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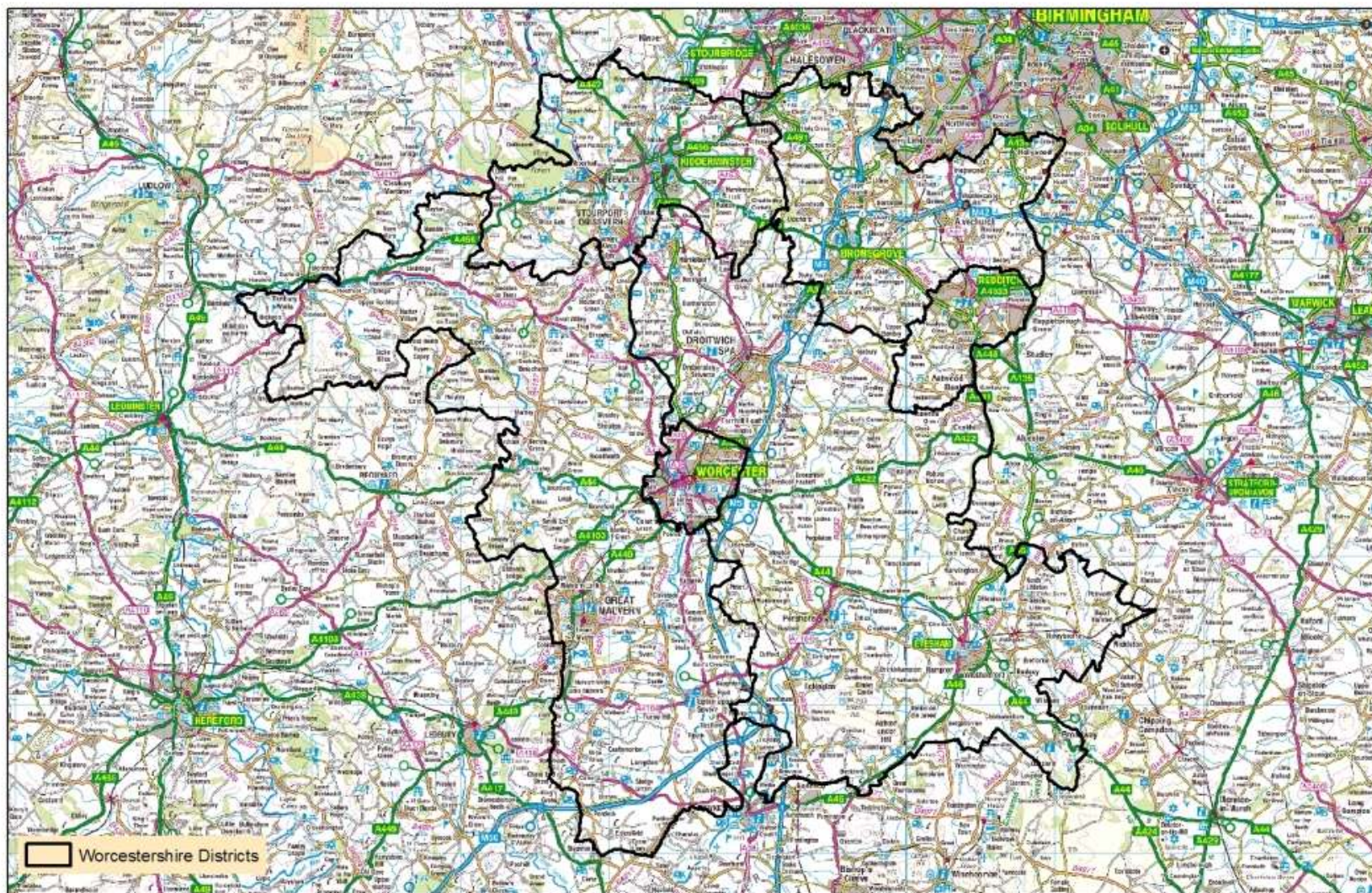
Air Quality Action Plan for Worcestershire

September 2013

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Executive Summary

This Air Quality Action Plan (AQAP) for Worcestershire has been developed and produced by Worcestershire Regulatory Services (WRS). It is a statutory duty for a local authority to develop an AQAP following the declaration of an Air quality Management Area (AQMA) in response to identified exceedence(s) of one or more of the air quality strategy objectives. This Countywide AQAP fulfils the requirements of the Local Air Quality Management process set out in Part IV of the Environment Act 1995 and the relevant Technical Guidance documents for the Worcestershire Authorities where AQMA's have been declared.

Before the plan can be adopted it must be subject to consultation with key stakeholders, and must also be appraised and accepted by the Secretary of State as being suitable for purpose. The purpose of the AQAP is to set out the local actions that will be implemented to improve air quality and work towards meeting the objectives.

Currently there are ten declared Air Quality Management Areas (AQMA's) in Worcestershire for exceedence of the annual average air quality objective for NO₂:

- Kidderminster Road, Hagley
- Lickey End, Bromsgrove
- Redditch Road, Bromsgrove
- Worcester Road, Bromsgrove
- Dolday/Bridge Street, Worcester City
- Lowesmoor/Rainbow Hill, Worcester City
- Newtown Road, Worcester City
- Port Street, Evesham
- Horsefair/Coventry Street, Kidderminster
- Welch Gate, Bewdley

Available best practice and guidance documents have been reviewed to identify all possible solutions included within this AQAP for consultation. WRS have also undertaken a review of available monitoring data, previous reports and plans from the last decade to ascertain long term pollutant trends and clarify the levels of exceedences within each AQMA. Relevant local policies and plans are also identified within the document and site visits to each AQMA have been undertaken to establish prevailing conditions.

The Action Plan Options are in two sections relating to the effect the actions would have on air quality: Generic Actions and AQMA Specific Actions. The generic actions have been grouped into types under the following headings:

- Traffic Management
- Lowering Emissions
- Promotion of Alternatives
- Education & Information
- Planning Initiatives
- Policy & Guidance

Anticipated costs, timescale and air quality benefit are indicated where possible. The AQAP will be updated with any relevant outcomes from the consultation period. A further update will occur following formation of the steering group to determine and help progress the preferred actions.

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1 Introduction

1.1.1 Purpose of the Action Plan

This Air Quality Action Plan (AQAP) for Worcestershire has been developed and produced by Worcestershire Regulatory Services (WRS). It is a statutory duty for a local authority to develop an AQAP following the declaration of an Air quality Management Area (AQMA) in response to identified exceedence(s) of one or more of the air quality strategy objectives (detailed in section 2).

Before the plan can be adopted it must be subject to consultation with key stakeholders as outlined in Local Air Quality Management Policy Guidance LAQM.PG(09) and must also be appraised and accepted by the Secretary of State as being suitable for purpose. The purpose of the Air Quality Action Plan is to set out the local actions that will be implemented to improve air quality and work towards meeting the objectives. Not all of the potential actions discussed in this document are likely to be formally adopted but are actively under consideration at this time.

1.1.2 Who are WRS?

Worcestershire Regulatory Services (WRS) is a shared service acting on behalf Worcestershire County Council, Redditch Borough Council, Bromsgrove District Council, Wyre Forest District Council, Worcester City Council, Malvern Hills District Council and Wychavon District Council.

The service was formed in June 2010 from the Environmental Health and Licensing departments of the six Worcestershire local authorities and Trading Standards from Worcestershire County Council. Responsibility for managing local air quality transferred from the partnership council's Environmental Health teams to the newly formed WRS Land, Air & Water Quality Team in April 2011.

1.1.3 Current status of air quality in Worcestershire

Currently there are ten declared Air Quality Management Areas (AQMAs) in Worcestershire. These are situated within the Bromsgrove, Worcester City, Wychavon and Wyre Forest Districts. No AQMAs have been declared within Malvern Hills District Council and Redditch Borough Council areas to date. The areas comprise:

- Kidderminster Road, Hagley
- Lickey End, Bromsgrove
- Redditch Road, Bromsgrove
- Worcester Road, Bromsgrove
- Dolday/Bridge Street, Worcester City
- Lowesmoor/Rainbow Hill, Worcester City
- Newtown Road, Worcester City
- Port Street, Evesham
- Horsefair/Coventry Street, Kidderminster
- Welch Gate, Bewdley

Newtown Road in Worcester requires revocation and a new AQMA in St Johns area of Worcester is to be declared. Additionally an area in Stourport on Severn is being considered as a possible AQMA. These three areas are not considered any further in this AQAP at this time.

1.1.4 Approach to Air Quality Action Planning

Traditionally an action plan has been produced for each individual AQMA. However with 10 inherited AQMAs, and potentially more to manage in Worcestershire in the future, there are clear advantages in terms of resources and managing the processes to combining actions for all AQMAs into one countywide action plan. Considering that many solutions employed are generic to all AQMAs a single action plan has the potential to provide economies of scale in terms of staff resources, budgets and working partnerships. Clearly this is important and necessary in the current economic climate when there is increasing pressure on Local Authority to maximise resources effectively and efficiently as possible.

It is generally recognised by Defra and air quality practitioners that although a Local Authority (LA) has the responsibility of managing the air quality in their areas they are unlikely to have direct control or capability to effect real reductions in pollution levels. This is because most AQMAs are declared as a result of pollution from traffic in built up urban areas over which LAs have no direct control. It is recognised that strong working partnerships must be formed with those able to directly deliver real reductions in pollutants related to vehicle emissions e.g. Highways at Worcestershire County Council, the Highways Agency, and Bus and Freight Quality partnerships.

It has been noted that some local plans have targeted solutions that have not been delivered. So in developing this AQAP WRS have sought to identify weaknesses in previous plans in order that valuable resources and effort are not expended on unrealistic or unachievable targets.

Available best practice and guidance documents have been reviewed to identify all possible solutions which are included within this AQAP. The AQAP has been updated with the feedback following consultation. Steering group(s) will be formed to help deliver the preferred actions.

1.1.5 How the AQAP has been formed

WRS have reviewed available guidance from Defra to ascertain which potential actions are most effective. Surprisingly there is minimal data available to local authorities on the success of the variety of solutions adopted in previous action plans across the UK or identified in guidance documents. Defra do provide a number of practice guidance documents and examples of AQAP by other LAs upheld as best practice to aid production of an AQAP. A number of these reports have been reviewed during the development of this plan and are referenced at the end of the document.

WRS have also reviewed all previous AQAPs produced by Worcestershire Local Authorities to determine what actions have been previously identified and if they have been successfully implemented. Additionally neighbouring authorities AQAPs and regional frameworks have been reviewed to identify any actions that could impact positively or negatively on AQMAs in the county.

WRS have also undertaken a review of available monitoring data, previous reports and plans from the last decade to ascertain long term pollutant trends and clarify the levels of pollutant exceedences within each AQMA.

Relevant local policies and transport plans that impact on local air quality have been identified and summarised e.g. planning, climate change, local transport plan. New approaches to Local Air Quality Management in England under consultation by Defra have also been considered.

Additionally site visits to each AQMA at peak traffic times have been undertaken to identify prevailing conditions and define the issues within each AQMA that cause elevated levels of NO₂.

1.1.6 Objectives of the AQAP

The aim of this AQAP is to identify solutions that can deliver real measurable contributions to improving air quality in Worcestershire. However it is recognised that delivering significant reductions in pollutants is not a quick process. Therefore the plan is intended to be a strategic document for many years and it must be future proof and versatile to accommodate changes to National and Local policy and guidance.

Objectives of the Worcestershire AQAP are as follows:

- To provide a robust framework for ensuring long term commitment and support of air quality issues.
- To be flexible enough to be amended with new policy changes, additional AQMAs and solutions as new ideas materialise in the air quality management field.
- Identify the effective actions that will be the basis of a long term implementation strategy to improve local air quality in Worcestershire.
- Highlight air quality issues in Worcestershire to policy makers and organisations that can deliver real improvements within partner authorities and the wider community.
- Identify potentially effective members of a Steering Group that can deliver implementation of the finalised action plan
- Identify national, regional and local policy that has an impact on local air quality or a role to play in improving air quality.
- Focus and resources should be targeted on implementing achievable actions that can provide the most cost effective reductions in emissions and improvements in local air quality that would necessitate a revocation of the AQMA's.

1.1.7 Why air quality matters - Air Quality and Health

Estimates indicate that air pollution reduces life expectancy in the UK by an average of six months with equivalent health costs estimated to be up to £20 billion a year. Improvements between 1990 and 2001 have helped avoid an estimated 4,200 premature deaths a year, and 3,500 hospital admissions a year. The UK Air Quality Strategy aims to address the reduced life expectancy impact to five months by 2020. (Defra 2009b)

The most important air pollutant in terms of health effects is Particulate Matter (PM) – particles emitted from vehicle exhausts, chimneys or formed in the air from reactions between other pollutants. The World Health Organization (WHO) advises there is no safe exposure level to PM. For people with lung and heart conditions, elevations in particulate air pollution can worsen their symptoms.

The short term health effects of nitrogen dioxide (NO₂) are also well established. At higher concentrations it can cause irritation of the lungs and can exacerbate existing lung conditions including asthma. However it is unlikely that such high levels of NO₂ will be reached in the UK. Ground level ozone (O₃) is formed when other pollutants react in sunlight and can cause breathing problems and reduced lung function. (Defra website accessed 03.04.2013)

In Worcestershire all current AQMAs have been declared because of an exceedance of the Nitrogen Dioxide annual average air quality objective (see Section 2).

1.1.8 Nitrogen Dioxide

In the context of air quality, nitrogen oxides usually refer to nitric oxide (NO) and nitrogen dioxide (NO₂) which are collectively known as NO_x. NO_x is emitted from many combustion processes, and the main sources in the UK include power generation, industrial combustion and road transport. In this report, concentrations of oxides of nitrogen are expressed in units of micrograms per cubic metre (µg/m³).

NO is not considered to be of concern with respect to human health. However, it is rapidly oxidised in the environment, forming NO₂. At high concentrations NO₂ acts as an irritant, causing inflammation of the airways. By affecting the immune cells in the lungs, it can also increase susceptibility to respiratory infections. It has been difficult to determine the direct, individual health effects of NO₂ at ambient concentrations because it is emitted from the same sources as other pollutants.

Motor vehicles make the largest contribution to long-term ground level concentrations in urban areas, and the highest NO_x levels in UK cities generally occur at the kerbside, particularly in locations with poor dispersion characteristics such as street canyons. Annual mean concentrations of NO₂ beside busy urban roads frequently exceed 40 µg/m³ (the limit value set by the European Union to protect human health) and may reach 80 µg/m³ or higher (as observed in 2011 at the London Marylebone Road monitoring station). Concentrations above the Air Quality Directive limit values for human health occur at roadside in most large cities in the UK. This is not a problem specific to the UK and is common in many other European countries.

At urban background locations in the UK, i.e. within built-up areas but away from busy roads, annual mean NO₂ concentrations are lower, typically in the range 15-40 µg/m³. However, some urban background sites (for example in central London, Manchester and Glasgow) often measure annual mean concentrations above 40

$\mu\text{g}/\text{m}^3$. Peak hourly mean concentrations exceed $100 \mu\text{g}/\text{m}^3$ at most urban locations, and occasionally exceed $300 \mu\text{g}/\text{m}^3$ at the most congested urban roadside sites. (Defra, 2011)

Lowe, 2010 states: 'NO₂ is an irritating gas that is absorbed into the mucous membrane of the respiratory tract which can damage cell membranes and proteins. Elevated concentrations of NO₂ may cause inflammation of the airways with long term exposure affecting lung function, causing respiratory symptoms. Over the short term this may lead to lower resistance to respiratory infections such as influenza due to NO₂ affecting the immune cells of airways. It may also enhance the response to allergens in sensitive individuals.

Very high levels may lead to narrowing of lung airways, particularly among people with pre-existing asthma and cause severe lung damage (severe difficulty breathing) or death. For example, in London in 1991 an episode occurred where average hourly NO₂ concentration reached a maximum of 423 ppb ($808 \mu\text{g}/\text{m}^3$), four times the Air Quality Objective (AQO) for 1 hour mean NO₂. This resulted in a 10% increase in death rates and an increase in hospital admission rates among older people with chronic lung diseases. However, when healthy volunteers have been exposed to varying concentrations of NO₂ no health effects have been found.

The secondary particles formed by NO₂, which contribute to PM₁₀, can penetrate deep into the lungs causing inflammation. This can also cause worsening of conditions of people with heart and lung diseases. Also the particles may carry surface-absorbed carcinogenic compounds. NO_x furthermore contributes to photochemical smog formation and acid deposition and may react with other substances producing powerful greenhouse gases.

For NO₂, the 1-hour mean AQO of $200 \mu\text{g}/\text{m}^3$ (with no more than 18 exceedences per year) is based on acute health effects, while the annual mean AQO of $40 \mu\text{g}/\text{m}^3$ is based on chronic health effects.'

2 Policy

2.1 National Policy

2.1.1 UK Air Quality Strategy for England, Scotland, Wales and Northern Ireland

Under Part IV of the Environment Act 1995 local authorities have a statutory duty to undertake periodic reviews of ambient air quality within their boundaries. The most recent version of the Air Quality Strategy (2007) sets out the framework of Local Air Quality Management (LAQM). It also sets out a series of health-based air quality objectives and the dates by which these are to be achieved.

The 2008 European Union ambient air quality directive (2008/50/EC) also sets legally binding limits for concentrations in outdoor air of major air pollutants that impact on public health. Achievement of these values is a national obligation rather than a local one. The directive requires EU member states to implement air quality plans where the standards are breached. The EU directive was transposed into UK law within the Air Quality Standards Regulations 2010.

A list of the air quality objectives relevant to England and the typical locations at which the objectives should and should not apply (as set out in The Air Quality Strategy) is presented in the tables on the following pages.

The air quality directive contains provisions for additional time to meet limit values for particulates PM₁₀ (3 years) and nitrogen dioxide (5 years) which the UK, like most other EU members states, has or will be seeking. Defra's current view is that 'meeting EU air quality limits for NO₂ (nitrogen dioxide) close to roadsides in London and other major cities by the extended 2015 deadline is very challenging given the largest source of this pollutant is road transport'.

In early 2011, the European Commission began a review of EU air quality policy which will culminate with the publication of new proposals on ambient air quality and emissions ceilings in 2013.

It is anticipated that measures adopted at international and national levels will ensure that objectives are reached at most relevant locations. However measures adopted at a local level can help to significantly improve air quality in specific locations and as such the Government recognises the important role that local authorities have to play in working towards achieving the objectives.

Local Authorities in UK are required when carrying out their local air quality management duties to have regard to technical and policy guidelines issued by the Secretary of State:

Defra (02/2009) Local Air Quality Management Policy Guidance LAQM.PG(09)

Defra (02/2009) Local Air Quality Management Technical Guidance LAQM.TG(09)

Table 2-1 UK Air Quality Objectives

Pollutant	Objective	Conc measured as	Date to be achieved by and maintained thereafter	European Obligations	Date to be achieved by and maintained thereafter
Nitrogen Dioxide	40 $\mu\text{g.m}^{-3}$	Annual mean	31/12/2005	40 $\mu\text{g.m}^{-3}$	01/01/2010
	200 $\mu\text{g.m}^{-3}$ not to be exceeded more than 18 times a year	1 hour mean	31/12/2005	200 $\mu\text{g.m}^{-3}$ not to be exceeded more than 18 times a year	01/01/2010
Particles (PM ₁₀)	40 $\mu\text{g.m}^{-3}$	Annual Mean	31/12/2004	40 $\mu\text{g.m}^{-3}$	01/01/2005
	50 $\mu\text{g.m}^{-3}$ not to be exceeded more than 35 times a year	24 hour mean	31/12/2004	50 $\mu\text{g.m}^{-3}$ not to be exceeded more than 35 times a year	01/01/2005
Particles (PM _{2.5}) Exposure reduction	25 $\mu\text{g.m}^{-3}$	Annual mean	2020	Target value 25 $\mu\text{g.m}^{-3}$	2010
Particles (PM _{2.5}) Exposure reduction (in UK Urban areas)	Target of 15% reduction in concentrations at urban background		Between 2010 and 2020	Target of 20% reduction in concentrations at urban background	Between 2010 and 2020
Ozone	100 $\mu\text{g.m}^{-3}$ not to be exceeded more than 10 times a year	8 hour mean	31/12/2005	Target of 120 $\mu\text{g.m}^{-3}$ not to be exceeded more than 25 times a year averaged over 3 years	31/12/2010
Sulphur Dioxide	266 $\mu\text{g.m}^{-3}$ not to be exceeded more than 35 times a year	15 minute mean	31/12/2005		
	350 $\mu\text{g.m}^{-3}$ not to be exceeded more than 24 times a year	1 hour mean	31/12/2004	350 $\mu\text{g.m}^{-3}$ not to be exceeded more than 24 times a year	01/01/2005
	125 $\mu\text{g.m}^{-3}$ not to be exceeded more than 3 times a year	24 hour mean	31/12/2004	125 $\mu\text{g.m}^{-3}$ not to be exceeded more than 3 times a year	01/01/2005
Polycyclic aromatic hydrocarbons	0.25 ng.m^{-3} B[a]p	As annual average	31/12/2010	Target of 1 ng.m^{-3}	31/12/2012
Benzene	16.25 $\mu\text{g.m}^{-3}$	Running annual mean	31/12/2003		
	5 $\mu\text{g.m}^{-3}$	Annual average	31/12/2010	5 $\mu\text{g.m}^{-3}$	01/01/2010
1,3 – butadiene	2.25 $\mu\text{g.m}^{-3}$	Running annual mean	31/12/2003		
Carbon Monoxide	10 $\mu\text{g.m}^{-3}$	Maximum daily running 8 hour mean	31/12/2003	10 $\mu\text{g.m}^{-3}$	01/01/2005
Lead	0.5 $\mu\text{g.m}^{-3}$	Annual mean	31/12/2004	0.5 $\mu\text{g.m}^{-3}$	01/01/2005
	0.25 $\mu\text{g.m}^{-3}$	Annual mean	31/12/2008		

Information taken from Table 2 of The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Vol. 1)

Table 2-2 Typical locations where objectives apply

Table 2.2 Typical locations where the objectives should and should not apply			
Averaging Period	Pollutants	Objectives should apply at ...	Objectives should not generally apply at ...
Annual mean	1,3 Butadiene Benzene Lead Nitrogen dioxide PM ₁₀	All background locations where members of the public might be regularly exposed.	Building facades of offices or other places of work where members of the public do not have regular access.
		Building facades of residential properties, schools, hospitals, libraries etc.	Gardens of residential properties.
			Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term
24 hour mean and 8-hour mean	Carbon monoxide PM ₁₀ Sulphur dioxide	All locations where the annual mean objective would apply. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term.
1 hour mean	Nitrogen dioxide Sulphur dioxide	All locations where the annual mean and 24 and 8-hour mean objectives apply.	Kerbside sites where the public would not be expected to have regular access.
		Kerbside sites (e.g. pavements of busy shopping streets).	
		Those parts of car parks and railway stations etc. which are not fully enclosed.	
15 minute mean	Sulphur dioxide	Any outdoor locations to which the public might reasonably be expected to have access. All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

2.1.2 National Planning Policy Framework

In March 2012 the existing Planning Policy Guidance notes were superseded by the National Planning Policy Framework (NPPF). This document sets out the Government's requirements for the planning system with an emphasis on enabling local people and councils to produce their own local and neighbourhood plans.

