason
Removal of receptors	Not consider politically viable/not a realistic option
Removal of the junction	Considerable expense and unlikely to achieved within any reasonable time frame.
Freight delivery hub.	The location is not within the urban conurbation to benefit from such a project. Not all traffic is delivering to Nottingham the route is a strategic route bypassing Nottingham
Smoke control/bonfires	Such issues are not the contributor to the exeedence and there are only a few properties in the area. Not part of an urban area where such issues arise.

Following on from this initial phase, the measures that remain were further examined and an expanded list of detailed measures produced. These measures are detailed in Appendix C: Measures considered in the AQAP.

6.3 Action plan options, their assessment and prioritisation.

Those measures set out in Appendix C: Measures considered in the AQAP, were then assessed for their potential to improve air quality or protect the air quality, their cost (broadly estimated) and the measure prioritised using a simple scoring system.

Given that the Highways Agency is responsible for the A52 road and a significant number of these options would affect the road, its lay out, access to the junction and trip times, this list of actions was referred back to the Highways Agency for further comment and the feasibility of implementing and support for implementation.

This consultation phase took several months to receive a reply from the Route Manager at the highways Agency.

The results from the HA indicated that a significant number of the measures would not be supported by the HA due to various reasons. Among the main reason a measure was not able to be supported were:

- excessive cost,
- journey time dis-benefits to drivers
- Congestion and safety issues that will arise as a result its implementation.
- Legal constraints
- Certain measures would require a Permanent Traffic Regulation Order and be open to objections.
- Increase in the length of journeys would result in increased emissions.

As such those measures that could not be supported by the Highways Agency were removed from the final action list. Some of those measures removed had the potential to reduce air quality impacts more speedily if implemented.

The remaining measures were then placed in the Air Quality Action Plan shown in the following Chapter 7.

7 Air Quality Action plan and Progress Monitoring

7.1 AQAP

The following table contains the Air Quality Action Plan measures that will be implemented as a result of the declaration of AQMA 1 2011. The table indicates who will be responsible for the implementing each measure and how each measure will be monitored to determine its implementation and air quality impacts. The later is some instances can be difficult to quantify and as such the monitoring parameter may change in subsequent LAQM reports if this is determined to be necessary.
Rushcliffe Borough Council‟s Neighbourhoods service is required to report annually on the progress of the action plan. As such the responsible authority for each action will provide Rushcliffe with an update prior to April each year. Rushcliffe will prepare and submit to Defra the Progress Report as required under the LAQM requirements and a copy will be sent to both the Highways Agency and the County Council Transport Planners.

List of AQAP Measures

Item Number	Action Plan Measure	timescale short=3, medium=2, long=1	Date to be completed by	target will be completed when	how will the effectiveness of the action be measured in subsequent LAQM/progress reports	responsibility
1	HA to undertake a feasibility study for other junction improvements	3	TBA within 18 months	The study is produced, published and has assessed impacts of NO_2 on residents in the AQMA(s) and proposed additional mitigation measures where necessary	Written update supplied by HA annually until completed. Any new measures to be incorporated into this existing AQAP	HA
2	Install NO_2 monitor in the AQMA area to measure and determine level of exceedance/ publish exceedance level/ more accurately determine emission reductions necessary to be in compliance. Continue with NO2 tube monitoring programme.	3	1 June 2014	Monitor is installed, data published.	Results will be reported annually to Defra	RBC

3	Re-phasing of current lights to give greater priority to A52 Nottingham bound	3	TBA but estimate within 18 months	letter or email from HA confirmation that re-phasing has been undertaken and the detail of the adjustments made	Traffic congestion/queuing data supplied by the HA to be reported annually to Defra via progress reports	HA
4	Install scoot/Mova or review operating performance to maximise junction capacity and prioritise A52	3	TBA within 12 months	Confirmation from the HA that this is installed and optimised	Traffic congestion/queuing data supplied by the HA to be reported annually to Defra via progress report	HA
5	Install speed limit to reduce emissions	3	TBA estimate of within 24 months	When speed limit is implemented. May require time to achieve. Annual reporting required by the HA until achieved.	Reductions in NO_2 from monitor and diffusion tubes. Monitoring of speed limit by HA	HA
6	Ensure Highways Agency consider the AQMA in their policies	3	Within 6 months	Confirmation Letter from the HA that the AQMA is registered with them and will be included in any policies in place.	Results of this measure are not measurable	HA
7	Integration of AQMA into LTP	3	Within 12 months	Confirmation Letter from the HA that the AQMA is registered with them and will be included in any policies in place.	report annual on any LTP issues if any that will affect AQMA	LTP/NCC
8	Planning policy: air quality guidance for developers amend/update existing guidance	3	1/14/2015	guide is updated and published	Results from this measure are not measurable	RBC
9	Planning policy: Ensure AQAP and AQMA are considered in future developments	3	1/4/2015	confirmation in LAQM reports	report numbers of developments considered for air quality	RBC

	likely to affect the AQMA					
10	Smarter choices:	3	Within 12 months	confirmation from LTP that the new AQMA is with there policies	report smarter choices targets annually	LTP/NCC
11	Implement policies to ensure mitigation measures are applied where new developments lead to traffic increases in this area. E.g. travel planning, promotion of electric charging points or other emission reduction measures.	3	Within 12 months	confirmation that the LTP will be responding to planning applications for air quality	report numbers of developments considered for air quality	LTP/NCC/RBC
12	Planning policy. Develop a Supplementary Planning Document or update the Air Quality Considerations for Developers guide. New development shall have regard to the guide or any SPD published by RBC.	2	Within 24 months	SPD or guide is updated and published on the RBC website. Update the air quality pages for on RBC website.	Results of this measure are not measurable	RBC

7.2 AQAP monitoring format

The AQAP will be reported on annual and the following reporting format will be used.