The NPPF is based on 12 core planning principles. Three of these are relevant to local air quality management and are summarised below:

Core principle number 7 states that planning should *"...contribute to conserving and enhancing the natural environment and reducing pollution..."*

Core principle number 9 states that planning should *"...actively manage patterns of growth to make the fullest possible use of public transport, walking and cycling..."*

Core principle number 10 states that planning should *"...take account of and support local strategies to improve health, social and cultural wellbeing for all..."*

The NPPF sets out a number of policies in paragraphs. Paragraph 124 specific to air quality and other relevant policies to local air quality management are summarised below:

Achieving Sustainable Development - Section 4: Promoting Sustainable Transport:

Paragraph 29. Transport policies have an important role to play in facilitating sustainable development but also in contributing to wider sustainability and health objectives. Smarter use of technologies can reduce the need to travel. The transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel. However, the Government recognises that different policies and measures will be required in different communities and opportunities to maximise sustainable transport solutions will vary from urban to rural areas.

Paragraph 30. Encouragement should be given to solutions which support reductions in greenhouse gas emissions and reduce congestion. In preparing Local Plans, local planning authorities should therefore support a pattern of development which, where reasonable to do so, facilitates the use of sustainable modes of transport.

Paragraph 31. Local authorities should work with neighbouring authorities and transport providers to develop strategies for the provision of viable infrastructure necessary to support sustainable development, including large scale facilities such as rail freight interchanges, roadside facilities for motorists or transport investment necessary to support strategies for the growth of ports, airports or other major generators of travel demand in their areas. The primary function of roadside facilities for motorists should be to support the safety and welfare of the road user.

Paragraph 32. All developments that generate significant amounts of movement should be supported by a Transport Statement or Transport Assessment. Plans and decisions should take account of whether:

- the opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;
- safe and suitable access to the site can be achieved for all people; and
- improvements can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.

Paragraph 34. Plans and decisions should ensure developments that generate significant movement are located where the need to travel will be minimised and the use of sustainable transport modes can be maximised. However this needs to take account of policies set out elsewhere in this Framework, particularly in rural areas.

Paragraph 35. Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods or people. Therefore, developments should be located and designed where practical to:

- accommodate the efficient delivery of goods and supplies;
- give priority to pedestrian and cycle movements, and have access to high quality public transport facilities;
- create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians, avoiding street clutter and where appropriate establishing home zones;
- incorporate facilities for charging plug-in and other ultra-low emission vehicles; and
- consider the needs of people with disabilities by all modes of transport.

Paragraph 36. A key tool to facilitate this will be a Travel Plan. All developments which generate significant amounts of movement should be required to provide a Travel Plan.

Paragraph 37. Planning policies should aim for a balance of land uses within their area so that people can be encouraged to minimise journey lengths for employment, shopping, leisure, education and other activities.

Paragraph 38. For larger scale residential developments in particular, planning policies should promote a mix of uses in order to provide opportunities to undertake day-to-day activities including work on site. Where practical, particularly within large-scale developments, key facilities such as primary schools and local shops should be located within walking distance of most properties.

Paragraph 39. If setting local parking standards for residential and non-residential development, local planning authorities should take into account:

- the accessibility of the development;
- the type, mix and use of development;
- the availability of and opportunities for public transport;
- local car ownership levels; and
- an overall need to reduce the use of high-emission vehicles.

Paragraph 40. Local authorities should seek to improve the quality of parking in town centres so that it is convenient, safe and secure, including appropriate provision for motorcycles. They should set appropriate parking charges that do not undermine the vitality of town centres. Parking enforcement should be proportionate.

Paragraph 41. Local planning authorities should identify and protect, where there is robust evidence, sites and routes which could be critical in developing infrastructure to widen transport choice.

Achieving Sustainable Development - Section 11: Conserving and Enhancing the Natural Environment:

Paragraph 109. The planning system should contribute to and enhance the natural and local environment by:

- protecting and enhancing valued landscapes, geological conservation interests and soils;
- recognising the wider benefits of ecosystem services;
- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
- preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air... pollution ...; and
- remediating and mitigating despoiled, degraded... land, where appropriate.

Paragraph 110. In preparing plans to meet development needs, the aim should be to minimise pollution and other adverse effects on the local and natural environment. Plans should allocate land with the least environmental or amenity value, where consistent with other policies in this Framework.

Paragraph 120. To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account....

Paragraph 124. Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan.

Decision Making - Planning conditions and obligations

203. Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition.

204. Planning obligations should only be sought where they meet all of the following tests:

- necessary to make the development acceptable in planning terms;
- directly related to the development; and
- fairly and reasonably related in scale and kind to the development.

205. Where obligations are being sought or revised, local planning authorities should take account of changes in market conditions over time and, wherever appropriate, be sufficiently flexible to prevent planned development being stalled.

206. Planning conditions should only be imposed where they are necessary, relevant to planning and to the development to be permitted, enforceable, precise and reasonable in all other respects.

2.1.3 Government White Paper “The Future of Transport”

This strategy builds on the progress made since the 2000 implementation of the 10 Year Plan for Transport and extends the UK’s investment plans to 2014-15 and look further forward at the challenges that the UK will face over the next 20 to 30 years.

The objective is “a transport network that can meet the challenges of a growing economy and the increasing demand for travel, but can also achieve our environmental objectives”. This includes providing a freer flowing road network, fast and reliable public transport and making walking and cycling a real alternative for local trips.

The Strategy is built around three central themes: sustained investment over the long term, improvements in transport management and planning ahead.

National Active Travel Strategy, 2010

The National Active Travel Strategy was published by the Department for Transport and the Department of Health in 2010. It highlights national plans to put walking and cycling at the heart of local transport and public health strategies over the next decade.

The guiding principles state that walking and cycling should be everyday ways of getting around – not just for their own sake but also because of what they can do to improve public health, tackle congestion, reduce carbon emissions and improve the local environment.

2.2 Regional Policy

2.2.1 Regional Spatial Strategy for the West Midlands

Regional spatial strategies (RSS) provided regional level planning frameworks for the regions of England outside London. RSS became the strategic level plan charged with informing local development frameworks (LDFs) in 2004. Their revocation was announced by the then new Conservative/Liberal Democrat government on 6 July 2010, however the decision to revoke the Regional Strategies through the Localism Bill has been subject to a high court challenge and further legal decisions. On the subject of local air quality the RSS states:

‘Although air quality in the Region is improving, local authorities with poor air quality may need to declare Air Quality Management Areas (AQMA) and to produce action plans to reduce air pollution to meet national standards. Reducing the need to travel will play a key part in this and Regional and local planning policies, together with local transport plans, must play their part in helping reduce air pollution throughout the Region. In developing these plans consideration should be given to how any adverse effects from development on air quality might be mitigated.’

Policies that may be applied to local air quality include the following:

Policy QE4: Greenery, Urban Greenspace and Public Spaces

“...Local authorities and others should also encourage patterns of development which maintain and improve air quality...”

Strategy Objective G - *“to ensure the quality of the environment is conserved and enhanced across all parts of the Region”*

Strategy includes headline indicators for achieving urban and rural renaissance, one of which is *“changes in the number of days with poor air quality in different parts of the region”*

Guiding Principle D *“...addressing environmental inequalities in air pollution...”*

2.3 Local Policy – County Level

There are currently no AQMAs within Malvern Hills and Redditch District Council areas hence policies of those two councils relating to Air Quality have not been considered in this document at this time. Should it be necessary to declare an AQMA in either of these districts in the future this master Action Plan document will be updated to include local Council policies, AQMA assessment details and AQMA specific actions at that time.

2.3.1 Herefordshire & Worcestershire Air Quality Strategy (AQS)

In 2008 the Herefordshire Council and the local authorities of Worcestershire set out a unified approach to managing local air quality across the two Counties in three documents:

- Herefordshire and Worcestershire Air Quality Strategy
- Herefordshire and Worcestershire Air Quality Planning Protocol
- Herefordshire and Worcestershire Air Quality Supporting Documents

The general aims of the strategy is to raise profile of air quality as an issue for consideration within a wide range of local government and regional policies and frameworks including local planning, transport planning, health, industry, housing and environmental protection. Additionally the AQS provides a framework for a consistent approach to local air quality considerations in development control (planning) processes and links to other initiatives such as Climate Change programmes and future Local Transport Plans. The strategy set out a number of commitments under different subject areas including Planning, Transport, Climate Change and Energy, Health, Industry and domestic sources to achieve those aims. The full document is available to download from the Pollution pages of the WRS website <http://www.worcsregs services.gov.uk/>

It is noted that since production in 2008 many local and national policies and guidelines referred to in the H & W AQ Strategy and Planning Protocol documents have changed and that an update of these documents is required. Revision of these documents is proposed in the future.

2.3.2 Local Transport Plan 3 (LTP3)

Local Transport Plans (LTPs) are documents required by the Transport Act 2000 (amended by the Local Transport Plan 2008). All transport authorities are required to produce an LTP in which they set out their objectives and plans for developing transport in their area over a stipulated period. The Worcestershire County Council's third Local Transport Plan (LTP3) sets out the long-term vision, objectives and outcomes for transport in Worcestershire for 2011 to 2026. The plan includes a range of policies, underpinned by a strategic programme of investment in maintenance of the existing network and investments in transport schemes where these can be justified, to deliver the vision and achieve the objectives and outcomes sought.

Worcestershire LTP3 Objectives

In accordance with national and local objectives, a series of local transport-specific objectives have been identified for the Worcestershire LTP3. These are shown below in Table 2.3 which is a reproduction of Table 1.2 in the main LTP3 document.

A principal aim of the LTP3 is to deliver the greatest possible benefits through the delivery of cost effective transport infrastructure and services, or in other words, achieving best value for money. Worcestershire County Council will make full use of its Transport Scheme Appraisal Framework to ensure that all proposed and delivered schemes meet this aim (WCC, 2011).

Table 2.3: National, Local and Worcestershire LTP3 objectives (WCC, 2011)

National Transport Objectives	Worcestershire Sustainable Community Strategy Objectives	Worcestershire Third Local Transport Plan (LTP3) Objectives
To support national economic competitiveness and growth, by delivering reliable and efficient transport networks.	Economic success that is shared by all Stronger Communities	To support Worcestershire's economic competitiveness and growth through delivering a reliable and efficient transport network The Economic Objective
To reduce transport's emissions of carbon dioxide	A better environment for today and	To reduce the impacts of transport in Worcestershire on the local

National Transport Objectives	Worcestershire Sustainable Community Strategy Objectives	Worcestershire Third Local Transport Plan (LTP3) Objectives
and other greenhouse gases, with the desired outcome of tackling climate change.	tomorrow	environment, by reducing noise and transport-related emissions of carbon dioxide and other greenhouse gases, with the desired outcomes of tackling climate change and reducing the impacts of transport on public health The Environment Objective
To contribute to better safety security and health and longer life-expectancy by reducing the risk of death, injury or illness arising from transport and by promoting travel modes that are beneficial to health.	Communities that are safe and feel safe	To contribute towards better safety, security, health and longer life expectancy in Worcestershire, by reducing the risk of death, injury or illness arising from transport and promoting healthy modes of travel The Health and Safety Objective
To promote greater equality of opportunity for all citizens, with the desired outcome of achieving a fairer society;	Stronger Communities Meeting the needs of children and young people	To optimise equality of opportunity for all of Worcestershire's citizens with the desired outcome of creating a fairer society. The Equality Objective
To improve quality of life for transport users and non-transport users, and to promote a healthy natural environment	A better environment for today and tomorrow	To enhance the quality of life for Worcestershire's residents by promoting a healthy, natural environment, conserving our historic built environment and preserving our heritage assets The Quality Of Life Objective
	Economic success that is shared by all Stronger Communities A better environment for today and tomorrow	To enhance the quality of Worcestershire's Transport Asset, through sensitive and appropriate design with the desired outcome of reducing the costs and inconvenience of maintenance works The Asset Management Objective

LTP3 Structure

The Worcestershire LTP3 has been structured as a compendium. A number of topic-specific policies have been developed, as separate documents, to provide additional detail and support the outcomes of the LTP3. The policy and other documents identified by WRS as most relevant to air quality are as follows:

- Transport Accessibility Policy
- Transport and Air Quality Policy
- Cycling Policy
- Development Control (Transport) Policy

- Multimodal Freight Policy
- Integrated Passenger Transport Policy
- Intelligent Transport Systems Policy
- Smarter Choices Policy
- Sustainable Modes of Travel to School Strategy
- Transport and Climate Change Policy
- Traffic and Parking Management Policy
- Walking an Public Realm Policy
- Network Management Plan
- Environmental Report

Within each topic-specific document are a number of specified policy statements. The policy statements within each document relevant to air quality are detailed in Appendix 3 and referred to throughout this AQAP.

The full plan and associated documents can be downloaded from the County Council's website at: <http://www.worcestershire.gov.uk/cms/local-transport-plan.aspx>

LTP3 Timeline

Previous local transport plans for Worcestershire were developed to cover five-year periods, from 2001 to 2006 and then 2006 to 2011. Recent government guidance has given local transport authorities the freedom to locally decide the length of local transport plans. Worcestershire has chosen to develop the LTP3 for a longer plan period (from 2011 to 2026), as this will enable Worcestershire County Council to be more strategic, and where justified, ambitious in its aims for maintaining and enhancing Worcestershire's transport networks. In particular, this will enable the development of major schemes, as identified in Section 11 of the LTP3 document (WCC, 2011)

Major Schemes identified in LTP3

Major schemes involve substantial investment (in excess of £5 million) in transport infrastructure and services and are designed to deliver commensurately large benefits to Worcestershire's economy, environment and quality of life. Worcestershire will bid for funding from central government and the private sector to fund these schemes during the 15-year life of the Local Transport Plan.

The major schemes outlined within the LTP3 main document are as follows:

- Evesham Abbey Bridge and Viaduct
- Worcester Transport Strategy (Phase 1)
- Worcestershire Parkway
- Kidderminster Transport Strategy
- Redditch Transport Strategy

With the exception of the Redditch Transport Strategy all of the above major schemes will potentially provide benefit to existing AQMAs. Another major scheme, not outlined in LTP3 but detailed on WCC webpages, that will have potential impact on current AQMAs is the New Bromsgrove Rail Station Interchange. A brief outline of these schemes pertinent to LAQM and the current proposed timelines are provided in table 2.4 below.

Table 2.4: Proposed major and other significant transport schemes pertinent to LAQM

Major Scheme	Current Status/Timescale for Delivery	Potentially Benefitting AQMA(s)
Worcester Transport Strategy (Phase 1) Major Scheme		
<p>The scheme involves the delivery of an integrated package of inter-related transport measures specifically developed to support the performance of the economy and improve the local environment through:</p> <ul style="list-style-type: none"> ■ Strategic Highways Improvements: Enhancements to the key junctions on the Worcester Southern Link Road, to improve traffic flow, particularly at peak times and reduce transport costs to businesses and road users; ■ Rail Station Enhancements: This will involve investment and improvement in passenger and interchange facilities at Worcester Foregate Street and Malvern Link stations, helping to improve the quality of rail travel and encourage increased use of these under-utilised transport assets. The improvements to passenger facilities to Worcester's Foregate Street will include upgrading of signage, the ground level waiting area, information and ticketing facilities, lighting, security and improved sheltered walk links to Foregate Street and its taxi ranks and bus stops. ■ Key Corridor Improvements: This will involve investment in key corridors to improve the quality of transport infrastructure and public realm along these routes. This will help to smooth traffic flows and improve conditions for all road users; ■ Transport Information Systems: Measures to provide users with better, more accurate information on the transport network, with the aim of increasing network efficiency. For example, variable message signs will direct car drivers to city centre car parks which have available capacity, while public transport users will be provided with real time information on services via mobile phones and at stop/station signs. ■ Improved infrastructure for walking and cycling: This would involve enhancements designed to encourage more local trips on foot and by bike. The improvements to passenger facilities to Worcester's Foregate Street will be on the ground level and include upgrading of the waiting area, signage, information, shelters, lighting and security. 	<p>Following a competitive bidding process the Worcester Transport Strategy Phase One project has been awarded £14.2million. The proposals to make travelling around the area easier will be put in place between 2012 and 2015.</p>	<p>Lowesmoor/ Rainbow Hill, Worcester</p>

Evesham Abbey Bridge and Viaduct Major Scheme		
This scheme involves the complete replacement of the Abbey Bridge in Evesham and the viaduct which approaches it. This scheme will maintain, and potentially improve accessibility into Evesham Town Centre.	Works began in spring 2013 and due for completion by 2014.	Port Street, Evesham
Worcestershire Parkway Major Scheme		
<p>This scheme involves the development of a new parkway station at the intersection of the Bristol to Birmingham/North West/North East and the Worcester - London (Cotswolds Line) main line railways, close to junction 7 of the M5. This station would provide significantly improved direct access to national (inter-city express) rail services from Worcestershire, and provide significant opportunities for local economic growth. This scheme will:</p> <ul style="list-style-type: none"> •Improve access (particularly by car) to direct rail services from Worcestershire to London, the South West, South Wales, Birmingham and beyond •Significantly reduce journey times to key regional and national destinations •Enable interchange between the Worcester – London (Cotswold Line) and Cross Country services •Benefit the Worcestershire economy and support economic growth as access to and from the county will be improved. 	In February 2013 WCC bid for major funding from Network Rail's 'New Stations Fund' to progress this scheme further. No update as to the success of the bid at this time.	No specific AQMAs identified from available information
Kidderminster Transport Strategy Major Scheme		
This scheme will be developed following detailed technical work to identify an integrated package of inter-related transport measures specifically targeted at supporting the performance of the local economy and improving the environment in Kidderminster and its hinterland. These measures will include a number of schemes as identified in the Wyre Forest Core Strategy, to support the ReWyre initiative to regenerate Kidderminster as a thriving centre of socio-economic activity. The first phase of the scheme proposed the Hoobrook Link Road. This will connect the A442 Worcester Road to the A451 Stourport Road via the old British Sugar site (situated to the south of Kidderminster Town centre).	WCC has recently secured £4.9million from DfT towards the Hoobrook Link Road phase of the scheme. A planning application should be submitted in August 2013 and if the remaining funds are found it is hoped that construction could commence in December 2014.	Horsefair, Kidderminster

Bromsgrove Rail Station Interchange Major Scheme		
<p>This scheme will see the station moved further south to allow Network Rail to electrify the line from Barnt Green to Bromsgrove. This strategic project will also allow the train companies to increase the frequency of the rail service between Bromsgrove and Birmingham. Improved facilities and better integration with local bus services will make it more attractive for people to use the train to travel between Bromsgrove and Birmingham and Worcester, reducing congestion, carbon emissions and making it easier to access the town. Proposals include:</p> <ul style="list-style-type: none"> ■ A car park with approximately 350 spaces designed to current standards in terms of security, lighting, ticketing, customer facilities and information. Parking charges will be similar to today. ■ A modern station building which may include toilets, ticket desk and a retail facility ■ Four platforms connected by a covered footbridge and lifts, designed to be fully accessible for all ■ Secure covered cycle storage, motor cycle parking, electric car parking and charging points ■ Direct access to local bus services through a bus / rail interchange ■ A taxi rank and drop off / pick up point ■ Alterations to New Road to remove parking from the west side to improve access to the new station ■ New access road to the station directly from Stoke Road ■ Restrictions on parking on streets close to the station 	<p>Public consultation completed on 17th March 2013. WCC will use the results of the consultation to finalise the design to be submitted for planning approval in Autumn 2013.</p> <p>Should the scheme be approved WCC hope construction of the new station will begin in 2014 and scheduled to open in Summer 2015</p>	<p>Bromsgrove AQMAs</p>

Worcestershire County Council's Packaged Approach to Delivering LTP3

The LTP3 main document states: '...WCC will seek to group transport schemes together as packages of investment. Packaging investments in a range of modes of transport generally delivers far greater benefits, and thus increases the value for money and business case for investment. It is vital, therefore, that schemes within each package are integrated such that benefits to the economy, environment and quality of life are maximised. This is critical in an era where Worcestershire will be required to compete for funding. Each of these packages will be incorporated with a broad area strategy.'

LTP3 main document also notes: 'Without contributions from alternative sources, including private sector contributions, many of the schemes and packages identified below will not be deliverable. It will be important, therefore, that the LTP3 is closely aligned with the relevant Local Development Plans and Core Strategies and that new developments are accompanied with appropriate investment in transport infrastructure and services, such that the Worcestershire economy, environment and quality of life are not undermined.'

The three area strategies identified within LTP3 are as follows:

- North East Worcestershire including the Bromsgrove Urban, Redditch Urban and North East Worcestershire Rural Packages;
- South Worcestershire including the Worcester Urban, Droitwich Spa Urban, Great Malvern Urban, Tenbury Wells, Upton upon Severn and the South Worcestershire Rural Packages;
- Wyre Forest including the Kidderminster Urban, Stourport-on-Severn Urban, Bewdley Urban and Wyre Forest Rural Packages.

Schemes identified from the Strategic Delivery Programme as directly relating to, or with the potential to benefit local air quality within the above packages are outlined and referred to within this AQAP.

2.3.3 Local Climate Change Policies

The Worcestershire Partnership has made tackling climate change a key crosscutting issue throughout its Sustainable Community Strategy. The Partnership is made up of various groups including District representatives. The Worcestershire Climate Change Task Group has developed the Worcestershire Climate Change Strategy and Pledge, which many key county organisations have signed up to. The Worcestershire Local Area Agreement (LAA), a three year agreement negotiated between key partner organisations to tackle key issues in the county, includes a number of targets to tackle climate change that are aligned with key priorities identified to improve local air quality.

Worcestershire County Council (WCC) has signed up to the Worcestershire Climate Change Pledge. As part of this pledge, organisations have committed to a number of actions to tackle climate change.

- Raise awareness of climate change issues with staff and in organisations activities.
- Monitor and reduce energy use.
- Insulate buildings and encourage staff to do so.
- Minimise waste by using less and recycling more.
- Set targets to reduce carbon emissions.
- Assess likely impacts of climate change and make plans to adapt.

- Implement a staff travel plan.
- Operate a sustainable purchasing policy.
- Use renewable energy.

Actions undertaken by WCC as part of their climate change strategy include:

- Implementation of the Sustainable Travel Town project, branded Choose How You Move in Worcester City which has delivered a reduction in single occupancy car use of 12 % amongst households participating in the project. The Choose How You Move scheme in Redditch will be the main focus for transport related CO₂ savings in the early part of this decade.
- Support the roll out of broadband and home working practices enabling ICT to reduce need to travel by enabling home working, virtual meetings etc.
- Support for electric vehicle technology via 'Plugged in Places' funding.
- Encouraged the development of both School and Employer Travel Plans, which aim to reduce single occupancy car use.
- Promote the Worcestershire Car Share database.
- Developed an Eco-Driving Course which demonstrates simple principles designed to reduce fuel consumption by at least 10 to 15 per cent, reducing costs, CO₂ emissions and accidents.
- Developed a new integrated passenger transport website providing greater access to passenger transport information.
- Improved the availability of passenger transport information so that it is more accessible through libraries and the Worcestershire Hub to those wishing to choose an alternative to the private car
- Implementation of Worcestershire's Walking & Public Realm Policy providing a strategic framework for the development of measures which will help to make journeys on foot safer, easier and more pleasant.

Bromsgrove District Council (BDC) and Redditch Borough Council (RBC) are signatories of the Nottingham Declaration and key partners in the delivery of the LAA. Over 300 local councils have signed up to the Nottingham Declaration, each pledging to actively tackle climate change in their area and help the UK deliver its national climate change targets. BDC and RBC have produced a combined Climate Change Strategy and Action Plan 2010 – 2013. Section 7 of the climate change strategy identifies a number of themes and Transport is the most relevant theme to local air quality.

The climate change strategy recognises traffic congestion is an issue which can cause air quality problems and health impacts within the Bromsgrove area and that 'future development must include the provision of a sustainable transport network if these issues are to be improved.'

Strategic Transport Actions identified:

- Encourage partner organisations to ensure that key services are accessible to everyone via public transport

- Planning Departments to influence sustainable travel options in new developments
- Identify vulnerabilities relating to transport in a changing climate e.g. the impact of melt point of tarmac during heat waves
- Encourage use of walking and cycling to achieve significant health benefits
- Establish a Council Travel Plan for own business miles including options of car sharing and public transport
- Review staff mileage reimbursement rates

The Climate Change Strategy within Bromsgrove is managed by the Better Environment Theme Group.

Worcester City Council (WC) has signed up to the Nottingham Declaration and the Worcestershire Climate Change Pledge. WC produced a Climate Change Strategy in 2009. The strategy's objectives closely follow the actions outlined in the Worcestershire Climate Change Pledge as detailed above.

Wychavon District Council (WDC) outlines the council's climate change strategy within 'Intelligently Green Plan 2012 – 2020'. The plan focuses on four subject areas for improvement: Energy, Construction, Food Tourism and Green Spaces, and Transport. Clearly the latter is the most significant in terms of air quality. The strategy for reducing carbon from transport is as follows:

- Raise local employers' awareness of green fleet reviews and the benefits of reducing fuel costs and emissions in Wychavon through the Worcestershire Local Enterprise Partnership, Wychavon magazine and Business Briefings.
- Raise awareness of car sharing and the Worcestershire Car Share Database by targeting the top ten employers in the district with information and marketing
- Host a training event for parish councils, volunteer centres and community groups to raise the profile of developing a community car scheme
- Deliver the objectives contained within the Wychavon Travel Plan
- Ensure that enhanced cycle routes and connections are identified and delivered through the allocated development sites in the South Worcestershire Development Plan.
- Review existing cycle provision at all train stations and major bus interchanges in Wychavon and work with Worcestershire County Council and Network Rail to identify whether there are opportunities to enhance cycle and vehicle parking provision at these sites to encourage greater use of public transport.
- Locate and install an electric car charging point for public use in each town within the district.
- Exploit opportunities (e.g. New Homes Bonus, section 106 agreements, other funding) to create circular routes, which are suitable for pedestrians, cyclists and mobility vehicles, around the three main towns and connections to improve access to and from surrounding areas.
- Work with Worcestershire County Council to explore the potential for car share parking points at key locations near major roads.

Wyre Forest District Council (WFDC) has signed up to the Worcestershire Climate Change Pledge, have produced a strategy and produce a Wyre Forest Climate Change Action Plan each year. Key Theme 6 within the Wyre Forest Climate Change Strategy outlines the plans for 'Reducing Energy Use and Emissions from Transport' as follows:

Partners to lead by example e.g. develop green travel plans, procure energy efficient vehicles, and promote 'eco-driving' amongst staff.

Actively participate in the delivery of countywide transport activity e.g. development of school and employer travel plans, delivery of actions in local transport plans, policies and strategies, Worcestershire Car Share Database.

- Work with partners to improve the quality and accessibility of the bus network in the district, e.g. through implementation of bus priority measures.
- Work with partners to implement improvements to the local rail network facilities and services, including the delivery of improved facilities at Kidderminster station.
- Work with partners to identify and provide Park and Ride facilities in the district.
- Develop and deliver planning policies that reduce the need to travel incorporate the development of a sustainable transport infrastructure.
- Promote the purchase of locally produced goods and services.
- Raise awareness about more sustainable transport choices e.g. by providing information about public and community transport options and promoting local walking and cycling maps.
- Continue to enable local people to have a voice about transport issues through forums such as the Wyre Forest Cycle Forum.

2.3.4 Local Planning Policy

Due to recent changes by central government and the introduction of the NPPF, local authorities are currently in the process of rewriting their local development plans to replace the previous Local Development Frameworks. The current status is as follows:

- Bromsgrove DC and Redditch BC have delayed publishing Local Plans until further work has been undertaken to address Housing Growth in Redditch. A consultation on that subject begins on 1st April 2013.
- Worcester City, Wychavon DC and Malvern Hills DC are working in partnership to produce the South Worcestershire Development Plan. Consultation was completed in February 2013 and the final version of the plan is due to be produced and adopted later this year.
- No current timeline for delivery of Wyre Forest DC has been identified.

Future versions of the AQAP will include any relevant policies included in revised Local Development Plans when the information becomes available.

It should be noted the AQAP becomes local policy through adoption by the Local Authority.

2.3.5 Other legislation

The Clean Air Act 1956, extended in 1968, consolidated in Clean Air Act 1993: Regulates black and dark smoke produced by industry; smoke, dust, grit and fumes from boilers and non Environment Agency responses, and Smoke Control Areas. Since all AQMAs within Worcestershire have been declared because of NO₂ this legislation is not relevant to the current AQAP.

3 Air Quality Management Areas in Worcestershire

Currently there are ten declared Air Quality Management Areas (AQMA) in Worcestershire. These are situated within the Bromsgrove, Worcester City, Wychavon and Wyre Forest Districts. No AQMA have been declared within Malvern Hills District Council and Redditch Borough Council areas to date.

At the time of writing the action plan WRS are in the process of preparing committee reports recommending revocation of Newtown Road AQMA and declaration of a new AQMA in St Johns for Worcester City Council to consider. Additionally potential declaration of an AQMA in Stourport on Severn by Wyre Forest District Council may need to be considered following further assessment in the future. These three areas are not considered any further in this AQAP. Information relating to any new AQMA will be incorporated into the Action Plan following declaration of an AQMA and the finalisation of a Further Assessment Report as required by Defra at the time of the annual Action Plan Progress Review.

Table 3-1 below provides a summary of the general details of each current and potential AQMA in Worcestershire.

The following pages of this section present a review of all available data to identify issues for consideration for each of the nine current AQMA including:

- Current AQMA boundary plan and description;
- Prevailing conditions including photos from site visits 2012/13;
- Summary of Further Assessment report;
- Source apportionment data;
- Required reductions to achieve objectives identified from modelling;
- Long term local trends from monitoring data in the last decade;
- Any actions implemented as a result of earlier Action Plans;
- Any relevant actions planned or implemented identified from Local Transport Programme 3 (LTP3);
- Summary of action plans of neighbouring Local Authorities outside Worcestershire with AQMA that bound onto Worcestershire AQMA;
- Summary of Issues identified.

Table 3-1 Overview of current and potential AQMAs in Worcestershire.

District	AQMA	Date Declared	Previous Action Plans	Actions Implemented
Bromsgrove	Kidderminster Road, Hagley	17.02.2010	None	Further Assessment completed March 2012.
Bromsgrove	Lickey End	26.07.2001	Oct 2004	Refer to AQMA Review and Appendices for summary of previous actions considered.
Bromsgrove	Redditch Road	17.02.2010	None	Further Assessment completed March 2012.
Bromsgrove	Worcester Road	24.10.2011	None	Further Assessment completed March 2012.
Worcester City	Bridge Street/ Dolday	01.03.2009	Sept 2010 (Incomplete Draft/WIP)	Further Assessment completed August 2010.
Worcester City	Lowesmoor/ Rainbow Hill	01.03.2009	Sept 2010 (Incomplete Draft/WIP)	Further Assessment completed August 2010.
Worcester City	Newtown Road	01.03.2009	Sept 2010 (Incomplete Draft/WIP)	AQMA to be revoked 2013 following the conclusions of Further Assessment completed August 2010.
Worcester City	St Johns	TBC	None	Declaration to be considered by WCC 2013
Wychavon	Port Street, Evesham	01.09.2007	Dec 2009 (Draft)	Continual monitoring within AQMA demonstrated results fallen below objective but AQAP to be finalised and actioned (PR, 2010). Communications with County Council re implementation of MOVA traffic light system at Waterside/Port Street junction. Features in LTP3 to be considered in conjunction with Abbey Bridge development now due 2013.
Wyre Forest	Horsefair, Kidderminster	06.01.2003 Extended 29.07.2009	2004	Refer to AQMA Review and Appendices for summary of previous actions considered.
Wyre Forest	Stourport-upon- Severn	TBC	None	Requirement for AQMA to be reviewed in 2014
Wyre Forest	Welch Gate, Bewdley	06.01.2003	2004	Refer to AQMA Review and Appendices for summary of previous actions considered.

Table 3-2 Summary of Contributory Factors and Local Impacts for AQMA in order of levels of exceedence

AQMA	Annual Average Daily Traffic (AADT)	Source Apportionment Main Contributor	Street Canyon	Approx. No. of residential properties in AQMA	Predicted no. of people affected by exceedence	1 hour NO ₂ objective applicable	No of exceedences of annual NO ₂ objective recorded 2007-11/ No. of monitoring positions	Highest model predicted NO ₂ / and monitored in 2007 - 11		Reduction in total vehicle emissions required
Horsefair	TBC	Modelling required	Y	97	NQ	N	14/4 ¹	NQ	74.1	NQ
Lowesmoor	TBC	Cars/LGVs 30–45%	Y	327	100+	N	8/4 ²	56.2	60.4 ³	50%
Worcs Rd	TBC	Cars/LGVs 41.3%	Y x 2	55	10 - 100	N	15/8 ⁴	54.9	59.8	25 – 50%
Welch Gate	TBC	Modelling required	Y	20	NQ	N	5/2	NQ	50.3	NQ
Dolday	TBC	HDV 30-45 %	Y	149	100+	N	4/2 ⁵	57.5	46.6 ⁶	50%
Lickey End	TBC	Modelling required	N	29	NQ	N	10/3	NQ	46.5	NQ
Redditch Rd	TBC	Cars 26%, HDV 22.5%	Y x 2	44	10 - 100	N	9/3	46.2	45.6	25%
Hagley	TBC	HGV 32.5%	N	112 + 3 block flats	<10	N	2/4 ⁷	42.7	42.8	10 – 25%
Port St	TBC	Cars 39.3%	Y	86	<10	N	1/8	41.5	41.7	10%

¹ Horsefair – only 3 locations 2007;² Lowesmoor – only 1 location 2007 – 08³ Requires calculation back to nearest receptor;⁴ Worcs Rd - 2 Locs 2007, 4 locations 2008-09, 8 locations 2010-11;^{5 & 6} Dolday Discounts automatic monitoring results 2008 and requires calculation back from roadside to Façade;⁷ Hagley – 2 Locs 2007, 4 locations 2008 – 11

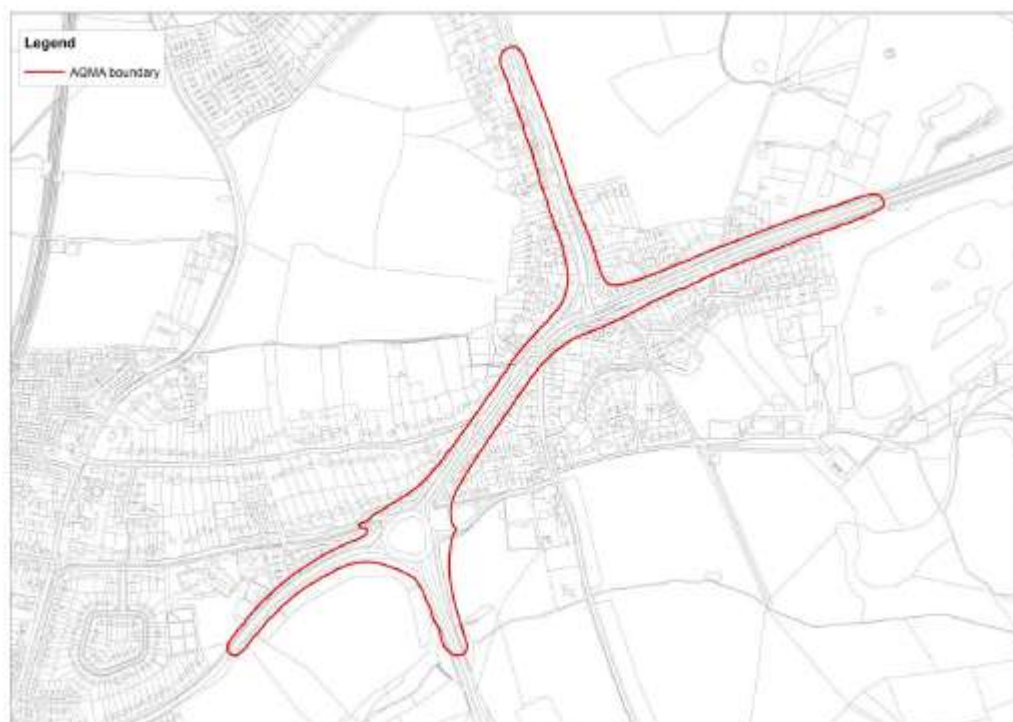
3.1 Kidderminster Road, Hagley AQMA - Bromsgrove District Council

Date of Detailed Assessment: July 2009

Date of Declaration: 17th February 2010

Date of Further Assessment: March 2012

Figure 3-1 Current plan of AQMA



The current area of the Kidderminster Road, Hagley AQMA comprises the conjunction of two major A roads between a busy gyratory at the southern end of the AQMA and a busy traffic light junction at the northern end of the AQMA and extends part way along the various arms from those two junctions.

At the traffic lights the A491 Stourbridge Road (north) meets the A456 Birmingham Road at the bottom of Hagley Hill emanating from a north easterly direction. From the traffic lights the conjunction of these two A roads continues southwest on the main stretch of the AQMA for ½ km culminating in the gyratory at the southern boundary. There are 5 arms leading off the gyratory including the Kidderminster Road AQMA section. The A456 Kidderminster Road continues off in a south-westerly direction and the A491 Stourbridge Road continues in a southerly direction away from the gyratory. The remaining arms are local roads; Park Road (east) which is not within the AQMA and the B4187 Park Road (west). There is a small access T road to residential properties also known as Park Road immediately before the exit from the B4187 onto the gyratory. Some properties within the latter are included in the AQMA as there is no distinctive boundary between that road and the A456 Kidderminster Road.

The current boundary of the AQMA follows the contours of predicted pollution levels produced in the Further Assessment (March, 2012). However these straight contour lines cut through residential gardens and buildings which does not conform to best

practice guidance from EPUK (NSCA, 2001b & 2004) as recommended by Defra (LAQM.TG(09) and PG(09)) thus the AQMA boundary requires amendment.

Currently there are no receptor locations beyond the eastern part of Park Road (west). It would therefore also be appropriate to reduce the southern end of the AQMA boundary to exclude the gyratory and the A491 Stourbridge Road (south) entirely and reduce the extent along the A456 Kidderminster Road (south-west).

3.1.1 Prevailing conditions

AM and PM peak traffic time site observations of the Kidderminster Road AQMA were undertaken in 2012 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 A456 is a busy highway connecting the M5 motorway junction 3 at Halesowen to Kidderminster and beyond. The A491 emanates from Junction 4 of the M5 and continues from Hagley northwards to the populace areas of Stourbridge and Brierley Hill. When compared to other AQMAs in Worcestershire, Kidderminster Road is a relatively wide road consisting of dual carriageway in both northerly and southerly directions separated by a central reservation.

From the gyratory going north the majority of buildings along the stretch of road are detached residential dwellings. The residential setting continues until a number of commercial properties positioned on the eastern side of the carriageway either side of the Bromsgrove Road turning. This includes a car showroom, a newsagents and a public house with a substantial car park. Beyond this on the eastern side the residential properties resume on Market Way, adjacent to the A491 Stourbridge Road/A456 Birmingham Road traffic light junction, and continue half way up Hagley Hill.

No loading and unloading at the commercial properties were observed to cause any traffic issues during site walkovers.

Opposite the Bromsgrove Road turning on the western side of the A456 is a small access road to a newer residential development consisting of 3 storey blocks of flats. These are slightly set back from the main road behind a pull-in bus stop. Detached residential dwellings continue beyond the flats along Stourbridge Road and across the traffic light junction on the western side of the carriageway half way up Hagley Hill.

The pull-in bus stop on the western side of the carriageway allows traffic to continue moving freely on the Kidderminster Road heading north. The stop on opposite side of the A456 located just south of the car showroom is a painted stop on the nearside lane of the carriageway and has the potential to cause traffic to queue. The routes identified at the bus stops were for the 192, 197 and 318. However no buses were observed stopping at either of the bus stop during site walkovers in 2012.

There are single yellow lines both sides and length of AQMA along (A456) but no restrictions on A491. No vehicles were observed ignoring parking restrictions during site walkovers.

There are pedestrian crossing traffic lights adjacent to the car showroom and at the exit/entrance on the A456 to the gyratory. However relatively few pedestrians were

observed in the AQMA in general during peak time site walkovers and even fewer were observed utilising the pedestrian crossings so activation of these light may be appropriately described as infrequent.

The length of the AQMA can be traversed comfortably in 5 to 10 minutes' walk by an average person. Therefore the area 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).

Site observations during the AM and PM peak traffic hours noted the majority of traffic consisted of cars/commuters with some LDVs and few HGVs with almost 100% commuter/cars observed travelling north from the gyratory at AM peak time. The majority of vehicles were noted to have only one occupant. Private Buses were quite numerous at AM peak times heading to schools located on or at least accessible via Park Road (west). School destination traffic was estimated to make up 10 to 20% of vehicles traversing the gyratory and 50% of vehicles turning onto Park Road (west) at AM peak time.

Queuing traffic was observed in the filter lane at the traffic lights heading west onto A491 Stourbridge Road from both northerly and southerly directions on the A456 at peak PM time. From the southerly direction it was observed that traffic gradually built up all the way back to the exit from the gyratory in the nearside lane. Some queuing traffic was observed in the offside lane approaching the exit from Kidderminster Road onto the gyratory. On rare occasions this was observed to be caused by pedestrians utilising the crossings. Generally it was noted traffic only paused here momentarily.

Photo 1: Maximum queue at A491/A456 traffic lights observed AM peak time. Traffic heading north. Looking NW from corner of Bromsgrove Road.



Photo 2: Pedestrian crossing on A456, 3 storey flats beyond pull-in bus stop. Looking SW from Bromsgrove Road.



Photo 3: PM traffic queue at pedestrian traffic lights heading south on A456 to gyratory exit.



Photo 4: PM traffic movement on gyratory. Looking SE from war memorial.



Photo 5: PM traffic queue in filter lane for Stourbridge Road, traffic lights and A456 Hagley Hill in background. Looking N from Kidderminster Road.



Photo 6: PM traffic queue at A491/A456 traffic lights. Looking E from Stourbridge Road



Photo 7: PM Maximum traffic queue observed in filter lane turning W onto A491 Stourbridge Road. Looking SW from Hagley Hill.



3.1.2 Summary of Further Assessment findings (AQC March 2012)

A Further Assessment to confirm the requirement for an AQMA in Kidderminster Road Hagley and undertake modelling to inform potential solutions was completed by independent consultants AQC (Air Quality Consultants) on behalf of BDC and WRS in March 2012. A summary of the findings of the Further Assessment is 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 only being exceeded at a small number of properties near to the Kidderminster Road gyratory and at the Stourbridge Road/Kidderminster Road/Hagley Hill junction. At the majority of relevant locations the annual mean objective is being achieved.
- The highest predicted concentration in 2010 is $42.7 \mu\text{g}/\text{m}^3$, at 62 Kidderminster Road (R15). Concentrations are also predicted to exceed the annual mean objective at 1 Hall Close (R5).
- 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 results demonstrated that the locations where concentrations are $36 \mu\text{g}/\text{m}^3$ or greater are all within the existing AQMA and therefore the boundary does not need to be extended.

3.1.3 Source Apportionment

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).