AQAP Reporting Format

Item Number	Action Plan Measure	Date to be completed by	Progress made with the measure in the preceding 12 month period	Reference/ indicator/ or other information	Responsibility
1	HA to undertake a feasibility study for other junction improvements	TBA but within 18 months			HA
2	Install NO_2 monitor in the AQMA area to measure and determine level of exceedance/ publish exceedance level/ more accurately determine emission reductions necessary to be in compliance	1 June 2014			RBC
3	Re-phasing of current lights to give greater priority to A52 Nottingham bound	TBA but estimate within 18 months			HA

4	Install scoot/Mova or review operating performance to maximise junction capacity and prioritise A52	TBA			HA
5	Install speed limit to reduce emissions	within 12 months			HA
6	Ensure Highways Agency consider the AQMA in their policies	TBA estimate of			HA
7	Integration of AQMA into LTP	within 24 months			LTP/NCC
8	Planning policy: air quality guidance for developers amend/update existing guidance	Within 6 months			RBC
9	Planning policy: Ensure AQAP and AQMA are considered in future developments likely to affect the AQMA	Within 12 months			RBC
10	Smarter choices:	1/14/2015			LTP/NCC

11	Implement policies to ensure mitigation measures are applied where new developments lead to traffic increases in this area. E.g. travel planning, promotion of electric charging points or other emission reduction measures.	1/4/2015			LTP/NCC/RBC
12	Planning policy. Develop a Supplementary Planning Document or update the Air Quality Considerations for Developers guide. New development shall have regard to the guide or any SPD published by RBC.	Within 12 months			RBC

8 Expected impact of the AQAP measures

The estimated impacts on the NO2 levels within the AQMA are shown in Table 6 below.

Table 6 Impacts of AQAP measures on NO_2

	Measure	**Estimate of impact of measure.**
1	HA to undertake a feasibility study for other junction improvements	No immediate effect is predicted, dependent on the study outcome new measures may be introduced or funded by the HA
2	Install NO_2 monitor in the AQMA area to measure and determine level of exceedance/ publish exceedance level/ more accurately determine emission reductions necessary to be in compliance	This will not reduce NO_2 on its own. Any data may help tune the phasing of lights to reduce NO_2 levels. Estimated impact 1-2 $\mu g/m^3$
3	Re-phasing of current lights to give greater priority to A52 Nottingham bound	1-7 $\mu g/m^3$
4	Install/reassess scoot/Mova to maximise junction capacity and prioritise A52	less than 1 $\mu g/m^3$
5	Install speed limit to reduce emissions	less than 3 $\mu g/m^3$
6	Ensure Highways Agency consider the AQMA in their policies	less than 1 $\mu g/m^3$
7	Integration of AQMA into LTP	less than 1 $\mu g/m^3$
8	Planning policy: air quality guidance for developers	prevent worsening of air quality
9	Planning policy: Ensure AQAP and AQMA are considered in future developments likely to affect the AQMA	prevent worsening of air quality
10	Smarter choices:	less than 1 $\mu g/m^3$
11	Implement policies to ensure mitigation measures are applied where new developments lead to traffic increases in this area. E.g. travel planning, promotion of electric charging points or other emission reduction measures.	prevent worsening of air quality

12	Planning policy. Develop a Supplementary Planning Document or update the Air Quality Considerations for Developers guide. New development shall have regard to the guide or any SPD published by RBC.	prevent worsening of air quality

It is also expected that as the national policies have an effect the NO_2, the level within the AQMA at the receptor façade will fall off with time. This has been estimated in the report as being between 2016 and 2018 although since the further assessment report the 2012 levels have not dipped as expected to date.

Table 7 below has been produced from the use of the DMRB screening model and the NOx to NO_2 calculator as described in Box 1 of TG (09) on the use of the DMRB screening model. The table shows the road NOx increment at various speeds through the junction. This NOx road increment is then converted to an NO_2 value and the back ground added (from the Defra published back ground maps for year 2013) using the NOx to NO_2 conversion spread sheet. As the site experiences a greater NO_2 level as shown through monitoring than the model predict, the model results have been scaled up to reflect this underestimate from the DMRB.

It can be seen from the table that low speeds increase NO_2 levels at the site and high speeds also cause a modest increment. The most beneficial speed for traffic to flow through the junction is at 40 Mph (64kph).

NOx to NO_2 calculator downloaded from http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html Nov 2013

DMRB downloaded from http://laqm.defra.gov.uk/review-and-assessment/modelling.html Nov 2013

Table 7 Showing potential improvements in NO_2 if traffic flow is maintained.

Local Authority:	Rushcliffe	Year: Traffic Mix:	2013 All non-urban UK traffic					
Receptor ID MPH/KPH	Road increment NOx(From DMRB) µg m^{-3}	Back ground NO_2 µg m^{-3}	Total NO_2 µg m^{-3}	Road NO_2 µg m^{-3}	2012 Diffusion tube result (triplicate average bias adjusted) µg m^{-3}	scaling factor	Result scaled at different average speed through Junction µg m^{-3}	potential improvements NO_2 µg m^{-3}
10/16	43.33	17.5	37.83	20.33	51.9	1.37	51.86	0.0
20/32	34.01	17.5	33.84	16.34	51.9	1.37	46.36	5.5
30/48	30.71	17.5	32.38	14.88	51.9	1.37	44.36	7.5
40/64	29.87	17.5	32	14.5	51.9	1.37	43.84	8.0
45/72	30.17	17.5	32.14	14.64	51.9	1.37	44.03	7.8
50/80	30.91	17.5	32.47	14.97	51.9	1.37	44.48	7.4
55/88	32.10	17.5	33	15.5	51.9	1.37	45.21	6.6
60/96	33.76	17.5	33.73	16.23	51.9	1.37	46.21	5.6
70/112	37.31	17.5	35.28	17.78	51.9	1.37	48.33	3.5

9 References

Local Air Quality Management Technical Guidance LAQM.TG (09). February 2009. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland

Local Air Quality Management Policy Guidance LAQM.PG (09). February 2009. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland

Local Air Quality Management, Annual Progress Report 2011 Rushcliffe Borough Council

Rushcliffe Borough Council published documents are available from www.Rushcliffe.gov.uk. Air quality reports are located on page http://www.rushcliffe.gov.uk/doc.asp?cat=10437

The Air Quality (England) Regulations 2000 (SI 928),

The Air Quality (England) (Amendment) Regulations 2002 (SI 3043),

Environment Act 1995, Part IV Air Quality

EPUK (NSCA) 2001, Guidance On The Development Of Air Quality Action Plans And Local Air Quality Strategies., accessed from http://laqm.defra.gov.uk/action-planning/aqap-supporting-guidance.html

Further assessment 2012, UWE (on behalf of Rushcliffe BC)

NOx to NO_2 calculator downloaded from http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html Nov 2013

DMRM, Design Manual for Roads and Bridges air quality screening model, downloaded from http://laqm.defra.gov.uk/review-and-assessment/modelling.html Nov 2013

10 Glossary of terms

Air Quality Standard – these standards represent minimal/no risk health based standards, for ambient concentrations of pollutants. They are based purely on medical evidence, taking no account of costs, benefits or technical feasibility.