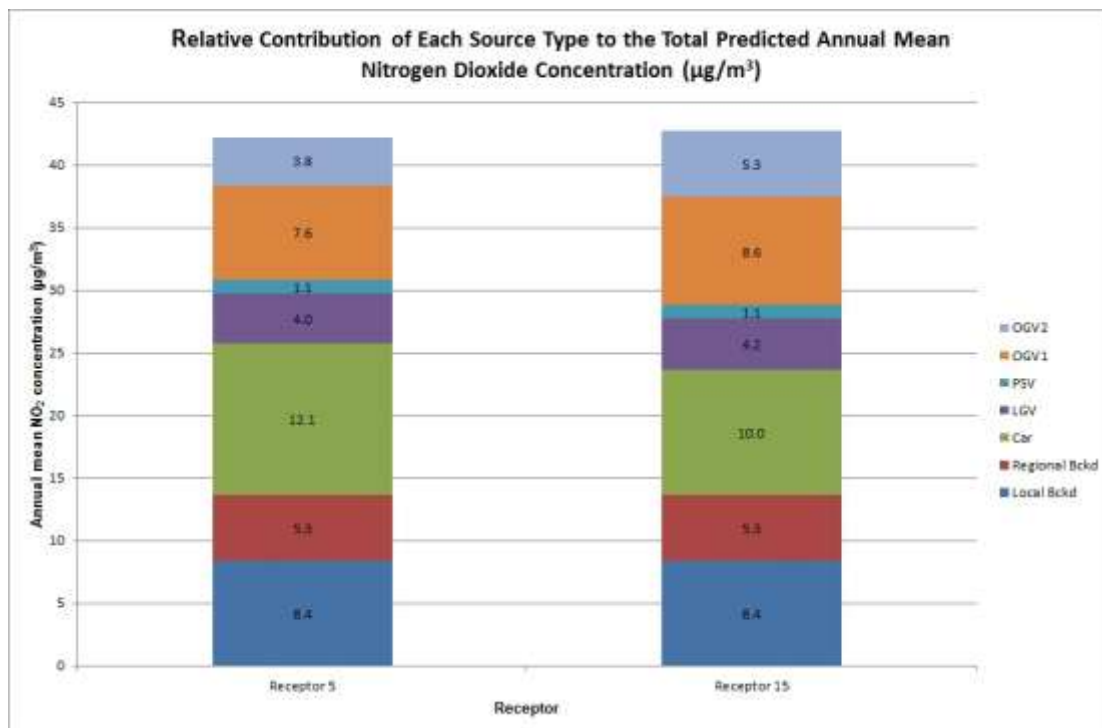
Table 3-3 and Figure 3-2 (AQC, 2012) set out the relative contributions of traffic emissions to the total predicted nitrogen dioxide concentration at two receptor locations.

Table 3-3 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
R5	8.4	5.3	12.1	4.0	1.1	11.4	42.2
R15	8.4	5.3	10.0	4.2	1.1	13.9	42.7
	% Contribution to Total						
	Local Bkgd	Regional Bkgd	Car	LGV	PSV	HGV	Total
R5	19.8	12.5	28.6	9.5	2.6	27.0	100.0
R15	19.6	12.3	23.3	9.7	2.5	32.5	100.0

Two receptor locations (R5 and R15) identified within the Further Assessment have been used to provide an overview of source contributions. Table 3-3 shows the most significant component for both Receptors 5 and 15 is from Cars, HGVs and background concentrations. HGVs, despite making up a relatively small proportion of the total traffic volume (5% on Kidderminster Road) have the largest impact on concentrations (32.5 % at Receptor 15). In most cases, the ambient background concentration and emissions from cars also contribute a significant proportion to the overall concentration.

Figure 3-2 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.



3.1.4 Air Quality Improvements 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 R15 (a property in Kidderminster Road) requiring a reduction of 2.7 $\mu\text{g}/\text{m}^3$ 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 3-4 below sets out the required reduction in local emissions of NO_x in Hagley AQMA to achieve the annual mean objective at two properties where an exceedence was predicted in 2010. At R15 local emissions would need to have been 12.3 % lower in order to meet the objective.

Table 3-4 Required reduction of NO_x in Hagley AQMA

Receptor Number	Receptor	Required Reduction in Annual Mean NO_2 Concentration ($\mu\text{g}/\text{m}^3$)	Required reduction in Emissions of NO_x from Local Roads (%)
R5	Hall Close	2.2	10.3
R15	Kidderminster Road	2.7	12.3

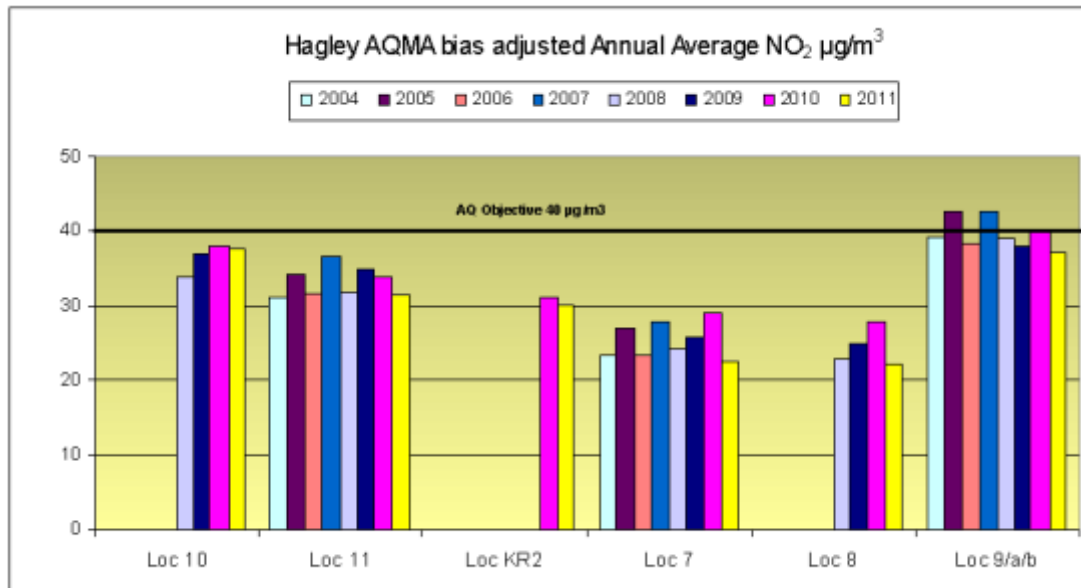
The results highlight that targeting individual types of vehicle on these local roads in isolation would not lead to the annual mean objective being achieved unless the reductions are very large (i.e. greater than 25% reduction in cars or HGVs). This is primarily because the background concentration, which is not influenced significantly by very local emissions, contributes a large proportion of total nitrogen dioxide concentrations. Reducing total vehicle emissions by between 10 to 25% would be a potentially effective measure for achieving the objectives at all 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, only a small number of people (approximately three properties) are subject to exceedences of the annual mean objective and the extent of the exceedence is relatively small (2 to 3 $\mu\text{g}/\text{m}^3$ above the objective) (AQC, 2012).

3.1.5 Long term local trends in NO_2

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 Hagley.

The graph below depicts these long term trends from bias adjusted annual average results of NO_2 at relevant exposure receptor locations.

Figure 3-3 Bias adjusted annual average NO₂ monitoring results in Hagley 2004 - 2011

Loc 10 - 77a Park Road; Loc 11 - 74 Worcester Lane; Loc KR2 – 10 Kidderminster Road; Loc 7 – 5 Stourbridge Road; Loc 8 – 9 Market Way; Loc 9/a/b – 78 Kidderminster Road

3.1.6 Summary of progress of actions identified or implemented to date

No previous action plans have been produced for the Kidderminster Road, Hagley AQMA.

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

One action, NE5 - Hagley Station Enhancement, has been identified within the County Councils transport strategy as having a potential impact on the Hagley AQMA. This LTP3 action involves improvements to passenger facilities at the train station. This general improvement to public transport potentially has an indirect benefit for local air quality and the impact depends on general public willingness to change behaviour and switch to public transport for long journeys. Worcestershire County Council Highways confirmed in February 2013 that there were no proposals for progressing this action at that time.

3.1.8 Neighbouring authority actions

Consideration has been given to the potential impacts from AQMAs within neighbouring authorities bordering Worcestershire County.

As the Hagley area is on the north western boundary of the Bromsgrove District Council it borders a local authority outside of Worcestershire; Dudley Metropolitan Borough Council (DMBC). DMBC declared a borough wide AQMA in December 2007 and produced an AQAP in March 2011. Consideration should therefore be given to ensuring that identified/preferred actions/solutions will not conflict with any actions being undertaken in the DMBC area and DMBC will be consulted regularly on the contents of and progress within this AQAP.

Similarly a review of the DMBC action plan was undertaken to identify any planned actions by DMBC that could significantly impact on the Hagley AQMA. The action plan identifies 15 areas within DMBC with exceedences of the NO₂ objectives due to roadside emissions. Two of those were identified to be on routes connected directly to Hagley: no7. Hagley Road, Halesowen and no 9. Lye. No actions anticipated to have a direct effect on the Hagley AQMA were identified. However a number of indirect actions in the following sections could have a wider positive impact on surrounding areas in harmony with solutions identified in this AQAP: Improving Public Transport & Rail Freight Facilities, Reducing Vehicle Emissions, Information and Awareness Raising and Encouraging Changes in Travel.

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

Issue KR1 - Kidderminster Road, Hagley AQMA comprises the junction of two major A roads between a busy gyratory and a busy traffic light junction used by high volumes of trans-boundary traffic.

Issue KR2 - 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 residential garden areas and sections of road not bounded by relevant exposure within identified 36 µg/m³ contour i.e. the gyratory, the A491 Stourbridge Road (south) and the A456 Kidderminster Road (south-west)

Issue KR3 – Majority of vehicles were noted to be single occupancy commuter cars.

Issue KR4 – A number of private buses heading for schools in Park Road.

Issue KR5 – Queuing traffic observed in both directions on A456 heading for A491 Stourbridge at both AM and PM peak times. In southerly direction queues observed spilling out of filter lane up Hagley Hill at times. In northerly direction observed queuing right back to gyratory at times.

Issue KR6 - The results of modelling in the Further Assessment indicate that the annual mean nitrogen dioxide objective is only being exceeded at a small number of properties (approximately three) within the AQMA and the extent of the exceedence is relatively small (2 to 3 µg/m³ above the objective). Measures within the Action Plan need to be proportionate to the scale of the exceedence of the objective and the number of people affected.

Issue KR7 – Source apportionment in Further Assessment demonstrated HGVs have the largest impact on concentrations (32.5 % at Receptor 15) despite making up only 5% of total traffic volume. In most cases, the ambient background concentration and emissions from cars also contribute a significant proportion to the overall concentration.

Issue KR8 – Long Term Local Trend data indicates only three exceedences have been recorded in last 7 years all at one receptor and a general downward trend is noted in the last four years. Additional monitoring positions have been erected in 2012 at appropriate receptor locations identified within the Further Assessment by AQC to improve coverage of relevant exposure.

3.2 Lickey End AQMA - Bromsgrove District Council

Date of Detailed Assessment: 30.01.2001 (Stage 3 Local Air Quality Review and Assessment)

Date of Declaration: 26.07.2001

Date of Further Assessment: September 2002 (Stage 4 Air Quality Review and Assessment)

Figure 3-4 Current plan of Lickey End AQMA



The Lickey End AQMA comprises approximately 29 residential properties along four roads emanating from the Junction 1 M42 gyratory, 2km north-northeast of Bromsgrove Town Centre. Additionally there is a slip road exiting onto the eastbound M42 below and a further slip road for westbound traffic exiting the Motorway to join the gyratory. The motorway under-passes beneath the gyratory and continues onto join the M5 at junction 4a.

The A38 Birmingham Road connects the gyratory with Junction 4 of the M5 to the northwest and continues around Bromsgrove from the south-western arm of the gyratory. The town centre is accessible from a filter lane set of traffic lights going south beyond the AQMA. The A38 continues onto the Sideslow gyratory connecting with the A448 to Redditch. From here the A38 continues south-westwards around the main suburban and Town Centre areas of Bromsgrove onto Junction 5 of the M5 at Wychbold, and then Droitwich and Worcester City beyond.

The B4096 Old Birmingham Road exits from the northeast arm of the J1 M42 gyratory. This connects to the village of Lickey and the popular Lickey Hills Country Park.

The B4096 Alcester Road exits the J1 M42 gyratory to the southeast. This is a comparably quieter road connecting to the small village of Burcot, HMP Brockhill and Redditch beyond.

The current area of the AQMA incorporates residential dwellings and associated gardens, the Forest Harvester Public House, Paul Matty Sports Car showroom and the gyratory itself. However, it should be noted the annual average air quality objective does not apply to residential garden areas or commercial properties and the one hour average does not apply to this locality (Defra, 2009).

3.2.1 Prevailing Conditions

AM peak traffic time site observations of the Lickey End 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 walkovers are included at the end of this section.

The A38 Birmingham Road at Lickey End is the major route for traffic travelling between Bromsgrove and the busy urban centre of Birmingham, surrounding suburbs and further afield via the M5 Junction 4a and the M42. Unsurprisingly the southern A38 arm of the gyratory is one of the busiest and congested stretches of road in Bromsgrove district. Additionally this route becomes heavily congested during occasions of serious road traffic incidents on the M5 when used as an alternative route.

There are residential properties on either side of the A38 Birmingham Road south of the gyratory. On the west side are 7 semi-detached properties within the AQMA situated between 10 and 31m from the roadside and screened by tall vegetation at the entrance to the side road. On the eastern side are a row of 5 terraced properties all approximately 9m from the roadside.

Closer to the gyratory on the eastern side of the carriageway is the Forest Harvester public house which is accessible from both the A38 and the B4096 Alcester Road. A pedestrian pelican crossing is situated on the A38 approximately at the boundary of the AQMA and the access to Barnsley Hall Road. Continuing south of the AQMA on the eastern side of Birmingham Road are further residential properties which continue up to and beyond the busy cut through junction of School Road, separated only by an Esso petrol station just south of the AQMA boundary.

On the western side of the carriageway Barnsley Hall Road connects to Birmingham Road just south of the pedestrian crossing and the AQMA boundary. Detached residential properties set back from the A38 continue on until the private Mount School at the junction where Birmingham Road diverts from the A38 via a filter lane and continues towards the town centre.

The length of the AQMA can be traversed comfortably in 5 to 10 minutes' walk by an average person depending on the number of pauses for traffic. Relatively few pedestrians were observed in the AQMA during peak time site walkovers but several pauses in traffic caused by pedestrians utilising the crossing at the southern boundary were noted particularly around 9am. The character of the 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).

During AM Peak traffic observations it was noted traffic moving north towards the gyratory was heavy but generally moving although occasionally queued from beyond the entrance to the Esso garage, further south of the AQMA boundary. Traffic was observed to contain a mixture of cars, LGVs and HGVs.

Congestion in the opposite direction is generally attributed to the narrowing of the road from two lanes to one just after the entrance to The Forest Harvester Public House which causes a bottle neck effect. Generally traffic in this direction was heavy and slow moving at all times from the gyratory to beyond School Lane to the south. The traffic was noted to move more speedily on approach to the filter lane and exit for Bromsgrove Town Centre and beyond.

Lickey End First School is accessed from the busy turning of School Lane south of the AQMA. A number of coaches and buses were observed exiting this busy turning heading South on A38. There is a filter lane on northern approach to School Lane. Turning into or exiting School Lane was observed to generally require a driver in the constant stream of slow moving traffic travelling south to give way.

A nursery school and an emergency vehicle station are situated in Barnsley Hall Road which joins the A38 going north to the gyratory just south of the AQMA boundary. Traffic turning into this road exiting the gyratory was not observed to be an issue as the carriageway is sufficiently wide enough for another car to pass on inside of a vehicle waiting to turn. However there is not enough space to allow LGVs or HGVs to pass a stationary vehicle. Similarly traffic exiting from this side road onto the A38 going north to the gyratory is not considered to be an issue from observations. Traffic attempting to turn right out of Barnsley Hall Road is considered to be problematic as this potentially holds up other traffic in both directions.

Similarly traffic turning right into the Harvester PUBLIC HOUSE car park from a northerly direction was observed to cause congestion behind the turning vehicles. A few vehicles were also observed using the car park as a cut through to Alcester Road.

Vehicles exiting right from the Esso garage towards the gyratory were notably few but were observed to also cause congestion to vehicles in both directions.

There are two lanes on approach to a set of traffic lights on either arm of the A38 Birmingham Road onto the gyratory. On the gyratory itself are a number of lanes and cross hatch markings to keep exits clear however it was noted the restriction on exit to B4096 Alcester Road was being ignored by drivers heading southwards towards Bromsgrove via the A38. The lane markings for exit onto the B4096 northwards and the slip road onto the M42 for eastward bound traffic appears to cause confusion to some drivers noticed from a few incidents.

From the gyratory going north on the A38 Birmingham Road there are no residential dwellings on the western side for some distance beyond the boundary of the AQMA. There are 4 properties on the eastern side of the carriageway adjacent to the approach to the gyratory. Notably these are relatively set back from the carriageway, being approximately 18m at the closest point. Traffic exiting this arm onto the gyratory was generally observed to be moving fast although busy and majority of vehicles were heading south onto A38. Mainly cars but some LGVs and HGVs were observed.

The two slip roads to and from the M42 are continuously busy. Traffic was moving on the M42 freely at time of site observations.

There are two bus stops within the AQMA on either arm of the A38 Birmingham Road, one going north opposite aforementioned houses and the other going south is situated outside the Forest Harvester PH. Both are pull-in lay-bys and therefore are not considered to contribute significantly to congestion. Routes are for 183 and 202. However, further along Birmingham Road just south of the Esso garage is another stop on the north bound side of the carriageway which is a painted road marking in a single lane and therefore has potential to cause congestion a short distance south of the AQMA.

The B4096 Old Birmingham Road is a popular cut through from Rednal and Longbridge areas to Lickey End for commuter traffic travelling into and out of Birmingham. The minimal traffic observed exiting this junction was estimated at 60% heading towards Bromsgrove and 40% joining the M42 eastbound. There are residential properties on the western side of this road immediately after the exit from the gyratory and continue up the hill into Lickey. On the western side of the road there are 6 semi-detached properties the closest of which is only 4-5m from the roadside.

On the eastern side of the road residential properties line the road after the Paul Massey Sports Cars establishment. Four of these detached and semi-detached properties are within the AQMA. They are approximately 10m set back from the roadside with garden areas and hedges, some substantial, in front.

On the southbound arm of the B4096, Alcester Road, 90% of traffic was observed to be cars heading south. Minimal traffic was observed heading down this road. However a few vehicles were observed using the Forest Harvester car park as a drive through short cut.

There are double yellow lines at the entrance/exit on each arm of the B4096 leading away from the gyratory for approximately 20m. No vehicles were seen ignoring the parking restrictions during the site walkovers. It is noted there are no prominent traffic restrictions on either approach to the gyratory on the A38 or around the gyratory itself. Double yellow lines were noted on the A38 Birmingham Road terminating just before the Esso petrol station south of the current AQMA boundary.

No loading or unloading at either of the commercial properties (The Forest Harvester and Paul Massey Sports Cars) within the AQMA were observed to cause any traffic issues during the site walkovers.

Photo1: Traffic exiting School Lane causes pause in slow moving traffic heading S into Bromsgrove. Looking NE on A38 south.



Photo 2: Continuous traffic heading towards Bromsgrove on A38 S just S of AQMA



Photo 3: Looking NE on A38 S to Forest Harvester Inn and adjacent properties within AQMA. Continuous slow moving traffic heading into Bromsgrove.



Photo 4: Looking SE on A38S to converging traffic adjacent to residential properties within AQMA.



Photo 5: Slow moving traffic exiting gyratory heading S onto A38. Looking E from A38



Photo 6: Vehicle exiting right from Barnsley Hall Road causing pause to traffic heading S on A38.



Photo 7: General AM Peak traffic flows on A38 S just south of AQMA boundary.



3.2.2 Summary of Further Assessment

Further assessment of Lickey End was undertaken within the Stage 4 Air Quality Review and Assessment report (Casella Stanger, 2002). Detailed dispersion modelling was undertaken to predict concentrations of NO_2 and NO_x in 2002 and 2005 at 409 property facades and utilised traffic data and background tools from 2002.

The locations of 16 properties where NO_2 exceedences of $36 \mu\text{g}/\text{m}^3$ were predicted for 2005 were shown in plan form. However it is noted that only 7 of those sites shown were residential dwellings. Worse predicted locations were adjacent to the M42 eastbound slip road which is comparable with Long Term Trends identified below.

3.2.3 Source Apportionment Data

Additional modelling was undertaken within the Stage 4 assessment to provide NOx source apportionment for 38 receptors in the area of the Lickey End site where predicted concentrations were above $36 \mu\text{g}/\text{m}^3$ for 2005. The percentage contribution from each vehicle class identified in the report is shown below in Table 3-5.

Table 3-5 Percentage contribution of NOx in 2005 in Lickey End AQMA

Percentage contribution of NOx of Local Sources				
Vehicle Class	Cars	LGV	HGV	Bus
Mean NOx %	30	10	58	3
Min NOx %	27	8	52	2
Max NOx %	31	12	63	5

Please note the above table does not include regional or local background sources of NOx and therefore does not demonstrate the proportions of total NOx or NO₂. It is only a representation of vehicle class contributions as percentage of the local sources element of Total NOx and the size of this element is not specifically defined within the Stage 4 report.

3.2.4 Air Quality Improvement Required.

The requirements for improvement identified in the Stage 4 assessment are detailed in Table 3-6 below.

Table 3-6 Air Quality Improvements Required in 2004 in Lickey End AQMA

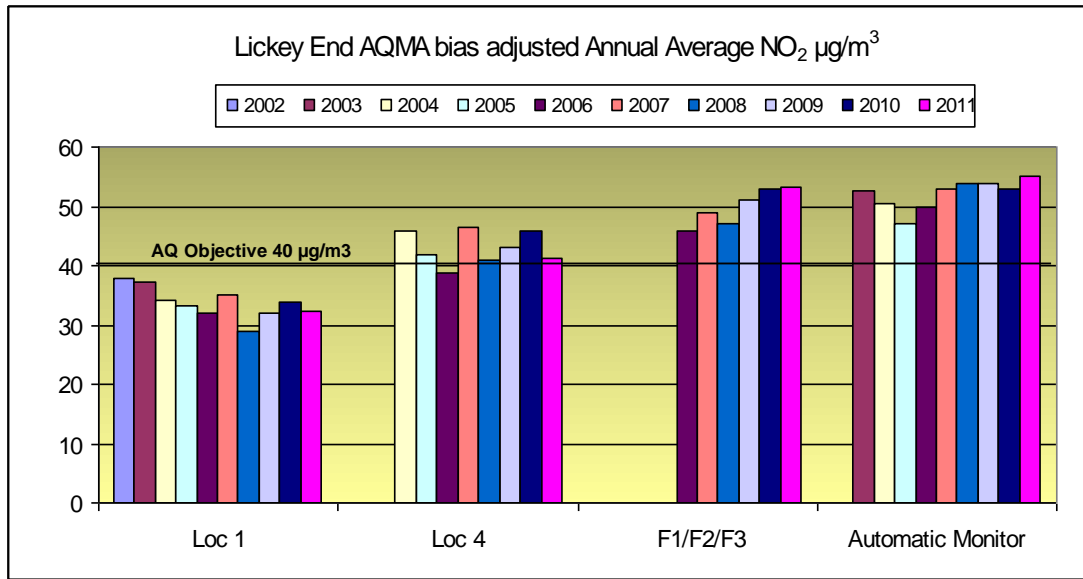
	NO ₂ ($\mu\text{g}/\text{m}^3$)	NOx ($\mu\text{g}/\text{m}^3$)
Lickey End Max. 2005 predicted concentration	41.6	115.4
Annual mean Air Quality Objective	40.0	107.2
Reduction in NOx required		8.2

3.2.5 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 Lickey End.

The graph below depicts these long term trends from bias adjusted annual average results of NO₂.

**Figure 3-5 Bias adjusted annual average NO₂ results from monitoring 2002 - 2011
Lickey End AQMA**



Loc 1 – 3a Alcester Road; Loc 4 – 288 Birmingham Road; F1/F2/F3 and Automatic Monitor – Gyratory roadside

It should be noted the position of the Automatic Monitor and F1/F2/F3 do not represent relevant receptor locations. The data requires further adjustment to provide relevant exposure at the façade of the nearest residential currently occupied residential dwelling, 1 Old Birmingham Road, 29m away from the monitoring location. There is a potential residential property only 15m away; however this has been unoccupied as a dwelling for some years and is part of the Paul Massey Sports Car concern. However consideration should be given to this more proximal property being brought back into residential use in the future when making spatial adjustments to monitored data subject to the property being ‘residential’ under planning categorisation at that time.

Accordingly the measured data for the Automatic Monitoring and location F1/F2/F3 has been adjusted back from the roadside position using the calculator tool provided by Defra. Two sets of figures have been calculated for each set of data to reflect levels at the façade of both the nearest potential receptor (nr) at 8.5m from roadside and the nearest current occupied property at 1 Old Birmingham Road (1OBR) at 14m from roadside. An average of data from two local background monitoring positions, BG3 Finstall Primary School and BG4 Charford Primary School, were used in the calculation tool. The results are presented in Table 3-7 below and presented graphically in the graph below. Data from Location 4 – façade of 288 Birmingham Road, 75m away from gyratory on the A38 south, is included for comparison.

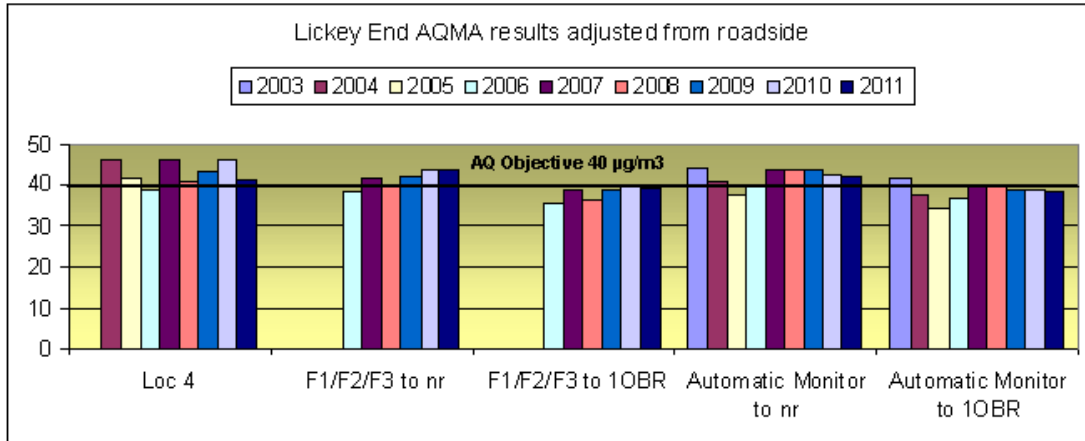
Table 3-7 Lickey End monitoring data recalculated to nearest relevant exposure (nre)

Year	F1/F2/F3 to nr	F1/F2/F3 to 1OBR	Auto Monitor to nr	Auto Monitor to 1OBR	Loc 4
2003			44.4	41.6	
2004			41.1	37.9	45.7
2005			37.8	34.6	41.9
2006	45.9	38.5	40.3	37.0	38.8
2007	41.7	38.8	43.5	40.2	46.5

2008	39.6	36.6	43.3	39.6	41
2009	42.4	38.9	43.3	39.6	43
2010	43.6	39.8	42.5	38.9	46
2011	43.3	39.3	42.1	38.4	41.2

Exceedences are presented in bold; highest recorded/recalculated figures for each year are presented in red bold. Nr = Nearest potential receptor. 1OBR = 1 Old Birmingham Road

Figure 3-6 Readjusted monitoring results Lickey End AQMA



The data indicates in four of the nine years the highest measured figures at relevant exposure are at Location 4 – 288 Birmingham Road. Adjusted measurements demonstrate the levels of NO₂ are higher at the façade of Location 4 than 1 Old Birmingham Road in every year and there have been no exceedences at the façade of the latter property since 2007. A number of exceedences are indicated at the façade of the nearest property which had it been occupied as a residential dwelling would be representative of relevant exposure.

3.2.6 Comment on Further Assessment

Clearly the data within the Stage 4 report is now 11 years old and may not be representative of the situation in the present day. Furthermore the modelling included traffic data for both directions of the M42 either side of the gyratory. Whilst the inclusion of this is not considered incorrect it is unclear from the report if the difference in height to the roadside sources on the M42 which is tens of metres (exact height to be confirmed by HA) has been considered within the assessment. Since NO₂ is heavier than air it will tend to sink and be more concentrated at ground level. Guidance on this matter was sought from the available technical guidance and Defra in February 2013. LAQM helpdesk advised:

'Unfortunately there is no prescriptive guidance on appropriate assumptions to make with regards to variation of pollutant concentrations with height due to the complex and site specific wind effects within street canyons. The variation in pollution levels will be dependent on location, traffic, layout, background and meteorology... but particularly in street canyons, it is possible that concentrations at elevated locations may be similar to those at ground level. This can result from reduced dispersion in a canyon and also because some HGVs and buses have raised exhausts.'

However as the M42 is a wide six lane carriageway below the gyratory it is not considered to meet the description of a street canyon. Furthermore, consideration could be given to the underpass acting as a confined space trapping emissions. No

doubt emissions from traffic below the gyratory will be contributing to total emissions affecting the air quality above but possibly not at the levels below on the M42. Thus, whilst the traffic data from the M42 cannot be dismissed the percentage of sources contributing to poor air quality apportioned to the various vehicle types is possibly being skewed by this traffic data and not wholly representative of the actual situation. The outcomes of the Stage 4 report led to the assertion in the following 2004 AQAP that the dominant source of NO_x emissions in the AQMA are from HGVs on the M42. In light of the considerations above this conclusion which has formed the basis of many actions in the previous AQAP may have been erroneous.

This issue is reflected within the Long Term Trend data above. Whilst the highest recorded levels of NO₂ are at the roadside location on the gyratory, these are not significantly higher than those recorded at Location 4 – 288 Birmingham Road, which is situated 75m away from the gyratory, when the data is appropriately spatially adjusted to the façade of the nearest property. The results are in fact lower than Location 4 in four of last eight years. Furthermore when considering the proximity of Location 1 - 3a Alcester Road to the motorway in comparison to Location 4 it is noted measured results are much lower. This further implies the M42 is not as influencing a source of emissions at Lickey End AQMA as considered in earlier reports and the focus of mitigating actions should be on more localised sources at the gyratory ground level.

It is considered necessary for up to date modelling utilising current data and tools to be undertaken to provide more relevant source apportionment and required NO_x reduction information to better inform future updates to this action plan. This would likely benefit from measured data from additional monitoring positions in the AQMA particularly along the A38 Birmingham Road (south) vicinity.

Summary of progress of actions identified or implemented to date

As mentioned in the above section an Air Quality Action Plan was produced by BDC in October 2004. A number of options and measurements were identified within the plan to improve air quality within the AQMA. An update on these options and measurements were regularly produced for annual Progress Reports for Defra and local Air Quality Task Group. The most recent update in 2010 is included in full detail as Appendix 1 to this report. A brief description of the actions and progress to date is summarised below in Table 3-8.

Table 3-8 Summary of options targeted in 2004 Lickey End AQAP

Action ID	Description	Outcome to Date
Option 1	Restrict speeds on M42 to 50mph	No changes proposed by Highways Agency
Option 2	Reduction in traffic flows on M42	No measures identified that would enable action
Option 3	Reduction in HDV flows on M42	No measures identified that would enable action. M42 J1 does not qualify for Ramp Metering
Option 4	Reduction in overall background levels	Ongoing, see measurements below
Option 5	Introduction of Tolls	No plans to introduce tolls in this vicinity.
Option 6	Improvements to J1 M42	Box markings completed at J1 in 2008
Option 7	Removal of the M42 J1 slip roads	No changes proposed as could lead to worsening situation on local roads
Option 8	Improved layout/signing on M42 J1 westbound – M5 J4A	Road Safety Audit was expected for autumn 2009. Further improvements to

Action ID	Description	Outcome to Date
	to reduce collisions & congestion	be implemented 2009/10
Measurement 1	Coordinate AQAP with LTP	Relevant action plan measures incorporated within LTP3
Measurement 2	Improve public transport facilities & develop Quality Partnership with providers	Bromsgrove Railway Station rebuilding programme progressed in 2011. A detailed public transport assessment for town centre was undertaken by WCC in 2007.
Measurement 3	Develop a Council Travel Plan in accordance with LTP	Work suspended due to restructuring of Council through shared services project with RBC and formation of WRS
Measurement 4	Encourage uptake of Employer & School Travel Plans	50% of County's schools reported to have travel plans in place by 2007. LTP2 proposed 100% by 2010
Measurement 5	Improve cycling & walking facilities within Bromsgrove & encourage take up	14% increase in cycling in 2001 – 2006. Increases of 33 – 37% in cycling after intro of Travel Plans
Measurement 6	Develop Freight Quality Partnerships	Countywide Freight Quality Partnership includes a Lorry Route Map
Measurement 7	Ensure AQ is considered as part of planning process	Ongoing. Occurs as part of planning process. Countywide Air Quality Planning Protocol adopted in 2009
Measurement 8	Improve sustainable transport links serving new developments	Ongoing. Occurs as part of planning process.
Measurement 9	Develop supplementary planning guidance on air quality assessments	Countywide Air Quality Planning Protocol adopted in 2009
Measurement 10	Develop a local air quality strategy	Countywide Air Quality Strategy adopted in February 2009
Measurement 11	Continue local monitoring	Ongoing
Measurement 12	Action Plan & annual progress reports available on Council website	Documents are available on BDC website. Last three annual reports available on new WRS website from Autumn 2012.
Measurement 13	Promote profile of air quality	Launch of Countywide Air Quality Strategy in February 2009

3.2.7 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 Lickey End AQMA. The LTP3 scheme code, brief description and current status as provided by WCC in February 2013 is shown in Table 3-9.

Table 3-9 LTP3 actions impacting Lickey End 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.

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

Issue LE1 - AQMA boundary needs redrawing to exclude rear residential garden areas and motorway areas not representative of relevant exposure locations. Should be undertaken following revised detailed dispersion modelling to take into consideration any other required amendments.

Issue LE2 - The southern A38 arm of the gyratory is one of the busiest and congested stretches of road in Bromsgrove. This route comes under increasing pressure during occasions of serious road traffic incidents on the M5.

Issue LE3 - Pedestrian crossing on A38 south causes pause to traffic flow.

Issue LE4 - Narrowing of carriageway from two lanes to one causes bottleneck to traffic flowing into Bromsgrove atop of A38 Birmingham Road south.

Issue LE5 - School Lane is a busy junction further south of the AQMA that can cause pauses in traffic in either direction.

Issue LE6 - Traffic exiting right from Barnsley Hall Road causes pause in traffic flow in both directions.

Issue LE7 - Traffic turning right into Harvester from A38 south causes pause in traffic flow.

Issue LE8 - Vehicles exiting northwards from Esso garage causes pause in traffic flow in both directions.

Issue LE9 - Lane markings on approach to B4096 north and the M42 access slip road appear to cause some confusion to drivers.

Issue LE10 - Painted bus marking going north on A38 Birmingham Road south has potential to cause congestion a short distance south of the AQMA.

Issue LE11 - No visible restrictions on gyratory with exception of Box markings which are sometimes ignored.

Issue LE12 - Long term local trend data indicates highest levels of NO₂ at current relevant exposure on A38 Birmingham Road south. Relevant exposure at current commercial property could be a significant issue if brought back into residential use. Consideration for working with planning and developers to avoid this situation.

Issue LE13 - Further assessment based on traffic data, modelling and tools over 11 years ago. A new further assessment should be provided utilising up to date data and tools to give more appropriate source apportionment and reductions required with careful consideration of change in elevation to M42 sources in modelling.

Issue LE14 - Additional monitoring points are required to provide better data from residential properties within and just beyond the current boundary.

Issue LE15 - A number of options have been identified in previous action plan specifically aimed at changes to M42 traffic flows. Most have been unachievable and remain unactioned. Bias adjusted long term local trend data suggests there has not been any significant improvement in NO₂ levels since production of previous AQAP, although spatially adjusted Automatic Monitor data suggests marginal downward trend in last 5 years. Previous emphasis on actioning sources from M42 maybe misguided.

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.

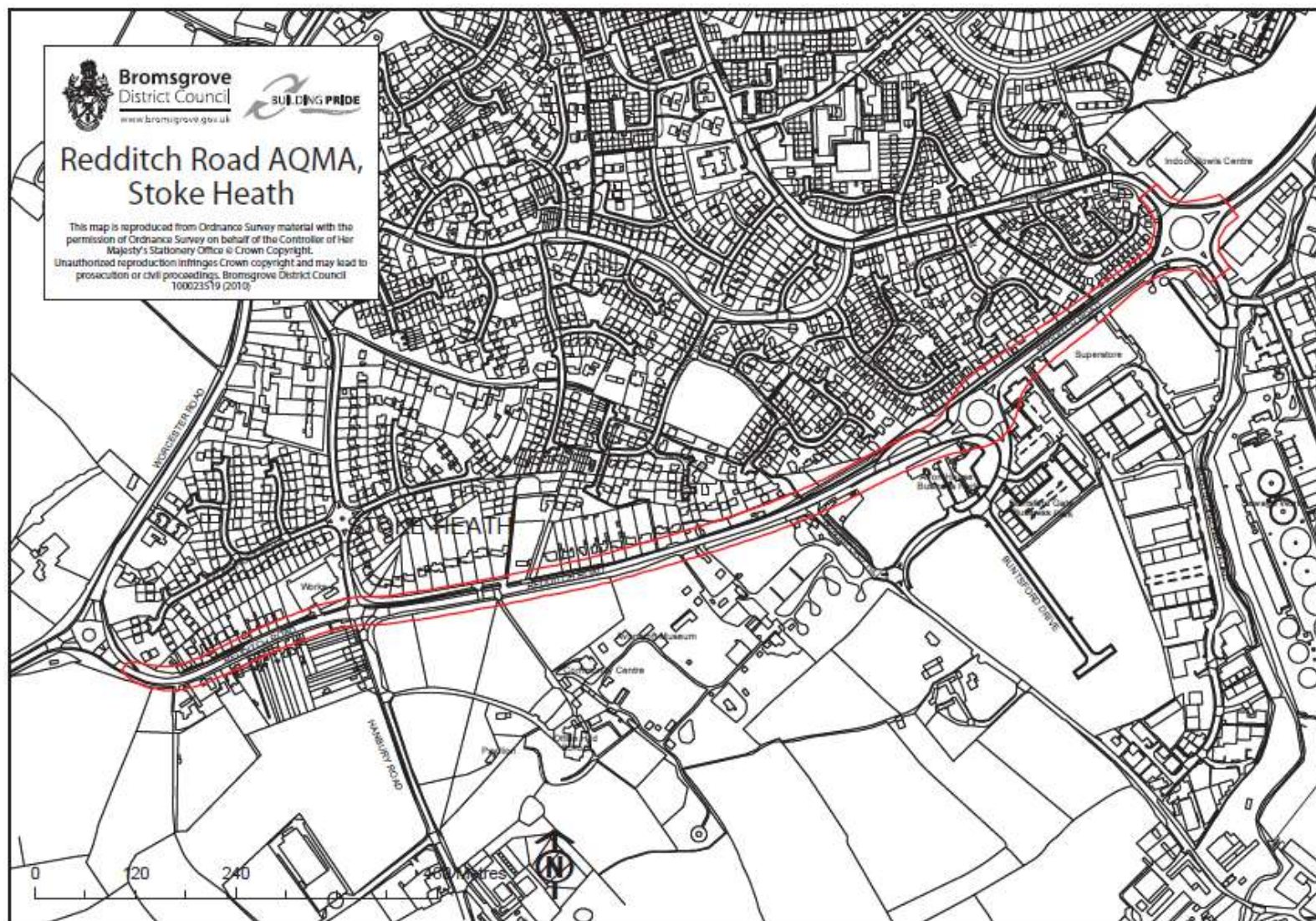
Avon House and Buntsford Gate Business Parks are accessed via Buntsford Drive from a further gyratory 290m to the south-west on Redditch Road. There are no further accessible roads along the AQMA until near the far western end at the cross roads with B4091 Hanbury Road. However there is one other inaccessible 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 Public House 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 focus 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 are slightly set back

and a number of semi-detached properties closer 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 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 is a single white line on either side of the carriageway the length of the AQMA.

Little pedestrian traffic was observed during the site visit and 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 gyratory systems. The Hanbury Turn Public House has a car park accessible from the Redditch Road so should provide access to the Public House 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. 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 the parked LGVs 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 has 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.

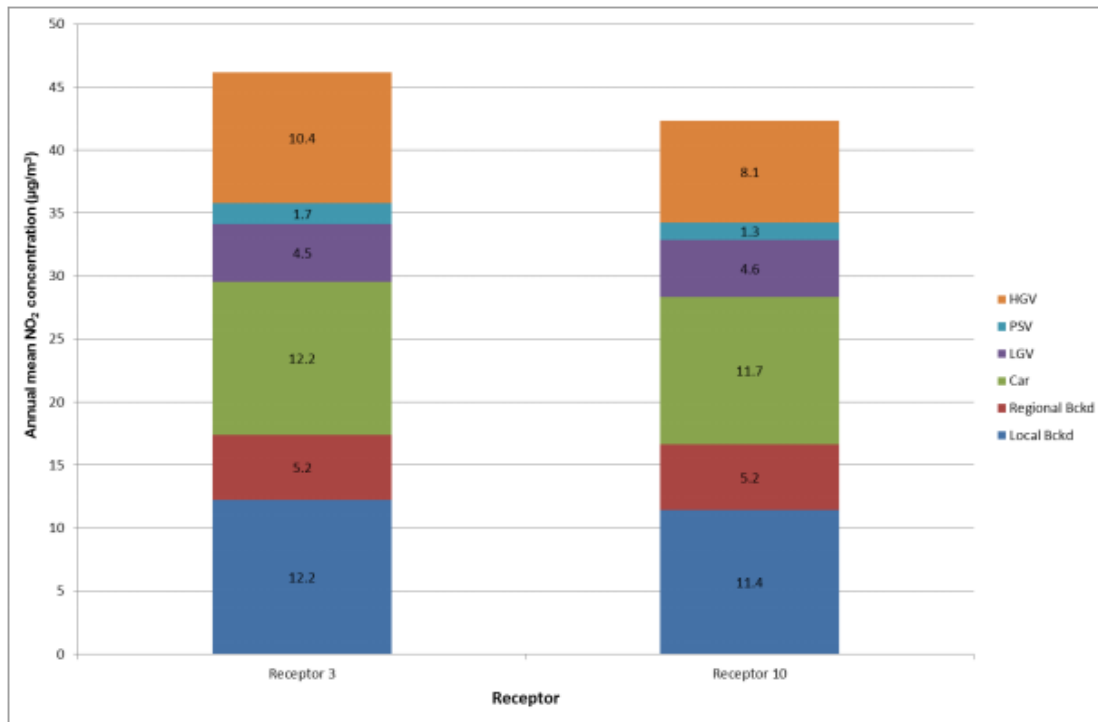
Table 3-10 Predicted Annual Mean (2010) Nitrogen Dioxide Concentrations and the contribution of Each Source Type to the Total

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 (R3 and R10) 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 NOx 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.

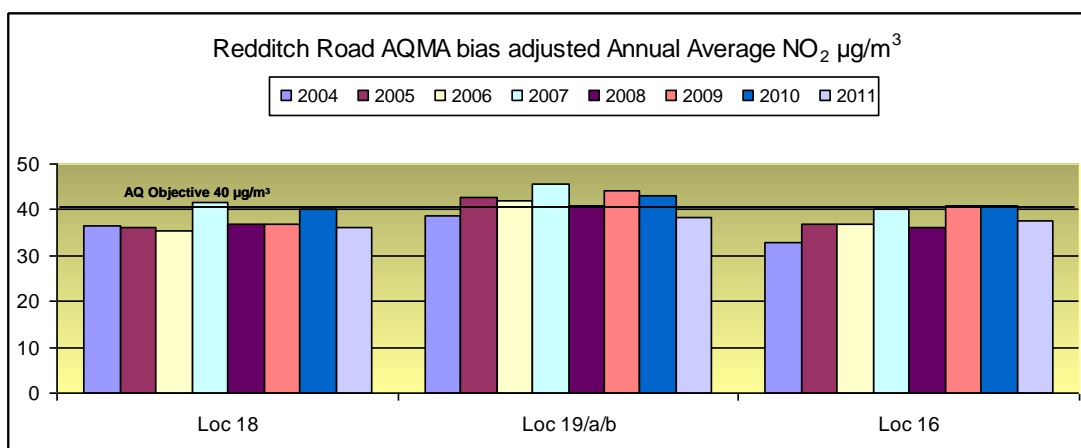
Measures within the Action Plan need to be proportionate to the scale of the exceedence of the objective and the number of people affected. In this case, 10 to 100 people are subject to exceedences of the annual mean objective (AQC, 2012b) and the magnitude of the exceedence ranges from relatively small 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 reports submitted by BDC to produce a 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 review of additional monitoring results.