Air Quality Objective – these objectives take account of both costs and benefits, forming benchmarks in time, against which "Air Quality Standards" can be achieved.

Annual mean – The average of the concentrations measured or calculated for each pollutant for one calendar year.

AQMA – Air Quality Management Area

Assessment – The consideration of whether estimated levels for the relevant future period are likely to exceed the levels set in the objectives.

AURN – Automated Urban and Rural Network of air quality monitoring stations

Background concentration – Concentration of a particular pollutant thought to be present in an area, which cannot be accounted for by dispersion modelling from local emissions. It is generally caused by transportation of pollutants over long distances.

Data Capture – The percentage of all the possible measurements for a given period that were validly measured

DEFRA – Department for Environment, Food and Rural Affairs

Exceedences – A period of time where the concentration of a pollutant is greater than, or equal to, the appropriate air quality objective.

Maximum hourly average – The highest hourly reading of air pollution obtained during the time period under study.

NO_2 – Nitrogen Dioxide

NO_x – Nitrogen Oxides

Part A installations – Large emitters of pollution, which are regulated by either the Environment Agency (A1) or Local Authorities (A2)

Part B installations – **Smaller emitters of pollution, which are regulated by local authorities**

Percentile – A value found by listing a set of numbers in order and calculating the number below which a certain percent of the data set lies. For example, the 99^{th} percentile of values in a data set, is the value below which 99% of the data falls.

QA/QC – Quality Assurance/Quality Control.

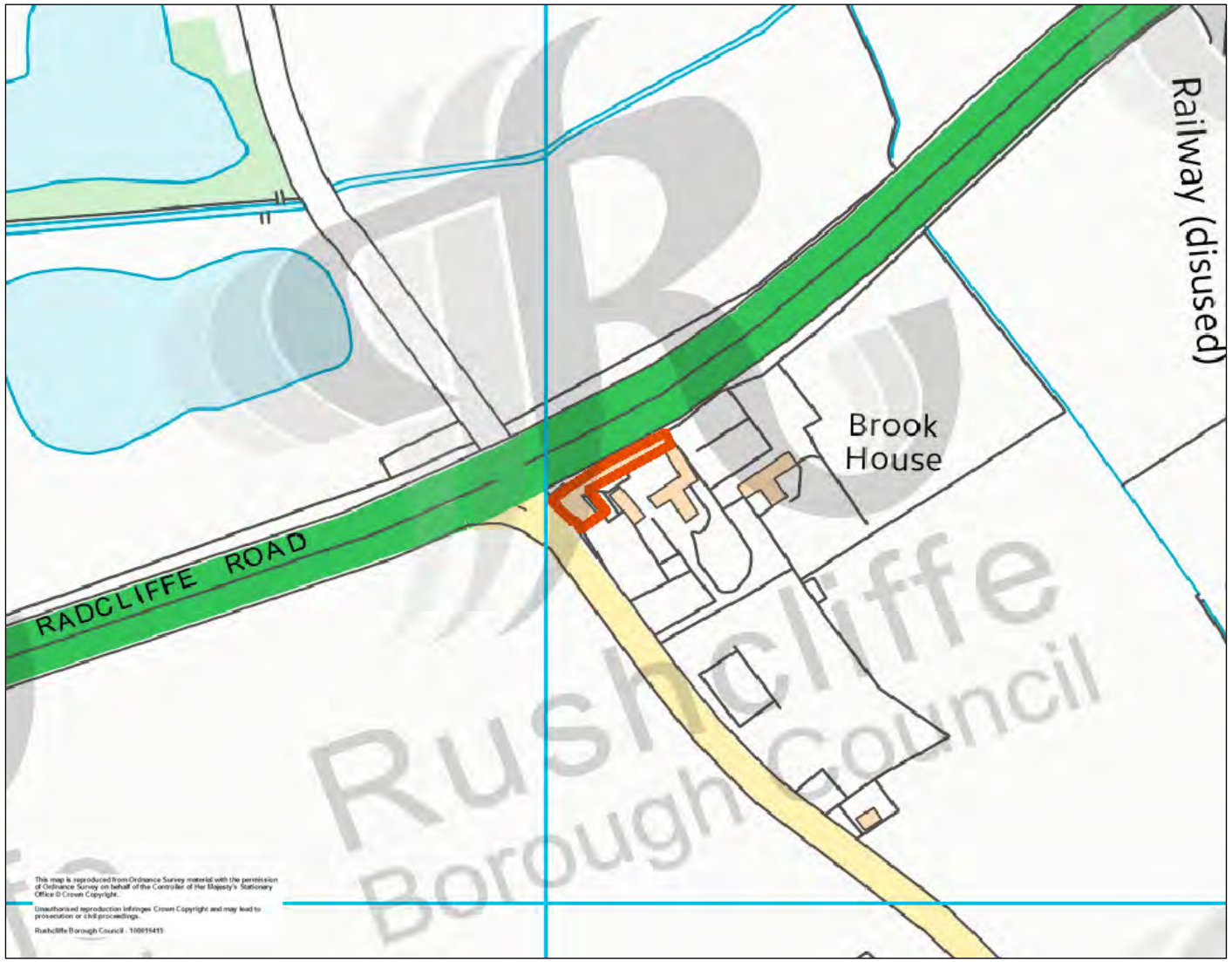
µg/m3 – Micrograms per cubic metre of air. A measure of concentration in terms of mass per unit volume. A concentration of 1µg/m3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

PPB – Parts per Billion

Smoke Control Area. – an area designated under the Clean Air Act 1993 where coal and wood burning is prohibited