Issue RR4 - The topography at the western and eastern extents is likely to be a contributing factor to 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 are 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 the 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 the top of an incline at Hanbury/Redditch Road crossroads.

Issue RR10 - Source apportionment in Further Assessment 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.

3.4 Worcester Road AQMA - Bromsgrove District Council

Date of Detailed Assessment: July 2010
Date of Declaration: 24th October 2011
Date of Further Assessment: March 2012

Figure 3-9 Plan of AQMA



The Current area of the AQMA comprises the B4091 Worcester Road single carriageway from St Peters Church at the bottom of Rock Hill up to and including the gyratory with the A448 Kidderminster/St Johns Road.

At the AQMA's southern extent is a mini roundabout providing access to the residential areas of Charford to the east and Highfield Road to the west. South Bromsgrove Community High School and St Peters Catholic First School are also accessible via Charford Road from the mini roundabout. Further residential properties line a large proportion of the B4091 Rock Hill as it continues south-west before joining the A38 Worcester/Redditch Road gyratory at the western extent of the Redditch Road AQMA. The A38 continues south-west to Wychbold and Junction 5 of the M5, and then onto Droitwich and Worcester City.

From the mini roundabout at the northern extent of the AQMA the A448 heads west past Bromsgrove School Housman House, Sanders Park and the residential area of Sidemoor. After passing-under the M5 the A448 heads out of Bromsgrove through several rural communities to Kidderminster.

The A448 turns north from the roundabout at the end of the AQMA into Market Street past a major superstore (Asda's) and the bus station immediately to the west of Bromsgrove Town Centre. At the busy crossroads with the B4091 Stourbridge Road and Birmingham Road the A448 turns east towards the Sideslow gyratory and Redditch beyond. Birmingham Road continues north connecting to the A38 Birmingham Road ½ km south of the Lickey End AQMA at Junction 1 of the M42.

The current boundary of the AQMA follows the contours of predicted pollution levels produced in the Detailed Assessment (July, 2010). However these straight contour lines cut through residential gardens, open fields and buildings which is not compliant with Defra guidance (LAQM.TG(09) and PG(09)) thus an amendment to the AQMA boundary requires amendment.

3.4.1 Prevailing Conditions

AM and PM peak traffic time site observations of the Worcester Road AQMA were undertaken in 2012 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.

From the A448 roundabout St Johns School and a number of commercial concerns bound the southern side of the AQMA on Hanover Street at its northern extent. On the northern side currently is a council car park although this area is earmarked for development with the Bromsgrove Town Centre Regeneration Plans (BDC, 2011).

At about 100 metres from the A448 roundabout there is a zebra crossing at the bottom of the extent of Bromsgrove Town Centre. Here the road bends from a south easterly to a south westerly direction at the junction where Hanover Street continues into Worcester Road. The facades of commercial properties line the pavements around the bend and on for some distance on the western side of the carriageway including the Ye Olde Black Cross Public House. There may be some residential properties on upper floors above retail units and the Public House. In contrast, the eastern side of the carriageway has a row of residential properties (Hanover Place) some just a few meters away from the kerbside for approximately 80m. The narrowness of the carriageway and proximity of buildings to the kerbside creates a street canyon effect in this area.

On the eastern side of the carriageway a wall, approximately 110m long and high trees separate buildings of the Bromsgrove School Senior Campus from the public pathway. Trees on the opposite side of the road may be compounding the street canyon effect mentioned above. Further residential properties, as close as a few metres to kerbside, then continue on for approximately 105m until the Turk Head Public House opposite Sanders Road. The road narrows at this point creating a pinch point (and street canyon) to the traffic flow exacerbated by on street parking adjacent to the residential properties.

On the opposite side of the carriageway the Sanders Road Industrial Estate and other commercial properties including Broad Street DIY, Kwik Fit, Jewsons and a Gym front onto Worcester Road back up to the Black Cross Public House. There is a pull-in layby for parking outside Jewsons and Vinci commercial establishments opposite the Bromsgrove School Senior campus. Continuing southwest from Sanders Road there are residential properties on both sides of the carriageway in close proximity to the roadside with just the width of the pavement to the road in some places.

The residential properties on the eastern side come to an end after approximately 70m at a pedestrian pelican crossing and the main entrance for the Bromsgrove School. Beyond the turning is a pull in bus stop and then a large open space down to the St Peters/Rock Hill mini roundabout filling the corner between Worcester Road, Charford Road and residential properties are setback 95m from the corner (although at the top of the triangular shaped development the nearest property is only 18.5m away from the kerbside but still some considerable distance in terms of proximity to NO₂ emissions).

On the western side of the carriageway the residential properties continue beyond two residential turnings, Ford Road and Westbourne Close until the Labour Club (now a Hungry Horse Public House) on the corner of Shrubbery Road opposite the open area on the eastern junction. A pull in bus stop for northbound traffic is situated adjacent to the corner of the Labour Club car park. Another school, Millfields, located on Swifts Close and Jack and Jills Nursery on Millfields Road are both accessible via Shrubbery Road. On the other side of this busy junction is the One Stop convenience store and a few other commercial premises including Spadesborne House until a few residential properties at the St Peters/Rock Hill mini roundabout.

As indicated previously there are several schools within the vicinity, either directly or indirectly accessed from parts of the AQMA: Bromsgrove School has two campuses directly accessible from the Worcester Road and a third immediately west of the boundary and the A448 roundabout. St Johns Middle School is also accessed directly from the AQMA at its western extent. It also possible to access this by foot via pathways from Brook Road off of Shrubbery Road and vehicles were observed dropping off for the school here. As mentioned above Millfields school and Jack and Jill Nursery are also accessible via Shrubbery Road and two more schools are accessible along Charford Road via the roundabout. Clearly this number of school destinations via the AQMA contributes significantly to the amount of traffic at AM peak times.

During site visits at peak traffic times in 2012 a high volume of traffic was noted travelling north and south. North of the main Bromsgrove School entrance commuters made up 95% of traffic observed and 70 to 80% of vehicles were estimated to have only one occupant during AM peak hours. Much of the northbound traffic (about 50% of vehicles up to 08:20) from the St Peters/Rock Hill mini roundabout was observed queuing to turn into the Bromsgrove School. Generally this was observed to move fair rapidly and enough room was generally available for non-school traffic to pass on inside of waiting vehicles with exception of HDVs. During PM peak a general mix of cars, buses, LGVs and HGVs was noted.

Not much pedestrian traffic was observed during PM peak hours. At AM peak time school pedestrians and others were observed accessing the Zebra crossing at the top of Worcester Road and less frequently the Pedestrian crossing adjacent to the Bromsgrove School entrance. It was also noted that school children were being dropped off at the Altered Images Gym and crossing the carriageway there to access the Senior School campus. Occasional southbound traffic queues were caused by use of zebra crossing and school traffic entering main Bromsgrove School entrance and pedestrian crossing further south.

The Shrubbery Road junction was noted to be a particularly busy junction during the site visits. This is a relatively narrow residential road with many cars parked half up pavements and on the road with some ignoring double yellow lines to access One Stop convenience store. This restricts the road to almost single car width at times causing problems in this busy side road.

Parked vehicles outside residential properties either side of the Turk Head Public House were observed to cause some disruption to traffic in both directions. Here the road narrows to a street canyon and there is reduced capacity for two columns of traffic to comfortably pass parked cars particularly when northbound HDVs are approaching. Thus southbound traffic occasionally had to pause behind the parked cars to allow oncoming traffic to pass first. This was highlighted during a visit by an ambulance in attendance at one of the residential properties causing southbound traffic congestion.

On the south side of the Shrubbery Road junction there are pull-in parking spaces, enough approximately for four or five vehicles outside the convenience store which are generally observed to be always occupied and thus potentially insufficient for purpose. The kerb appears to be designed to dissuade vehicles from parking on the corner but additionally causes vehicles to exercise care when entering Shrubbery Road from Worcester Road south. School and local traffic exiting right from this junction towards the St Peters/Rock Hill roundabout was noted to occasionally cause congestion within Worcester Road.

Sanders Road leading to the industrial estate has the potential to be a busy junction and destination for HGVs but not much traffic was actually observed turning onto this road during the site visits. The industrial estate is a potential redevelopment target within the Bromsgrove Town Centre Regeneration Draft plan.

There are double yellow lines along many parts of the AQMA but not continuously. Areas with restrictions observed were at the Shrubbery Road junction, the Bromsgrove School main entrance, Peters Finger Lane just south of the Turks Head Public House, Sanders Road and continuously from the walled Bromsgrove School Senior campus and opposite to the A448 roundabout. In addition to Shrubbery Road mentioned above a few delivery vehicles, noted on separate occasions, parked on the double yellow lines adjacent to Hanover Place causing partial obstruction to traffic.

Bus stops indicated Worcester Road is the route for the 144 and 143 (First) services. A number of 54/05 plate single decker and double decker buses were observed, generally between $\frac{1}{4}$ and $\frac{1}{2}$ full. Occasional private single Clearaway of Catshill minibuses labelled Charford service were noted. It was not possible to discern the age of these vehicles from number plates but the vehicle fleet appeared to be relatively old.

Photo 1: Looking NW from Worcester Road to Hanover Street W and towards Town Centre N



Photo 2: Looking SW from Hanover Place to zebra crossing at top of Worcester Road, street canyon and PH to left



Photo 3: Looking NW at street canyon at top of Worcester Road



Photo 4: Looking NE at street Canyon



Photo 5: From adjacent to Bromsgrove School Senior Campus boundary Looking N to parked vehicle ignoring road restrictions at top of Worcester Road



Photo 6: Looking N along Worcester Road. Off road parking at Commercial.



Photo 7: Looking S on Worcester Road from Sanders Road Industrial Estate at mid-way street canyon/pinch point



Photo 8: Looking S on Worcester Road to slow moving traffic passing Pedestrian crossing and main Bromsgrove School entrance



Photo 9a & b: Looking S at traffic entering Bromsgrove School



Photo 10: Looking W at Shrubbery Road and Labour Club



Photo 11: Looking SW to One Stop convenience store and adjacent parking



3.4.2 Summary of any Further Assessment report

A Further Assessment to confirm the requirement for an AQMA in Worcester 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 is 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 only being exceeded at a number of properties along the street canyon sections of Worcester Road i.e. its middle and northern sections.
- The highest predicted concentration in 2010 is 54.9 $\mu\text{g}/\text{m}^3$, at 16 Worcester Road (R23). Concentrations are also predicted to exceed the annual mean objective at 9 other receptors.
- 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 properties 1 to 10 Worcester Road, where predicted concentrations are greater than 36 $\mu\text{g}/\text{m}^3$ but below 40 $\mu\text{g}/\text{m}^3$, are currently outside of the current AQMA boundary. Monitoring at Loc. WR (11 Worcester Road) measured a concentration in excess of the annual mean objective. On this basis AQC recommend that the AQMA boundary needs to be extended to include those properties.

3.4.3 Source Apportionment Data

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

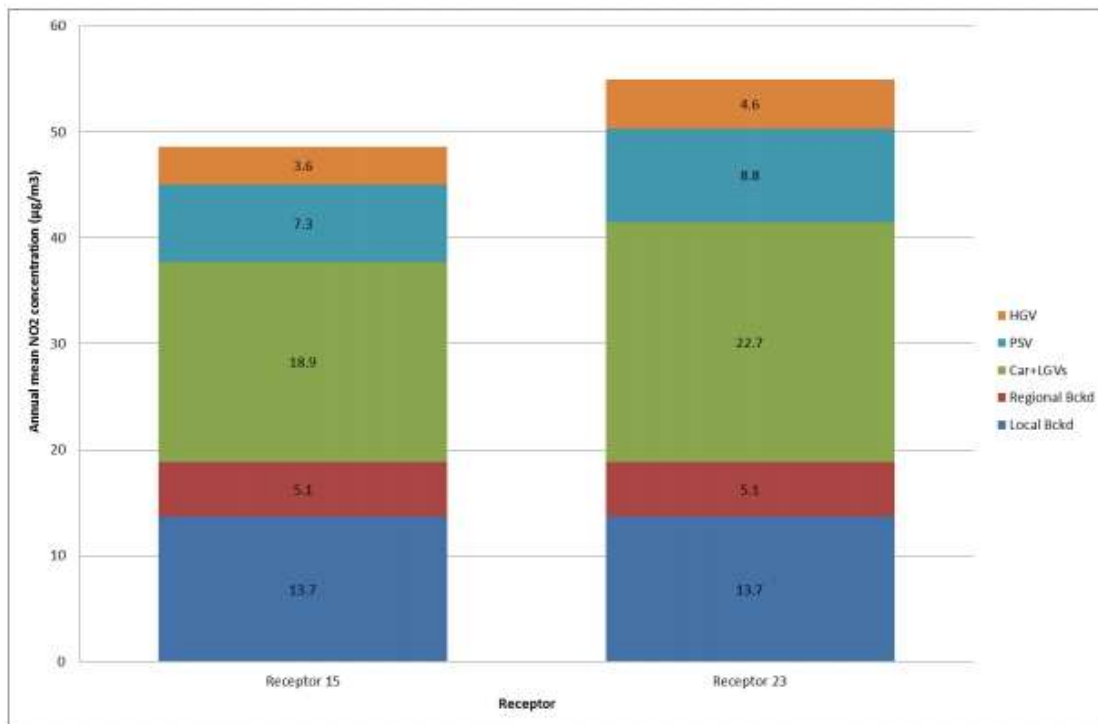
Table 3-13 and Figure 3-10 (AQC, 2012b) set out the relative contributions of traffic emissions to the total predicted nitrogen dioxide concentration at two receptor locations.

Table 3-13 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	Cars + LGV	PSV	HGV	Total
R15	13.7	5.1	18.9	7.3	3.5	48.6
R23	13.7	5.1	22.7	8.8	4.6	54.9
	% Contribution to Total					
	Local Bkgd	Regional Bkgd	Cars + LGV	PSV	HGV	Total
R15	28.2	10.5	39.0	15.0	7.3	100.0
R23	24.6	9.2	41.3	16.1	8.4	100.0

Two receptor locations identified previously have been used to provide an overview of source contributions. Table 3-13 and Figure 3-10 show that the most significant components for both Receptors 15 and 23 is from Cars and LGVs, closely followed by HDVs (HGVs and PSVs (buses)) and background concentrations. Cars and LGVs make up approximately 98% of the traffic volume on Worcester Road, and contribute 41.3% to the total concentration. Despite making up a relatively small proportion of the total traffic volume (1.2% on Worcester Road), PSVs contribute up to 16.1% to the total concentrations and HGVs make up less than 1% of the traffic volume but contribute up to 8.4% to the total concentrations.

Figure 3-10 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.



3.4.4 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 16 Worcester Road (R23) requiring a reduction of $14.9 \mu\text{g}/\text{m}^3$ 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 3-14 below sets out the required reduction in local emissions of NO_x in Worcester Road AQMA to achieve the annual mean objective at ten receptors where an exceedence was predicted in 2010. At 16 Worcester Road local emissions would need to have been 49.8 % lower in order to meet the objective.

Table 3-14 Required reduction in Annual Mean Nitrogen Dioxide Concentrations and in Emissions of Nitrogen Oxides at Receptors in the Worcester Road AQMA in 2010

Receptor Number	Receptor	Required Reduction in Annual Mean NO ₂ Concentration (µg/m ³)	Required reduction in Emissions of NOx from Local Roads (%)
R12	146 Worcester Road	8.7	35.2%
R13	144 Worcester Road	8.1	33.4%
R14	138 Worcester Road	8.0	33.2%
R15	161 Worcester Road	8.6	34.8%
R20	87 Worcester Road	4.5	21.0%
R21	76 Worcester Road (1 st Floor)	13.4	46.8%
R22	85 Worcester Road	6.1	26.9%
R23	16 Worcester Road	14.9	49.8%
R24	11 Worcester Road	8.7	35.0%
R29	1 Hanover Street	8.9	35.6%

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. Reducing total vehicle emissions by between 25% to 50% would be a potentially effective measure for achieving the objectives at most receptor locations.

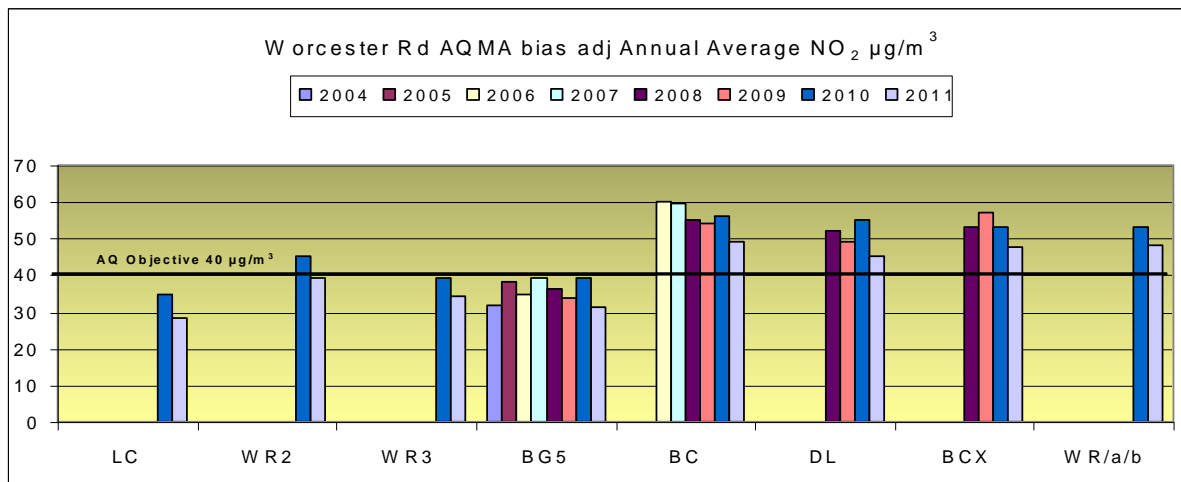
Measures within the Action Plan need to be proportionate to the scale of the exceedence of the objective and the number of people affected. In this case, 10 to 100 people are subject to exceedences of the annual mean objective (AQC, 2012b) and the magnitude of the exceedence ranges are relatively large (4.5 to 15 µg/m³ above the objective).

3.4.5 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 Worcester Road.

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

Figure 3-11 Bias adjusted annual average NO₂ monitoring results Worcester Road AQMA 2004 - 2011



3.4.6 Summary of progress of actions identified or implemented to date

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

3.4.7 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 Worcester Road AQMA. The LTP3 scheme code, brief description and current status as provided by WCC in February 2013 is shown in Table 3-15.

Table 3-15 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.
BR3 – Bromsgrove Town Centre Public realm Enhancement Scheme	Indirect: This proposed scheme would involve a package of Public Realm Enhancements in Bromsgrove Town Centre and would be integrated with other schemes in the area.	Awaiting more information from WCC on this scheme

LTP3 Scheme	Description of Improvements	Current Status
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.

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

Issue WR1 - The northern extent of the AQMA is immediately south of the Bromsgrove Town Centre, a superstore and bus station and connects to the A448 Kidderminster Road.

Issue WR2 – Extension of the current boundary of the AQMA to include 1 - 10 Worcester Road is recommended by AQC within the Further Assessment. Furthermore it is recommended the boundary be amended to comply with Defra and EPUK guidance e.g. along physical or administrative boundaries and exclude rear residential garden areas and open fields not representative of relevant exposure.

Issue WR3 – The zebra crossing at the Hanover Street/Worcester Road bend can cause congestion in either direction.

Issue WR4 – Worcester Road narrows in two places where the facades of residential properties are in close proximity with the roadside creating street canyons; for 80m from the bend at the top of Worcester Road and further south in the vicinity of the Turks Head Public House.

Issue WR5 - There are three school campuses adjacent to the AQMA and five more within the vicinity but accessible from Worcester Road. School traffic contributes significantly to the amount of vehicles using Worcester Road.

Issue WR6 - Parked vehicles outside residential properties either side of the Turk Head Public House were observed to cause some disruption to traffic flow in both directions. Worcester Road also narrows at this point and there is reduced capacity for two columns of traffic to comfortably pass parked cars.

Issue WR7 - There are extensive kerbs on the south side of the Shrubbery Road junction possibly designed to dissuade vehicles from parking on this corner but these maybe causing difficulty when vehicles turn into this junction from the south.

Issue WR8 - There are pull-in parking spaces outside the One Stop convenience store, only enough for four or five vehicles, generally observed to be always occupied and thus potentially not sufficient.

Issue WR9 - School and local traffic exiting right from Shrubbery Road junction towards the St Peters/Rock Hill roundabout was noted to occasionally cause congestion within Worcester Road.

Issue WR10 – The Sanders Road Industrial Estate and the Market Site car park at the northern extent is a potential redevelopment target within the Bromsgrove Town Centre Draft Area Action Plan; potentially increasing trip journeys through the AQMA

Issue WR11 – An old bus fleet was observed to be serving the local communities via Worcester Road.

Issue WR12 - The results of modelling within the Further Assessment indicate that the annual mean nitrogen dioxide objective is only being exceeded at a number of properties along the street canyon sections of Worcester Road i.e. its middle and northern sections.

Issue WR13 – Source apportionment within the Further Assessment demonstrated that Cars and LGVs make up approximately 98% of the traffic volume on Worcester Road, and contribute 41.3% to the total concentration of NO₂. Despite making up a relatively small proportion of the total traffic volume (1.2% on Worcester Road), PSVs (buses) contribute up to 16.1%.

Issue WR14 - The results of Modelling within the Further Assessment indicate 10 to 100 people are subject to exceedences of the annual mean objective and the magnitude of the exceedence ranges from 4.5 to 14.9 µg/m³ above the objective. Reducing total vehicle emissions by between 25% to 50% would be a potentially effective measure for achieving the objectives at most receptor locations.