Appendices

Appendix A: Boundary of Air Quality Management Area 1, 2011



Appendix B: DMRB model

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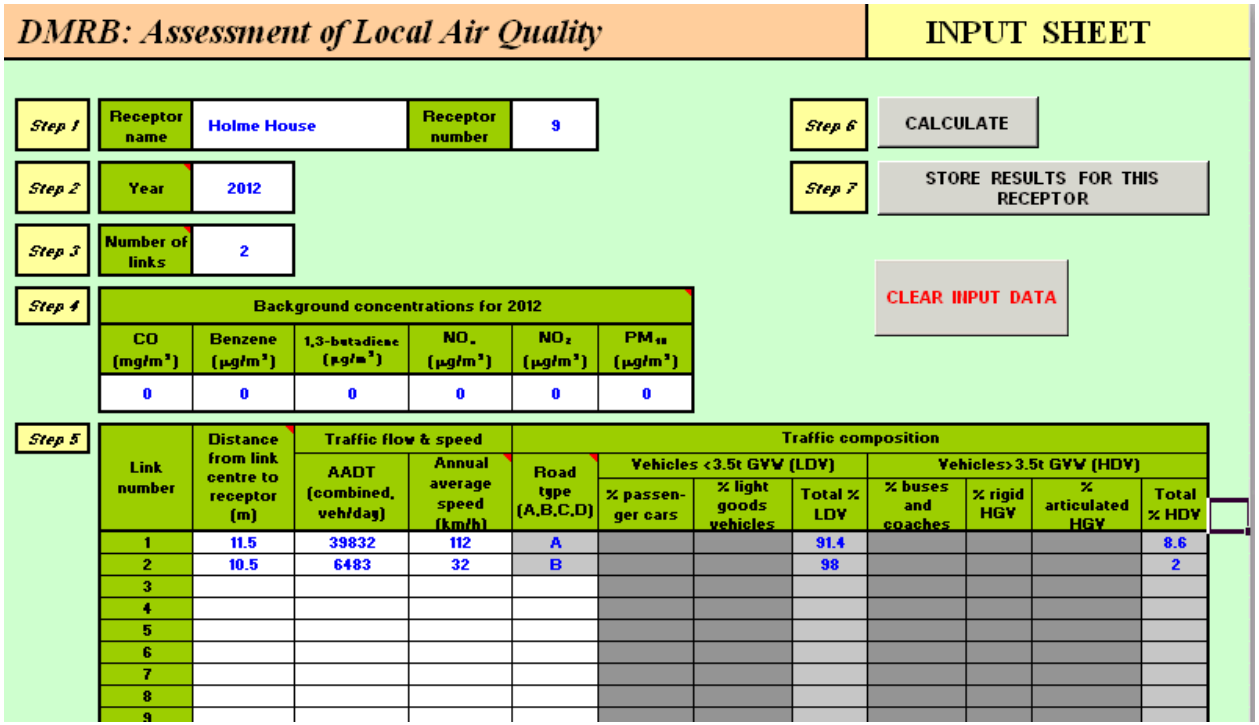
DMRB input sheet



DMRB: Assessment of Local Air Quality — INPUT SHEET

Step 1	Receptor name	Holme House	Receptor number	9
Step 2	Year	2012		
Step 3	Number of links	2		

Step 6: CALCULATE

Step 7: STORE RESULTS FOR THIS RECEPTOR

CLEAR INPUT DATA

Step 4 — Background concentrations for 2012

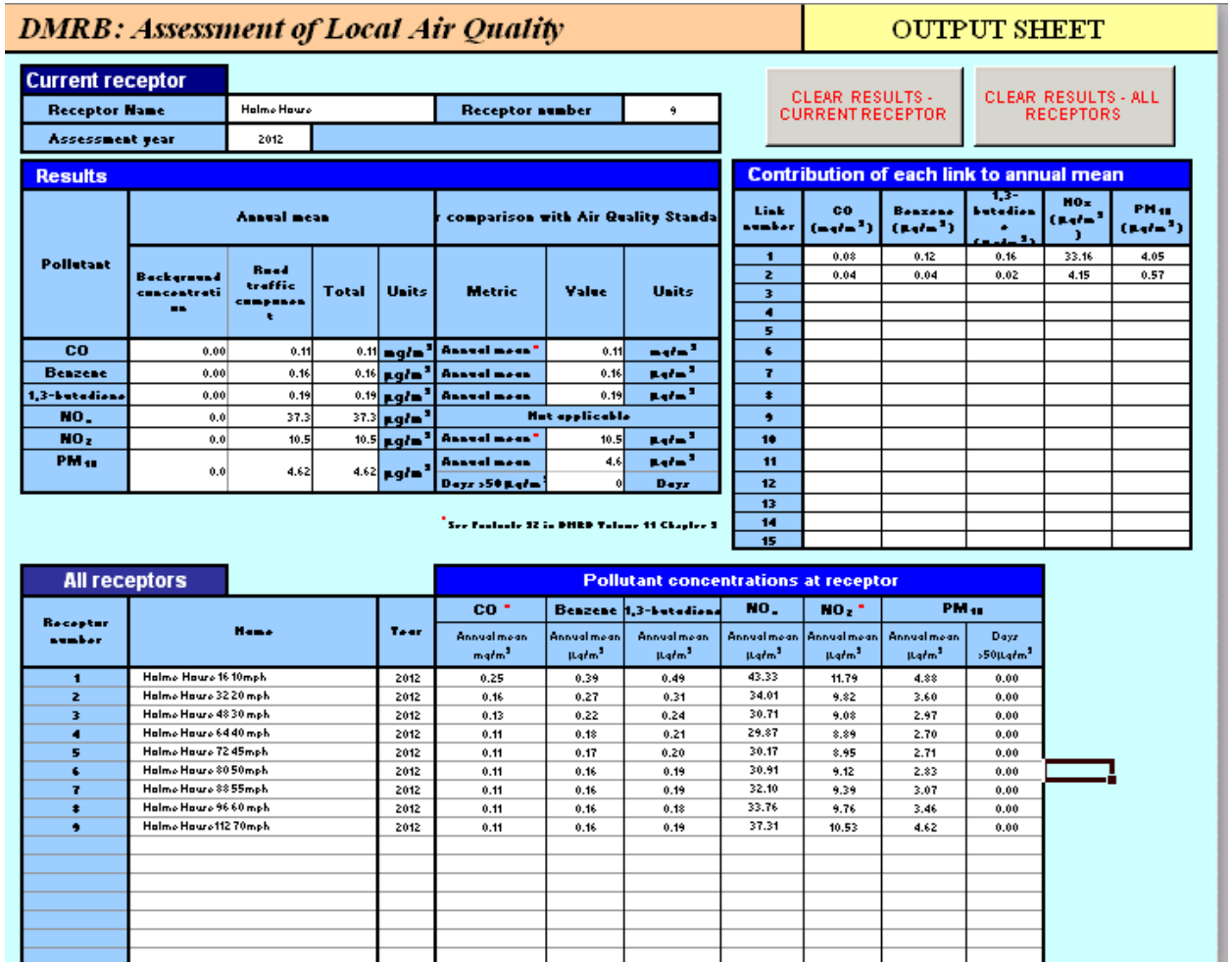
CO (mg/m³)	Benzene (µg/m³)	1,3-butadiene (µg/m³)	NO_x (µg/m³)	NO_2 (µg/m³)	PM_{10} (µg/m³)
0	0	0	0	0	0

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed: AADT (combined, veh/day)	Traffic flow & speed: Annual average speed (km/h)	Traffic composition: Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV): % passenger cars	Vehicles <3.5t GVW (LDV): % light goods vehicles	Vehicles <3.5t GVW (LDV): Total % LDV	Vehicles>3.5t GVW (HDV): % buses and coaches	Vehicles>3.5t GVW (HDV): % rigid HGV	Vehicles>3.5t GVW (HDV): % articulated HGV	Vehicles>3.5t GVW (HDV): Total % HDV
1	11.5	39832	112	A			91.4				8.6
2	10.5	6483	32	B			98				2
3											
4											
5											
6											
7											
8											
9											

Appendix B continued

DMRB output sheet



DMRB: Assessment of Local Air Quality — OUTPUT SHEET

Current receptor

Receptor Name	Holme Moore	Receptor number	9
Assessment year	2012		

CLEAR RESULTS - CURRENT RECEPTOR | CLEAR RESULTS - ALL RECEPTORS

Results

Pollutant	Annual mean				Comparison with Air Quality Standa		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.11	0.11	mg/m³	Annual mean *	0.11	mg/m³
Benzene	0.00	0.16	0.16	µg/m³	Annual mean	0.16	µg/m³
1,3-butadiene	0.00	0.19	0.19	µg/m³	Annual mean	0.19	µg/m³
NO_x	0.0	37.3	37.3	µg/m³	Not applicable		
NO_2	0.0	10.5	10.5	µg/m³	Annual mean *	10.5	µg/m³
PM_{10}	0.0	4.62	4.62	µg/m³	Annual mean	4.6	µg/m³
					Days >50 µg/m³	0	Days

* See Exclusion 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m³)	Benzene (µg/m³)	1,3-butadiene (µg/m³)	NOx (µg/m³)	PM_{10} (µg/m³)
1	0.08	0.12	0.16	33.16	4.05
2	0.04	0.04	0.02	4.15	0.57
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m³	Annual mean µg/m³	Annual mean µg/m³	Annual mean µg/m³	Annual mean µg/m³	Annual mean µg/m³	Days >50 µg/m³
1	Holme Moore 16 10mph	2012	0.25	0.39	0.49	43.33	11.79	4.88	0.00
2	Holme Moore 32 20 mph	2012	0.16	0.27	0.31	34.01	9.82	3.60	0.00
3	Holme Moore 48 30 mph	2012	0.13	0.22	0.24	30.71	9.08	2.97	0.00
4	Holme Moore 64 40 mph	2012	0.11	0.18	0.21	29.87	8.89	2.70	0.00
5	Holme Moore 72 45mph	2012	0.11	0.17	0.20	30.17	8.95	2.71	0.00
6	Holme Moore 80 50mph	2012	0.11	0.16	0.19	30.91	9.12	2.83	0.00
7	Holme Moore 88 55mph	2012	0.11	0.16	0.19	32.10	9.39	3.07	0.00
8	Holme Moore 96 60 mph	2012	0.11	0.16	0.18	33.76	9.76	3.46	0.00
9	Holme Moore 112 70mph	2012	0.11	0.16	0.19	37.31	10.53	4.62	0.00

Appendix C: Measures considered in the AQAP showing cost estimate and prioritisation

List of AQAP measures considered for AQMA1 2011 action plan

Prioritised by cost effectiveness

Measure	expanded list of measures/detail of measure	Comment	Potential level of impact on compliance with AQS (1-3 *1)	level of cost (1-5*2)	cost effectiveness score	timescale short=3, medium=2, long=1	Priority Score	responsibility	Comments from HA	To be taken as an AQAP measures
1	**HA to undertake a feasibility study for other junction improvements**	**Placed on action plan for consideration and appraisal**	**3**	**5**	**15**	**3**	**45**	**HA**	**Our A52 study proposals between QMC roundabout and Bingham Interchange include an environmental review which will identify any issues with AQMAs. The study will seek to identify improvements to all junctions along the A52.**	**Yes**

2	**Restrict the lane closest to the house to use less polluting cars/reduce to one carriage way.**	**Placed on action plan for consideration and appraisal**	**3**	**5**	**15**	**2**	**30**	**HA**	**This measure would need to take account of the journey time dis-benefits to drivers and congestion and safety issues that will arise as a result its implementation. Therefore, it is unlikely that this measure would be taken forward. In addition, the increase in delay to high polluting vehicles could result in a worsening of air quality up stream of the proposed measure location.**	**No**
3	**Restrict access to the nearside lane in low peak times**	**Placed on action plan for consideration and appraisal**	**3**	**5**	**15**	**2**	**30**	**HA**	**See point 2**	**No**
4	**Restrict use of nearside lane to Left turn only**	**Placed on action plan for consideration and appraisal**	**3**	**5**	**15**	**2**	**30**	**HA**	**See point 2**	**No**