3.5 Dolday/Bridge Street AQMA - Worcester City Council

Date of Detailed Assessment: October 2008
Date of Declaration: 23rd April 2009
Date of Further Assessment: July 2010

Figure 3-12 Plan of AQMA:



Please note the above plan is out of date. There is a recent development of 84 residential apartments that is situated the length of the south side of All Saints Road from the corner of Newport Street to the corner of Dolday and part of the area immediately south of that corner denoted as car park in the above plan.

The Dolday AQMA comprises a one way gyratory system on the A44 on the eastern side of Worcester Bridge and the River Severn at the heart of Worcester City. The bridge is the only crossing in the city for vehicles crossing across the river. All traffic heading into or across the city from the west side of the river and towns such as Malvern, Hereford, Leominster on the A44 and A449 are forced by the one way system, once they cross the bridge to enter the AQMA.

The one way system comprises three lanes around the four sides of the roughly diamond shaped AQMA island. From the bridge traffic travels north west along North Parade past residential properties in John Gwyn House (a residential home for the elderly) on the corner and The Old Rectifying Public House on the right. After 100m Newport Street turning on the right provides access to Newport Street car park which makes up 25 – 30% of the current AQMA area. The western side is bounded by the River Severn. After Newport Street the carriageway becomes North Quay. The left hand lane continues forward onto Croft Road A449 which then passes under railway arches before turning right towards The Tything and then continues north for a few miles eventually out of the city towards destinations such as Kidderminster and Bromsgrove.

The two right lanes of traffic from North Quay turn right in an easterly direction after traffic lights adjacent to the Severn View Public House onto Dolday. Two lanes of traffic also join the one way system from the opposite direction on Croft Road after traffic lights. Dolday is bounded by commercial properties on its northern side and Newport Street car park in between the Severn View Public House, which has limited residential accommodation, and the recently developed Newport House residential block at the corner with All Saints Road. The left hand lane turns left onto The Butts out of Dolday opposite the enclosed city bus station beneath the Crowngate shopping centre. The two right hand lanes of traffic turn right in a south easterly onto All Saints Road after a set of traffic lights and pedestrian crossing.

The two right hand lanes continue on a slight incline along All Saints Road to a set of traffic lights and pedestrian crossing after 100m before turning right in south westerly direction onto Bridge Street. A one way turning on the right immediately before the lights provides access to a few residential and commercial properties and the car park on Newport Street. The southern side of All Saints Road is bounded by a four or five storey block of residential apartments, Newport House, with residential parking on ground floor.

On the northern side All Saints Road is bounded by the Crowngate Shopping Centre and car park block accessed from a turning on the left, Moreton Place, 30 to 40m from the junction. Beyond Moreton Place is a five storey residential apartment block of 28 properties and then mixed 1st and 2nd floor residential and ground floor commercial properties on the corner with Deansway A44. The left hand lane turns out of All Saints Road onto Deansway which bypasses the town centre to the north and passes the Cathedral before heading south east out of the city towards J7 of the M5 or south along the A38 to suburban residential areas such as St Peter The Great.

Bridge Street is a narrow 60 – 70m stretch of road bounded by four storey residential properties on both sides. Traffic is joined by vehicles heading south westwards from Deansway after two sets traffic lights and pedestrian crossings. The right hand lane turns back onto the one way system on North Parade at the junction with the City Bridge. The two left hand lanes head across the bridge into another one way system pass the Cricket ground and then onto the west side of the City and other destinations.

The current boundary of the AQMA follows the 40 $\mu\text{g}/\text{m}^3$ contours of predicted pollution levels produced in the Detailed Assessment (AQC, 2008b). However the predicted pollution contours in the DA included the properties on the east of Bridge Street which have not been included in the AQMA order 2009. It also includes large areas of non-residential land (i.e. no relevant exposure) including three car parks. Therefore the AQMA boundary requires amendment unless more recent monitoring or modelling implies otherwise. This is confirmed within the Further Assessment by AQC, 2010 – see below.

3.5.1 Prevailing Conditions

AM and PM peak traffic time site observations of the Dolday/Bridge Street AQMA were undertaken in 2012 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.

A large volume of traffic uses the one way system within the AQMA, particularly at peak times, due to the major routes and destinations accessible from this central location.

The speed limit in the area is 30mph although traffic is generally observed to move much more slowly at peak times. Traffic flow moving around the inner two lanes of the one way system is paused at a set of traffic lights on each side of the AQMA with the exception of

Bridge Street onto North Parade and the bridge. This clearly causes queuing traffic to build up whilst waiting for lights to change but it also controls an even spread of traffic on the inner ring. Significant volumes of traffic particularly during peak hours queue back along Bridge Street from the exit onto North Parade. Here there are no traffic signals controlling spread of traffic and drivers have to await a break in oncoming traffic traversing the bridge eastwards for an opportunity to exit Bridge Street. This can be exacerbated by traffic queues caused by activation of the pedestrian crossing in North Parade.

Additionally significant congestion in the AQMA is noted due to traffic exiting the AQMA onto Croft Road, The Butts and Deansway which are observed to be very slow stop/start at peak times. Traffic continuing on Croft Road is observed to queue and be slow moving all the way back from much further along The Tything particularly at PM peak times. In fact this peak time queue starts at the junction where the A38 and A449 fork on the exit out of the city 1.5km to the north. This is in part made worse by a relatively recently introduced zebra crossing for pedestrians accessing the city or St. Johns area on foot via The Sabrina footbridge. Similarly traffic queues along the length of The Butts from the junction with Foregate Street during AM and PM peak times. The congestion caused by exiting traffic has an adverse effect on queues at the traffic lights on the inner lanes of the AQMA due to vehicles changing and blocking lanes etc.

Traffic is made up of a mixture of vehicle types, cars and commuters, delivery vehicles and also high proportion of buses due to the proximity of Worcestershire Bus Station on the boundary of the AQMA.

The high residential buildings on Bridge Street and All Saints Road in conjunction with the Crowngate Centre create street canyons in those roads. Contrastingly there is the opposite effect along North Quay and North Parade as they are bounded by the open space across the river on the south west and the car park for large part on the eastern side. Similarly Dolday is open for two thirds of its length on the southern side because of the car park.

There are parking restrictions in place, with double yellow lines along the whole route. Loading and unloading was not observed to be an issue within the AQMA as all properties, commercial and residential, bounding the AQMA are accessible from the rear for deliveries. In addition to yellow lines there are 'no waiting box' markings at each set of traffic lights; however these are often ignored during busy peak times caused by congestion.

The Newport Street Car Park is not the busiest car park within the city. Generally parking spaces are available during AM peak traffic and car park gradually fills up during the working day. There are also a few other car parks in the nearby vicinity: Croft Road located underneath the railway arches and the Cattle Market accessible via The Butts or Croft Road, in addition to the Crowngate multi-storey car park accessed via Moreton Place off the AQMA. All are significant destinations for traffic seeking to access the town centre and surrounding businesses.

There are no bus stops or taxi ranks within the AQMA but Worcester Bus Station is located adjacent to the Dolday/The Butts junction and all buses turning left out of the bus station exit the local area via the AQMA. Similarly buses travelling from the west of the city, cross the bridge and traverse the AQMA to enter the bus station via North Parade and Dolday before turning onto The Butts and entering the bus station from the east. Buses therefore make up a relatively higher proportion of traffic in Dolday/Bridge Street compared to other AQMAs.

There are no schools or nurseries within the AQMA although the Worcester College of Technology is close by in Deansway.

There are pedestrian crossings at each of the three sets of traffic lights and additionally there is a separate crossing on North Parade adjacent to the Old Rectifying Public House. However pedestrian traffic was not observed to be particularly significant within the AQMA. The whole AQMA can be walked comfortably within a 10 minute period and there are very few retail outlets within the AQMA. The AQMA does not therefore meet the criterion of the Technical Guidance LAQM.TG(09) requiring consideration of the 1 hour objective.

Photo 1: North Quay looking NW to Dolday and Croft Road



Photo 2: North Quay looking SE along North Parade



Photo 3: Looking NW along Dolday to congestion on far lane exiting AQMA onto The Butts



Photo 4: Looking SE along All Saints Road from Dolday



Photo 5: Looking N from corner of Bridge Street/All Saints Road to Deansway



Photo 6: Looking N on Bridge Street at traffic queuing to turn right onto North Parade



Photo 7: Looking SW along Bridge Street and traffic on bridge centre of picture



3.5.2 Summary of any Further Assessment report

A Further Assessment to confirm the requirement for an AQMA in Dolday/Bridge Street, Worcester and undertake modelling to inform potential solutions was completed by independent consultants AQC (Air Quality Consultants) on behalf of WC in July 2010. A summary of the findings of the Further Assessment are outlined below.

- The model results indicate that the annual mean nitrogen dioxide objective is being exceeded at a number of properties along Bridge Street and All Saints Road.
- Concentrations are predicted at both ground floor and first floor levels; however ground-floor concentrations are discussed as these are worst case.
- The highest predicted concentration in 2009 is $57.5 \mu\text{g}/\text{m}^3$, at dwellings at corner of Bridge Street and North Parade (D1). Concentrations are also predicted to exceed the annual mean objective at 5 other receptors.
- 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 no predicted exceedences of the annual mean objective outside of the current AQMA boundary and therefore the AQMA should be retained.
- Measured results at the Bridge Street diffusion tube monitoring site in 2009 ($39.9 \mu\text{g}/\text{m}^3$) are lower than those modelled at nearby receptors. This can be accounted for by the canyon effect along Bridge Street. The diffusion tube monitoring site is located outside of the canyon, and therefore results are lower than those modelled within the canyon.
- The measured concentration at the Dolday (Ambirak) diffusion tube monitoring site in 2009 ($39.3 \mu\text{g}/\text{m}^3$) is lower than nearby receptors as it is located on The Butts, away from the busier Dolday and All Saints.
- AQC recommend that the AQMA should therefore be retained and for precautionary reasons, the boundary should be extended to include properties to the east along Deansway, where concentrations are just below the objective. Additionally considering the redeployment of the diffusion tubes in this area to sites along Deansway and All Saints Road, with tubes located at the building façade.

3.5.3 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 3-16 and Figure 3-14 (AQC, 2010) set out the relative contributions of traffic emissions to the total predicted nitrogen dioxide concentration at ten worst case scenario receptor locations shown in Figure 3-13 below.

Figure 3-13 shows location of worst case scenario receptors, monitoring positions and boundary

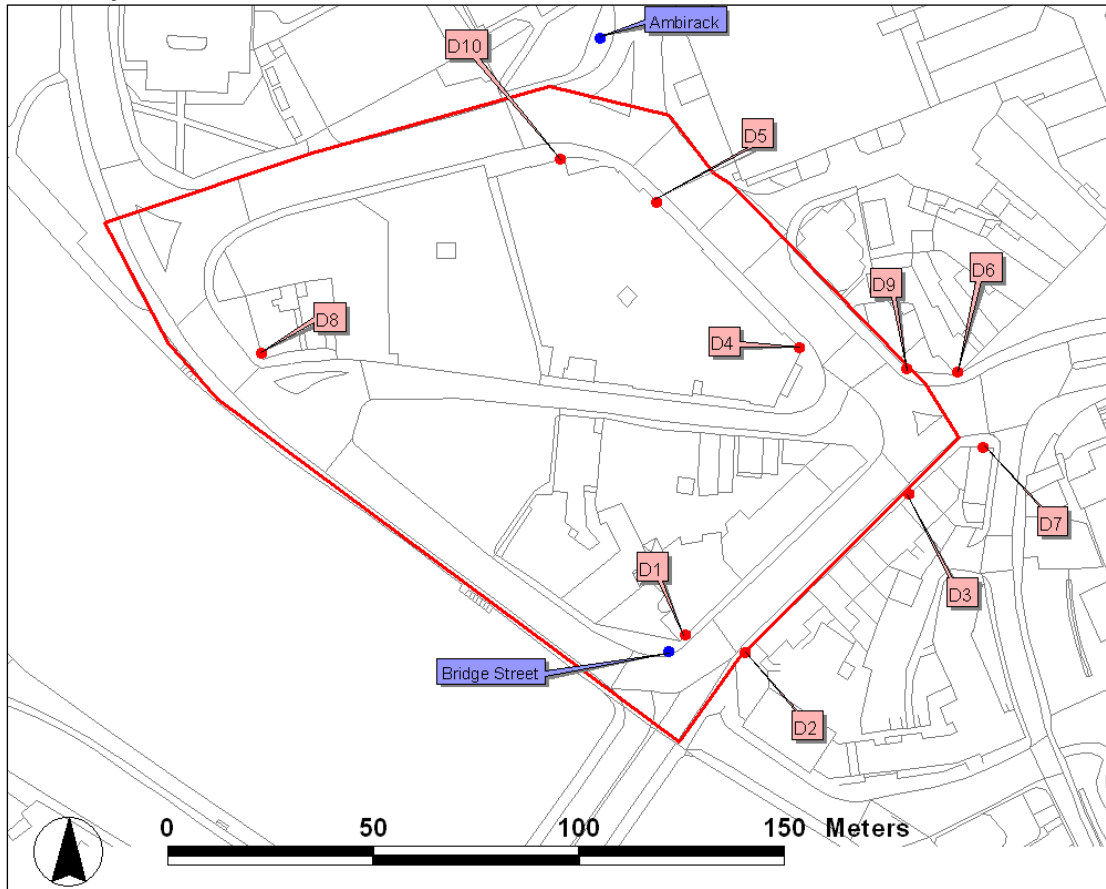


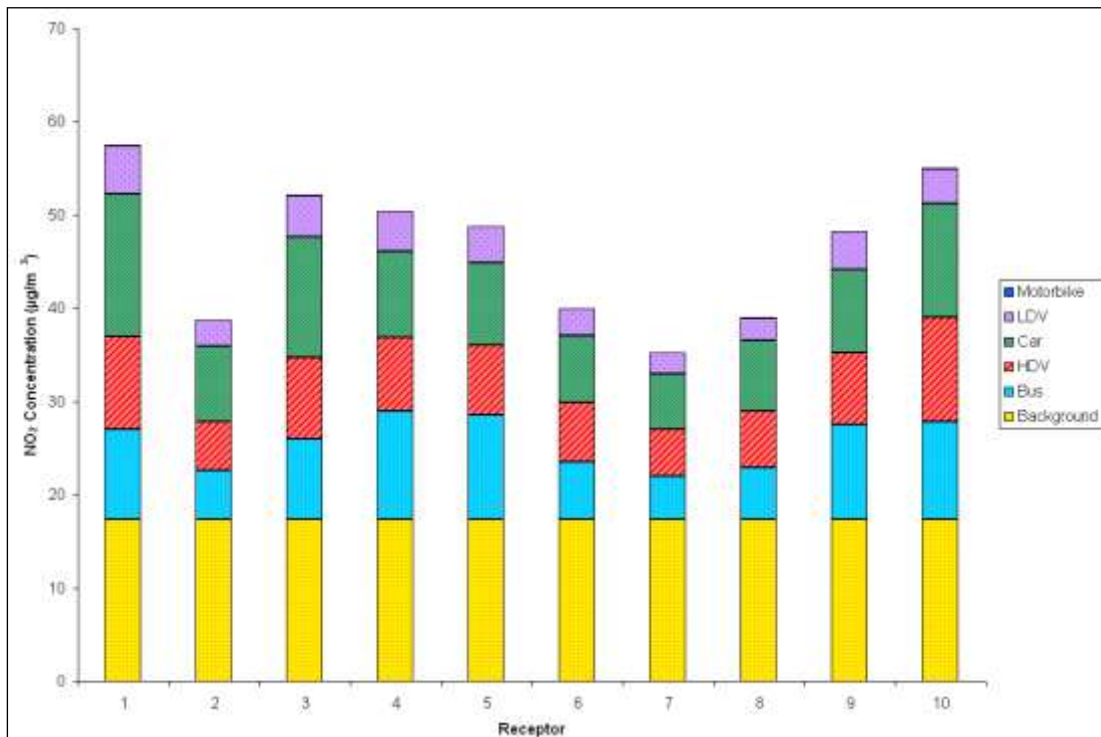
Table 3-16 Predicted Annual Mean (2010) Nitrogen Dioxide Concentrations and the Contribution of Each Source Type to the Total within the Bridge Street/Dolday AQMA

	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)						Total
	Background	Motor Cycles	Cars	LGV	Buses	HGV	
D1	17.3	0.1	15.3	5.1	9.7	9.9	57.5
D2	17.3	0.1	8.1	2.7	5.2	5.3	38.7
D3	17.3	0.1	12.9	4.4	8.7	8.7	52.1
D4	17.3	0.0	9.2	4.3	11.6	7.9	50.4
D5	17.3	0.0	8.9	3.9	11.2	7.5	48.8
D6	17.3	0.1	7.2	2.9	6.2	6.3	40.0
D7	17.3	0.1	6.0	2.3	4.6	5.1	35.2
D8	17.3	0.0	7.5	2.4	5.6	6.0	39.0
D9	17.3	0.0	8.9	4.0	10.2	7.6	48.2
D10	17.3	0.1	12.2	3.7	10.5	11.2	55.0
% Contribution to Total							
D1	30.2	0.2	26.7	8.9	16.9	17.2	100
D2	44.8	0.2	21.0	7.0	13.4	13.6	100
D3	33.3	0.2	24.8	8.5	16.6	16.6	100
D4	34.4	0.1	18.2	8.6	22.9	15.8	100
D5	35.5	0.1	18.1	8.0	22.9	15.3	100

D6	43.4	0.1	18.0	7.2	15.5	15.8	100
D7	49.2	0.1	16.9	6.4	13.0	14.3	100
D8	44.5	0.1	19.4	6.3	14.3	15.5	100
D9	35.9	0.1	18.5	8.4	21.2	15.9	100
D10	31.5	0.1	22.2	6.7	19.1	20.3	100

Ten worst case scenario receptor locations identified in above figure 3-13 have been used to provide an overview of source contributions. Table 3-16 above and Figure 3-14 below show that the most significant component for each receptor is the background concentrations. In most cases, emissions from Heavy Goods Vehicles and buses, despite making up a relatively small proportion of the total traffic volume, contribute significantly to the overall concentration (over 30% when considered together). Emissions from cars contribute the next largest proportion to the overall concentration.

Figure 3-14 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, 2010)



3.5.4 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 NO₂ concentration at a relevant location is $57.5 \mu\text{g}/\text{m}^3$ modelled at D1 on corner of Bridge Street and North Parade requiring a reduction of $17.5 \mu\text{g}/\text{m}^3$ 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 3-15 below sets out the required reduction in local emissions of NO_x in Dolday/Bridge Street AQMA at each receptor where an exceedence has been predicted in order for the annual mean objective to have been achieved in 2009. At Receptor D1, local emissions would need to have been 54% lower.

Figure 3-15 Predicted distribution of nitrogen concentrations at receptors in AQMA

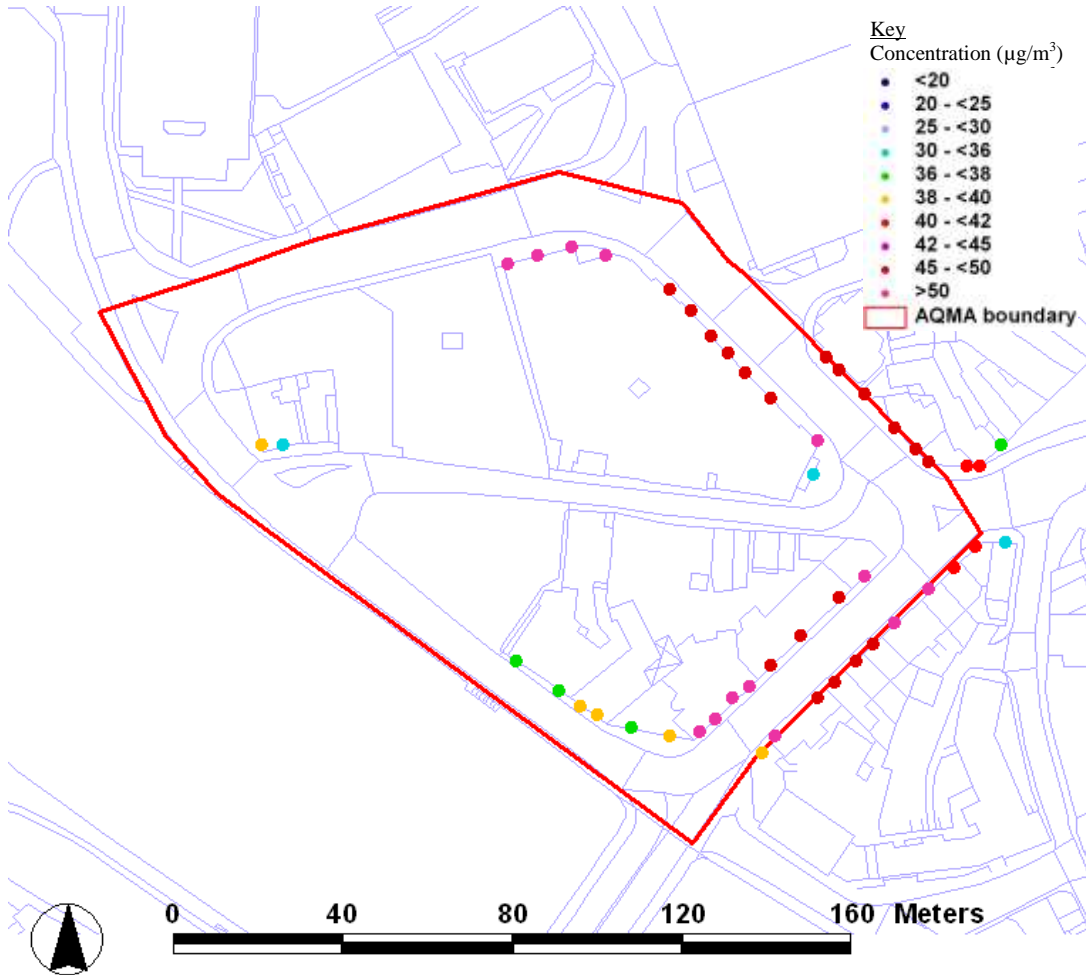


Table 3-17 Required reduction in Annual Mean Nitrogen Dioxide Concentrations and in Emissions of Nitrogen Oxides at Receptors in the Dolday/Bridge Street AQMA in 2009

Receptor	Required reduction in annual mean nitrogen dioxide concentration ($\mu\text{g}/\text{m}^3$)	Required reduction in emissions of oxides of nitrogen from local roads (%)
D1	17.5	54.0
D3	12.1	43.5
D4	10.4	39.4
D5	8.8	35.0
D9	8.2	33.3
D10	15.0	49.6

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 50% would be a potentially effective measure for achieving the objectives at most receptor locations.