5	**Install NO2 monitor in the AQMA area to measure and determine level of exceedance/ publish exceedance level/ more accurately determine emission reductions necessary to be in compliance**	**Will not in itself reduce emissions but will provide on-going evidence to justify the level measures required to achieve the objective**	**3**	**4**	**12**	**3**	**36**	**RBC**		**Yes**
6	**low emission zone in the area**	**not viable for a small location and would not gain support of HA**	**3**	**4**	**12**	**1**	**12**	**HA**	**Not sure how this measure could be practically implemented on the Trunk Road. All legally authorised vehicles have a right to use the strategic road network. This measure is unlikely to taken forward.**	**No**
7	**Re-phasing of current lights to give greater priority to A52 Nottingham bound**	**Placed on action plan for consideration and appraisal**	**2**	**5**	**10**	**3**	**30**	**HA**	**This measure could be reviewed but releasing delayed traffic from this junction could result in further delays at the next junction along the A52 and possibly result in the air quality issues also being moved to the**	**Yes**

									next junction along (Gamston roundabout).	
8	**Install/review scoot/Mova to maximise junction capacity and prioritise A52**	**Placed on action plan for consideration and appraisal**	**2**	**5**	**10**	**3**	**30**	**HA**	**The Junction currently operates on MOVA control.**	**Yes**
9	**Install speed limit to reduce emissions**	**Placed on action plan for consideration and appraisal**	**2**	**5**	**10**	**3**	**30**	**HA**	**We could look at this measure as part of the A52 study but the likely benefits to Air Quality could be outweighed by the dis-benefit to journey times. In addition, the change in speed limit would require a Permanent order leading to a possible public consultation where objections could be made.**	**Yes**
10	**Ensure Highways Agency consider the AQMA in their policies**	**Placed on action plan for consideration and appraisal**	**2**	**5**	**10**	**3**	**30**	**HA**	**Air Quality considerations are built into (i) assessment criteria as laid out in DMRB (ii) VM criteria for**	**Yes**

									any new schemes at this location	
11	**Re-line layout of junction to remove ability to right turn from Stragglethorpe road.**	**Placed on action plan for consideration and appraisal**	**2**	**5**	**10**	**2**	**20**	**HA**	**There would be a journey time dis-benefit to drivers as a result of the measure which would need to be assessed. Very unlikely to be taken forward as a practical option. The measure would require a Permanent Traffic Regulation Order and be open to objections.**	**No**
12	**Provide slip road for Stragglethorpe Road with access to A52 toward Nottm only, remove the junction. Traffic to u turn at next lights and at Gamston Island to access egress Stragglethorpe Rd**	**Radical solution that would require substantial funding /planning and consultation. To discuss with HA unlikely to be possible measure would require major investment rand a study by the HA to see if any**	**3**	**2**	**6**	**1**	**6**	**HA**	**We need to assess journey time dis-benefit to drivers as a result of the measure. Very unlikely to be taken forward. Increase in the length of journeys would result in increased emissions.**	**No**

		benefits would occur and the safety implications.								
13	**Integration of AQMA into LTP**	**Placed on action plan for consideration and appraisal**	**1**	**5**	**5**	**3**	**15**	**LTP/NCC**		**Yes**
14	**Planning policy: air quality guidance for developers amend/ review to include this AQMA**	**Placed on action plan for consideration and appraisal**	**1**	**5**	**5**	**3**	**15**	**RBC**		**Yes**
15	**Planning policy: Ensure AQAP and AQMA are considered in future developments likely to affect the AQMA**	**Placed on action plan for consideration and appraisal**	**1**	**5**	**5**	**3**	**15**	**RBC**		**Yes**

16	**Smarter choices:**	**These measures are currently in the AQAP for the existing AQMA's in the Trent Bridge area. Measures can be expanded to include outlining villages etc. but the net benefits are likely to be minimal.**	**1**	**5**	**5**	**3**	**15**	**LTP/NCC**		**Yes**
17	**Implement policies to ensure mitigation measures are applied where new developments lead to traffic increases in this area. E.g. travel planning, promotion of electric charging points or other emission reduction measures.**	**Development is taking place in locations that can increase traffic in the AQMA.**	**1**	**5**	**5**	**3**	**15**	**LTP/ NCC/ RBC**		**Yes**

18	**Planning policy. Develop a SPD on air quality impacts from new developments**	**Placed on action plan for consideration and appraisal**	**1**	**5**	**5**	**2**	**10**	**RBC**		**Yes**
19	**Development control contributions: Use of collected development control contributions to provide cycling, walking and public transport improvements that would impact on the AQMA**	**Placed on action plan for consideration and appraisal**	**1**	**4**	**4**	**2**	**8**	**LTP/ NCC /RBC**		**No**
20	**Install island to replace traffic control**	**Radical solution that would require substantial funding /planning and consultation. To discuss with HA unlikely to be possible measure would require major investment rand a study by the HA to see if any benefits**	**2**	**2**	**4**	**1**	**4**	**HA**	**This measure is very unlikely to be taken forward. The construction of a roundabout would require third party which would be very costly and a detailed assessment would be required in order to ensure that delays on other arms of the proposed roundabout are not increased.**	**No**

		would occur and the safety implications.								
21	**Implement a quality bus partnership.**	**Buses are not a significant contributor. In any case the NCC already operate such a measure**	**1**	**3**	**3**	**2**	**6**	**LTP/NCC**		**No**
22	**Compulsory purchase and demolition**	**Currently moving occupiers is not a policy that any authority has adopted. In addition the Holme House is a listed building and cannot be demolished Not viable option. Not taken up.**	**3**	**1**	**3**	**1**	**3**	**HA**	**The Agency would only use compulsory purchases powers to acquire land for the construction of a road scheme. This might include a property or part of a property. There is no road scheme to take forward at this location.**	**No**

23	**Move road several meters further away from the housing**	**Placed on action plan for consideration and appraisal**	**3**	**1**	**3**	**1**	**3**	**HA**	**This measure would require third party land and the benefits to air quality would against the cost of moving the road could not be justified.**	**No**
24	**Industrial locations: control emissions from**	**none in the area**	0	5	0	0	0	RBC		**No**

*1

0 = no improvement expected
1 = small (less than 1 $\mu g/m^3$)
2= medium (1-2 $\mu g/m^3$)
3= large (>2 $\mu g/m^3$)

*2

1= very high costs (greater than £1m)
2= high costs (up to £1m)
3= medium costs (up to £500k)
4= low cost (up to £100k)
5= Neutral/minimal cost

Appendix D: Consultation list and responses

Consultee	Date consulted
[redacted] Clerk to Radcliffe on Trent Parish Council Grange Hall, Vicarage Lane, Radcliffe-on-Trent, Nottinghamshire, NG12 2FB	3 December 2013
[redacted] Clerk for Holme Pierrepont and Gamston Parish Council 18 Sandale Close, Gamston, Nottingham NG2 6QG	3 December 2013
Head Of Environmental Health Broxtowe Borough Council Foster Avenue Beeston Nottingham NG9 1AB	3 December 2013
Richard Taylor Environmental Health Officer - Team Leader Noise and Pollution Control Team Community Protection Environmental Health and Trading Standards, Loxley House, Station Street, Nottingham, NG2 3NG	3 December 2013
consultations@naturalengland.org.uk Natural England, Apex Court, City Link, Nottingham, NG2 4LA	3 December 2013
Kamaljit Khokhar, Route Performance Manager Highways Agency The Cube 199 Wharfside Street	3 December 2013

Birmingham West Midlands B1 1RN	
Dave Mitchell Executive Manager Communities Rushcliffe Borough Council	13 December 2013
Mr Sean Parks Local Transport Plan Manager Environment & Resources Nottinghamshire County Council County Hall West Bridgford Nottingham NG2 7QP	3 December 2013
Mr A Twells Head Of Environmental Health Charnwood Borough Council Council Offices Southfield Road Loughborough LE11 2TN	3 December 2013
Marshalls of Sutton-on-Trent, 11 Main Street, Sutton-on-Trent, Newark, Nottinghamshire, NG23 6PF	3 December 2013
Nottingham City Transport 5 South Parade Old Market Square Nottingham NG1 2JS	3 December 2013
[redacted] Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT	3 December 2013
[redacted] Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT	3 December 2013
[redacted] Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT	3 December 2013

[redacted] Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT	3 December 2013
[redacted] Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT	3 December 2013
[redacted] Holme House Farm, Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT	3 December 2013
[redacted] Radcliffe Road, Holme Pierrepont, Nottingham, NG12 2LT	3 December 2013
Draft AQAP Published on Rushcliffe‟s Website at www.rushcliffe.gov.uk	3 December 2013

Responses

Martin Hickey

From: Chambers, Susan <Susan.Chambers@highways.gsi.gov.uk>
Sent: 10 January 2014 16:05
To: EnvHealth
Cc: Martin Hickey; Khokhar, Kamaljit; Winter, Matt
Subject: AQAP A52 Stragglethorpe Road Radcliffe on Trent

Dear Martin,

We have reviewed the Draft Air Quality Action Plan for Air Quality Management Area 1/2011, A52/Stragglethorpe Road, Radcliffe on Trent, and have no further comments to make.

Regards,

Susan Chambers, Asset Manager
Highways Agency | The Cube | 199 Wharfside Street | Birmingham | B1 1RN
Tel: +44 (0) 121 6788201
Web: http://www.highways.gov.uk
GTN: 6189 8201

Safe roads, reliable journeys, informed travellers
Highways Agency, an executive agency of the Department for Transport.

Martin Hickey

From: Chambers, Susan <Susan.Chambers@highways.gsi.gov.uk>
Sent: 06 December 2013 15:15
To: Martin Hickey
Cc: Khokhar, Kamaljit
Subject: FW: Consultation on draft AQAP
Attachments: A public consultation to HA with logo.pdf

Dear Martin,

Thank you for your letter dated 3rd December 2013 about the Draft AQAP for Stragglethorpe/A52 AQMA.

I have passed the letter to our Managing Agent Contractor for their comments and will get back to you before 10th January 2014.

In the meantime if you have any further information or queries please do not hesitate to contact me.

Regards,
Sue

Susan Chambers, Asset Manager
Highways Agency | The Cube | 199 Wharfside Street | Birmingham | B1 1RN
Tel: +44 (0) 121 6788201
Web: http://www.highways.gov.uk
GTN: 6189 8201

Safe roads, reliable journeys, informed travellers
Highways Agency, an executive agency of the Department for Transport.

From: Martin Hickey [mailto:MHickey@rushcliffe.gov.uk]
Sent: 03 December 2013 12:06
To: Khokhar, Kamaljit
Cc: Winter, Matt; Sarah Cairns; Phil Scotney
Subject: Consultation on draft AQAP

Kam, please find a letter requesting a final consultation on the AQAP for Stragglethorpe/A52 AQMA. This consultation is to a wider list of organisations and will result in the submitted AQAP in January 2014
Clearly the AQAP has commitments within it for the Highways Agency and you as the route manager.
The AQAP is based on the discussions and emails we have had up to date.
If you need to discuss this further then please get back to me. Please note there is a dead line on the consultation for mid-January.
I would envisage us having at least annual meetings with regard to the AQAP in the future on an on-going basis.

Regards

Martin Hickey MCIEH MSC
Environmental Health Officer
Neighbourhoods
Rushcliffe Borough Council
Pavilion Road

1

Date: 19 December 2013
Our ref: 106192
Your ref: Consultation for Air Quality Action plan at Radcliffe on Trent

Customer Services
Hornbeam House
Crewe Business Park
Electra Way
Crewe
Cheshire CW1 6GJ

T 0300 060 3900

Mr Martin Hickey
Rushcliffe Borough Council
Civic Centre
Pavilion Road
West Bridgford
Nottingham
NG2 5FE

BY EMAIL ONLY

Dear Mr Hickey

Planning consultation: Draft Air Quality Action Plan for Air Quality Management Area 1/2011
Location: A52 /Stragglethorpe Road, Radcliffe on Trent Consultation

Thank you for your consultation on the above dated 03 December 2013 which was received by Natural England on 03 December 2013.

Natural England is a non-departmental public body. Our statutory purpose is to ensure that the natural environment is conserved, enhanced, and managed for the benefit of present and future generations, thereby contributing to sustainable development.

Regarding the Draft Air Quality Action Plan, Natural England has no comments to make.

Should the proposal be amended in a way which **significantly** affects its impact on the natural environment then, in accordance with Section 4 of the Natural Environment and Rural Communities Act 2006, Natural England should be consulted again. Before sending us the amended consultation, please assess whether the changes proposed will materially affect any of the advice we have previously offered. If they are unlikely to do so, please do not re-consult us.

Yours sincerely

Catherine Neagus
Customer Service Consultation Team

Martin Hickey

From: Sean Parks <sean.parks@nottscc.gov.uk>
Sent: 05 October 2012 12:34
To: Martin Hickey
Subject: Stragglethorpe further assessment

Martin,

Further to our discussion I just had a couple of comments that I would like to make on the Stragglethorpe further assessment.

Just for information, there is a section 278 agreement with the proposed Cotgrave developers to undertake construction work (once the development works commence) to improve the entry arm from Stragglethorpe Lane onto A52. The improvements, however, are only to deliver nil detriment on the highways as a result of the development and therefore will not provide any improvements.

Section 1.1 – The last paragraph is unclear. It's not clear if the assessment considers the agglomeration impacts on traffic at this junction from all of the proposed development in the locality (Bingham/Radcliffe/Cotgrave) or just the proposed development at Cotgrave in solation. You would need to consider the impacts of all of the proposed development. In the last paragraph it's also not clear what time frame is being discussed and the increases need to be quantified (volume; timeframe etc.).

There are a number of measures that are undertaken by the County Council and Rushcliffe BC (and are included in the Trent Bridge/Lady Bay Bridge AQMA) that would also be applicable to the A52 Stragglethorpe AQMA. The relevant measures are detailed below:

Intervention	**Measure/ timescales**
Smarter Choices	Cycling Undertake measures to maintain cycling levels at 2010 levels
	Workplace travel plans Develop workplace travel plans with businesses Marketing campaigns Investment in marketing public transport as well as the benefits of walking and cycling
	Car sharing The promotion and facilitation of car sharing schemes throughout the county
Planning	Development control
	Development control contributions Use of collected development control contributions to provide cycling, walking and public transport improvements that would impact on the AQMA
Walking	Promotion and marketing Involvement and promotion of walk week and walk to work day
Cycling	Promotion and marketing

Intervention	Measure/ timescales
	Develop and distribute cycle maps of Rushcliffe area (and the rest of the county)
	Cycle training Deliver adult and child cycle training
Public transport	Ticketing Introduction of ITSO smartcard ticketing
	Concessionary fare schemes for the over 60s and disabled Free countywide off-peak concessionary fare schemes for the over 60s and disabled
	Concessionary fares for young people Consideration of introduction of concessionary fares for young people
	Information Investigate and publicise web based journey planners
	Encourage operators to take-up cleaner vehicles through partnership working
Network management	Traffic control and information Jointly fund the traffic control centre that monitors traffic movement and provides real time traffic control over many traffic signal installations
	Co-ordination of streetworks - Effective co-ordination of streetworks to minimise traffic disruption and unnecessary congestion as part of NCC's network management duty
	Incident management - Effective management of incidents to minimise traffic disruption and unnecessary congestion as part of NCC's network management duty
	Contingency planning - Effective contingency planning to minimise traffic disruption and unnecessary congestion as part of NCC's network management duty

Regards,
Sean

Sean Parks
Local Transport Plan manager
Transport Plans and Programmes
Environment & Resources
Nottinghamshire County Council

A verbal response was received from Mr Richard Taylor from the Nottingham City Council, suggesting the issues was difficult to forma plan that will result in reductions, however consider moving the stop line back from its current location or other white light changes.

Response from resident in the AQMA

Martin Hickey

From: [redacted]
Sent: 20 December 2013 14:22
To: Martin Hickey
Subject: Re: Kaizen Footprint Plan
Attachments: image001.png

Hi Martin
Is the grey box yours outside Holme House Cottage?
Can you continue to keep me up to speed.
Had a look on the councils website at the future plan and it appears no one really knows in what direction to go to solve the matter, other than it will come down 2020 due to manufacturer improvements on cars.

The main solutions seem to have been disregarded due to costs..

Look forward to hearing from you.

[redacted]

Appendix E: FURTHER INFORMATION

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FARSI

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GUJARATI

વધુ માહિતી

બીજી કોઇ ફોર્મેટ અથવા ભાષામાં જોઇએ ?

જો તમને આ દસ્તાવેજની એક નકલ બીજી કોઇ ફોર્મેટ જોઇતી હોય, દા.ત. મોટા અક્ષરોમાં, બ્રેઇલમાં, ઓડીઓ ટેઇપમાં અથવા બીજી ભાષામાં, તો કૃપા કરીને કસ્ટમર સર્વિસીસ ટીમનો અહીં સંપર્ક સાધો :

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અમારી સેવાઓ અમારા બધા ગ્રાહકોને ઉપલબ્ધ હોય તે નિશ્ચિત કરવા માટે રશ્ક્લીફ બરા કાઉન્સિલ 'લેન્ગ્વેજ લાઇન' સાથે રજિસ્ટર્ડ છે.

HINDI

और ज्यादा जानकारी

जानकारी कोई दूसरी भाषा या फोरमैट में ?

यदि यह दस्तावेज आपको किसी दूसरी भाषा या फारमैट में, जैसे कि बडे अक्षरों में, बरेयल (अन्धे लोगो के लिये) में, सुनने वाली टेप पर, चाहिये तो आप कसटमर सर्विस टीम को निम्नलिखित टैलीफोन नम्बर व डाक पते पर सम्पर्क करके प्राप्त कर सकतें हैं ।

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रश्कलिफ बरोअ काऊंसिल 'लैन्गुऐज लाईन'(एजैन्सी जो कि दूसरी भाषा में अनुवाद कराने में मदद करती है) के साथ रजिस्टर है यह निश्चित करने के लिये कि हम्हारी सेवाऐं सभी लोगों के लिये प्राप्य हैं ।

URDU

مزید معلومات

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