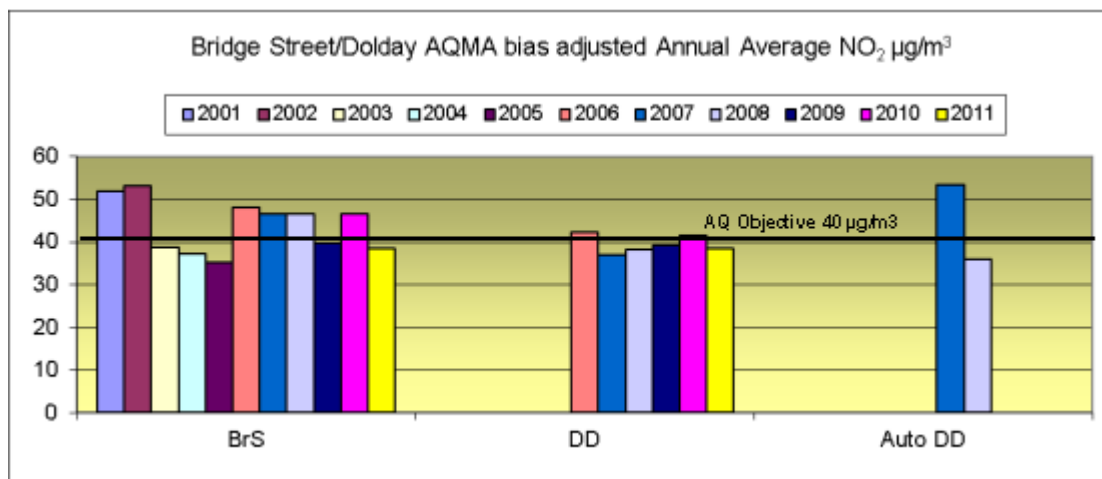
Measures within the Action Plan need to be proportionate to the scale of the exceedence of the objective and the number of people affected. In this case, 100+ people may be subject to exceedences of the annual mean objective and the magnitude of the exceedence ranges from relatively medium to large 8.2 to 17.5 $\mu\text{g}/\text{m}^3$ above the objective).

3.5.5 Long term local trends in NO₂

As part of the AQAP process data has been collated from previous WC yearly progress reports and screening assessments to produce meaningful picture of long term trends in monitoring results of nitrogen dioxide in Dolday/Bridge Street.

The graph below depicts these long term trends from bias adjusted annual average results of NO₂.

Figure 3-16 Bias adjusted annual average NO₂ monitoring results 2001 - 2011 Dolday AQMA



Loc Brs – Lamp post near John Gwyn House; Loc DD and Auto DD – Opposite Crown Gate bus station;

It should be noted both monitoring positions do not represent relevant receptor locations. The data requires further adjustment to provide relevant exposure at the façade of the nearest residential dwellings; Bridge street – John Gwyn House (2m distance) and Dolday – Newport House (approx. 28m from away from the monitoring location).

Accordingly the measured data from all the positions should be adjusted back from the roadside position to relevant exposure receptor locations using the calculator tool provided by Defra. The calculation requires an appropriate background level be used within the calculation. As an appropriate local urban background monitoring position is not available for the majority of the years it has not been possible to undertake the necessary calculations satisfactorily prior to the completion of this 2013 AQAP. Calculations will be undertaken for future versions of the AQAP utilising available background map data from Defra.

3.5.6 Summary of progress of actions identified or implemented to date

No previous action plans have been completed for the Dolday/Bridge Street AQMA.

3.5.7 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 Dolday/Bridge Street AQMA. The LTP3 scheme code, brief description and current status as provided by WCC in February and update in June 2013 is shown in Table 3-18.

LTP3: Network Management Plan (WCC, 2011o) states: 'Worcester's congestion problems are primarily due to the limited River Severn road crossing capacity. The Worcester Transport Strategy is being developed by building on the success of Worcester as a national demonstration project for the Sustainable Travel Towns Initiative. The strategy aims to reduce congestion and accommodate future economic growth through the more efficient use of the existing highway network through increased use of sustainable travel. Thus, a number of congestion related performance indicators are being regularly monitored for Worcester including:

- Percentage of journeys made by bus, bicycle and on foot in Worcester
- Change in annual traffic flow
- In bound am peak journey times on key routes into the city'

Table 3-18 LTP3 actions impacting Dolday/Bridge Street AQMA.

LTP3 Scheme	Description of Improvements	Current Status
W1 - Worcester Foregate Street Enhancement.	Indirect: Significant improvement to passenger facilities including quality of interchange with other transport modes	This scheme is now under construction and will be completed in 2013.
W2 - Worcester Shrub Hill Station Enhancement	Indirect: Improvements to infrastructure and facilities	Proposals exist within future phases of the Worcester Transport Strategy
W9 - Worcester City Walls Rd/ Cathedral Sq./ Deansway corridor maintenance & improvement	Adjacent: A comprehensive programme of junction and traffic signals enhancements, street furniture decluttering, replacement and enhancement, and improved walk and cycle infrastructure, and passenger transport infrastructure and information	Proposals exist within future phases of the Worcester Transport Strategy
W11 - Worcester City Secure Cycle parking.	Indirect: Provision of indoor cycle parking facilities in City Centre to make cycling more attractive	This scheme is now under construction and will be completed in late 2013
W14 - Worcester Crown East (West of Worcester) Park & Ride.	Indirect: Provide a Park and ride alternative to access for residents of the rural areas to the west of Worcester as well as residents of any new developments approved in the area.	Proposals exist within future phases of the Worcester Transport Strategy

W17 - Worcester – Rail capacity Improvement	Indirect: Upgrading rail signalling and junctions, removal of single track operations, enhance capacity and improve reliability	Not in current Network Rail work scheme. Likely to be 2021-2025.
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3.5.8 Summary of key issues identified from review for consideration within actions

Issue DD1 - The A44 Dolday one way gyratory system is a major link at the heart of Worcester City connecting west and east across the River Severn. All traffic traversing the only highway bridge within the Worcester City boundary will travel through at least one side of the AQMA.

Issue DD2 - The current boundary of the AQMA requires amendment to include residential buildings on eastern side of Bridge Street as outlined in the Detailed and Further Assessments. Additionally the western boundary could be altered to exclude large open areas of car park and commercial buildings as these are not representative of relevant exposure.

Issue DD3 – There are three sets of traffic lights within the AQMA which can cause temporary pauses in traffic.

Issue DD4 – Much congestion within the AQMA is caused by problem flows much further afield particularly at PM peak time e.g. The Butts and Croft Road – Castle Street – Tything – Barborne Road congestion.

Issue DD5 – Relatively high proportion of buses in AQMA due to adjacent bus station.

Issue DD6 – Two street canyons exist within the AQMA due to the high storey buildings within Bridge Street and All Saints Road. A slight rise in topography is also a minor contributing factor to emissions in the latter.

Issue DD7 – Box markings are being ignored during periods of congestion.

Issue DD8 – There are a number of car parks in the vicinity including two within or adjacent to the AQMA.

Issue DD9 – Worcester College of Technology is nearby.

Issue DD10 – Existing diffusion tube monitoring positions are outside the street canyons and so not are representative of worst case scenarios identified within the Further Assessment. Redeploying or providing additional monitoring positions will improve data quality and definition of AQMA boundary.

Issue DD11 - Source apportionment in the Further Assessment demonstrated emissions from Heavy Duty Vehicles (HGVs and buses), despite making up a relatively small proportion of the total traffic volume, contribute significantly to the overall concentration, generally over 30% when considered together (38.7% at Receptor D4). However, the ambient background concentration contributes a significant proportion (30 to 49.2%) to the overall concentration.

Issue DD12 - The results of modelling in the Further Assessment indicate 100+ people are subject to exceedences of the annual mean and the magnitude of the exceedence ranges from 8.8 to 17.5 $\mu\text{g}/\text{m}^3$ above the objective. Reducing total vehicle emissions by around 50%

would be a potentially effective measure for achieving the objectives at most receptor locations.

Issue DD13 – Recorded data must be worked back to facades of residential properties from roadside monitoring locations using available calculator tools and background maps to be representative of relevant exposure.

Issue DD14 - Significant traffic queues back along the street canyon in Bridge Street from the exit onto North Parade due to a lack of traffic signals controlling spread of oncoming traffic crossing the bridge. Congestion is also exacerbated by traffic queues caused by activation of the pedestrian crossing in North Parade.

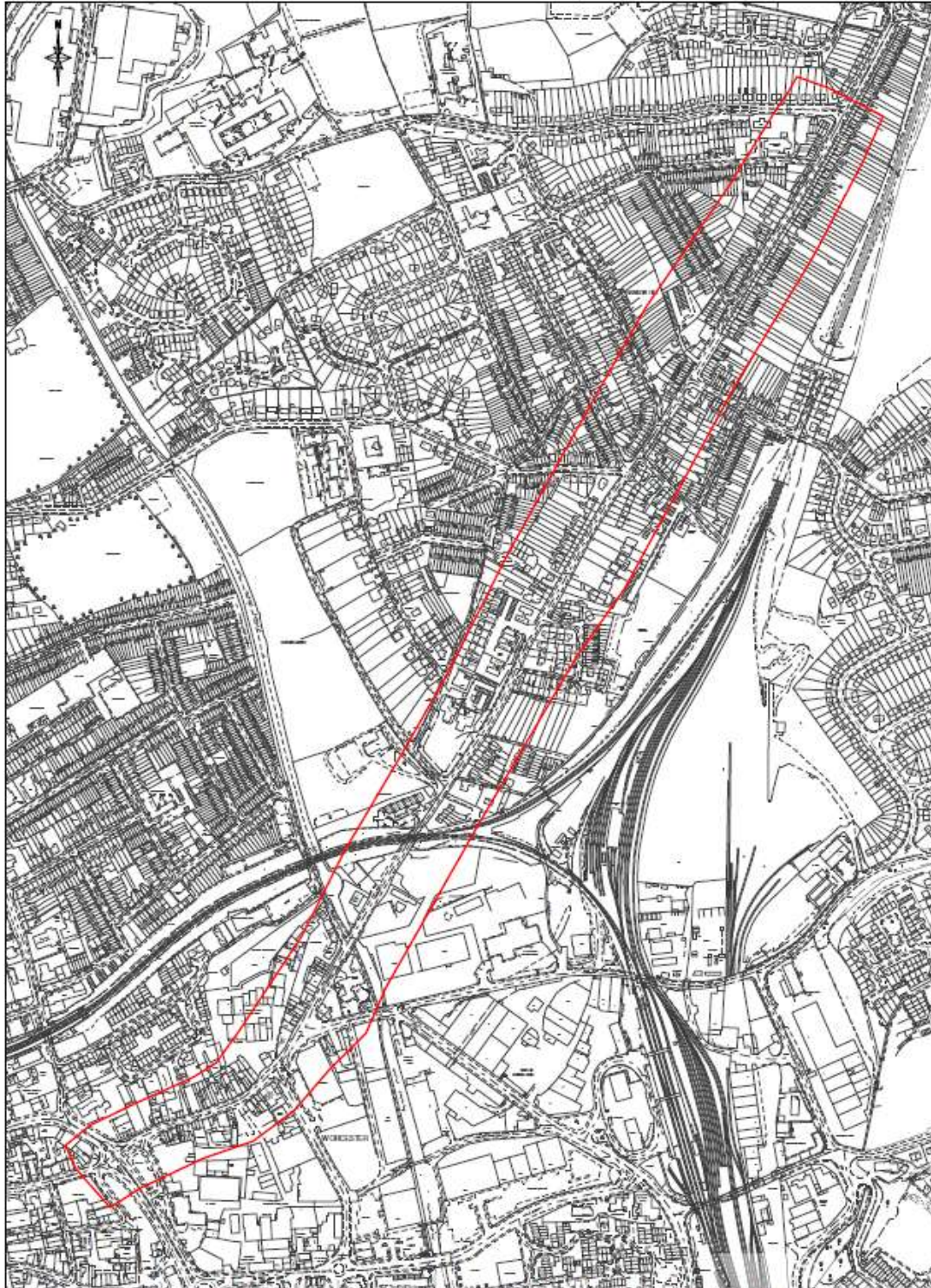
3.6 Lowesmoor/Rainbow Hill AQMA - Worcester City Council

Date of Detailed Assessment: October 2008

Date of Declaration: 23rd April 2009

Date of Further Assessment: July 2010

Figure 3-17 Plan of Lowesmoor/Rainbow Hill AQMA
Lowesmoor and Rainbowhill, Worcester



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Scale 1:4000

The Lowesmoor / Rainbow Hill AQMA comprises the majority of the single carriageway B4550 Astwood Road leading south west from the Green Lane mini roundabout junction, up and down Rainbow Hill and into Lowesmoor after the junction with the B4205 Tolladine Road. The distance between Green Hill and the western end of Lowesmoor on the fringes of the City centre is just over 1.5km.

To the north of the AQMA Astwood Road continues north wards before turning west as the B4482 Bilford Road which connects to the A38 Droitwich Road. Just north of the AQMA boundary the B4550 turns east towards the Brickfields residential area, at another mini roundabout with the New Chequers Inn, under a very narrow railway bridge and then turns immediately northwards to the Blackpole Industrial area. Beyond Blackpole the route connects up to the A449 and A38 and J6 of the M5 providing an alternative route to the busy and often congested A38 Droitwich Road/Tything for many commuters into and out of Worcester.

There are many side roads leading to other residential areas in Worcester from Rainbow Hill. Two in particular provide cut throughs to Barbourne Road and The Tything via Green Lane and Lansdowne Road although the former has speed restrictions in place.

Beyond the railway bridge near the bottom of Rainbow Hill, 250m from the junction with Tolladine Road, the residential properties cease and there are industrial areas either side of the carriageway for approximately 150m to the Lowesmoor Bridge over the canal. Beyond this are further residential properties before the Bridge Inn Public House and commercial properties continue to the junction with Tolladine Road. Shrub Hill train station is accessible from Tolladine Road.

At the mini roundabout junction the AQMA continues south west onto Lowesmoor Terrace and then turns right onto Lowesmoor via a filter lane and through a set of traffic lights. At the end of Lowesmoor there are priority lanes for buses and cyclists going straight on to St Nicholas Street whilst other traffic turns left onto the City Walls Road dual carriageway.

The current boundary of the AQMA loosely follows the $36 \mu\text{g}/\text{m}^3$ contours of predicted pollution levels produced in the Detailed Assessment (AQC, 2008b). However these straight contour lines cut through residential gardens 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.

3.6.1 Prevailing Conditions

AM and PM peak traffic time site observations of the Lowesmoor/Rainbow Hill AQMA were undertaken in 2012 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 AQMA can be divided into two distinctly different areas: Rainbow Hill is predominately a residential area with a few shops, pubs and food bars whilst Lowesmoor is predominately retail with service providers, restaurants and other food outlets on the ground floor with residential dwellings above.

A large volume of traffic passes through the two areas of the AQMA and is made up of a mixture of vehicle types and users including commuters, buses, delivery vehicles and school traffic. In Lowesmoor the proportion of buses and delivery vehicles is higher whilst in the

Rainbow Hill area school traffic, commuters and local residents are the dominant vehicles. Speed limit is 30mph but this is not possible in many parts during the peak traffic times.

There are a number of schools in the area although none within the AQMA itself: the closest being St Barnabas Primary School and Bishop Perone High School both on Green Lane. Gorse Hill primary School is accessible via Tunnel Hill halfway along Rainbow Hill and there is a Tudor Grange Academy and Perdiswell Primary School along Bilford Road. Traffic accessing these various education institutions likely contributes significantly to the AM peak traffic volumes.

The majority of the AQMA is narrow, leading to a street canyon effect in most parts, particularly evident in Lowesmoor. The majority of buildings are only two or three storey residential houses but some taller dwellings and commercial properties are also present. This effect is exacerbated by queuing traffic unable to pass buses at stops, illegally parked delivery vehicles and cars dropping off passengers.

Despite the presence of double yellow lines in most parts of the AQMA delivery vehicles have been observed obstructing the flow of traffic on numerous occasions in the AQMA, particularly in the Lowesmoor area.

There are no taxi ranks within the AQMA but there are a number of bus routes and stops into the City Centre from Warndon, Blackpole and Perdiswell. There are no pull-ins bus stops and therefore traffic queues form behind buses at stops as the street is too narrow to overtake.

There are few traffic light signals within the AQMA. There is a pedestrian crossing near a small row of local shops in the centre of Rainbow Hill area near Tunnel Hill turning. Pedestrian traffic increases in this area due to the presence of the shops and the crossing potentially causes queuing traffic. The only other set other signals is at the exit from Lowesmoor onto Lowesmoor Terrace. It has been noted the lights here do cause traffic to build up at the traffic lights, backing up along the street canyon in Lowesmoor, and is especially apparent at peak times. Comment provided by WCC June 2013 indicates this traffic is caused by contravention of Traffic Regulation Orders at Trinity Gate Junction which limit access into Lowesmoor during the afternoon peak westbound.

Pedestrian traffic was not observed to be particularly significant within the Astwood Road end of the AQMA with the exception of the small shopping area. In contrast Lowesmoor is a bustling shopping and restaurant community with footpaths linking to recent St Martins Gate development. The whole AQMA does not therefore meet the criterion of the Technical Guidance LAQM.TG(09) requiring consideration of the 1 hour objective. However the Lowesmoor area would potentially be a consideration under that objective if emission levels were sufficiently elevated.

Photo 1: Astwood Road Looking S to Green Lane junction and Rainbow Hill beyond



Photo 2: Rainbow Hill Looking N along Astwood Road from location of monitoring position Astwood 3



Photo 3: Corner of Lowesmoor Looking N to Lowesmoor Terrace and along Rainbow Hill in centre right of picture.



Photo 4: Looking SW along Lowesmoor to legitimate parking bays outside Elim Pentecostal Church



Photo 5: Looking W along Lowesmoor to traffic waiting for traffic lights to change.



Photo 6: Delivery van parked on double yellow lines in Lowesmoor



Photo 7: Bus at stop causes congestion for vehicles behind



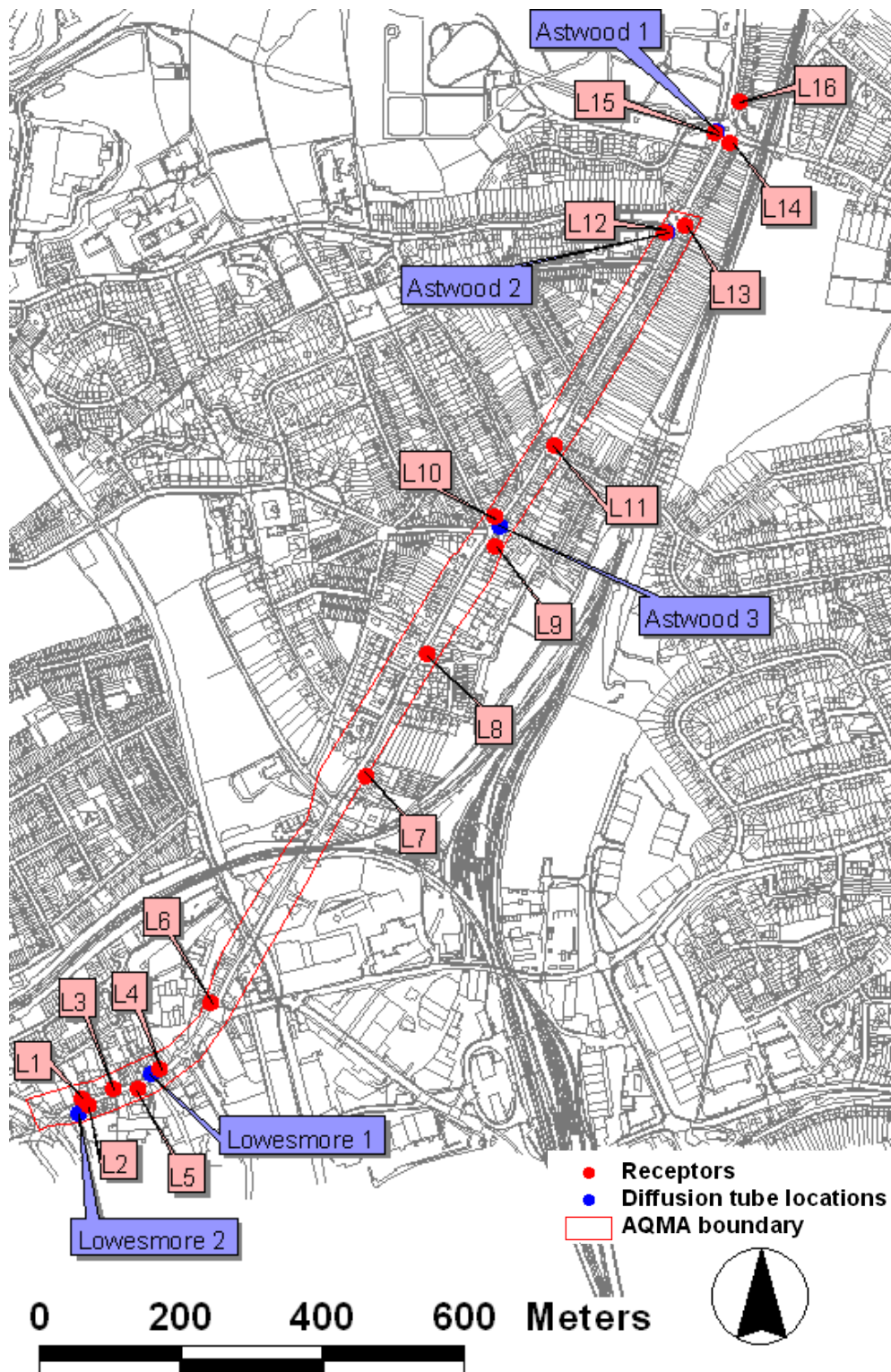
3.6.2 Summary of any Further Assessment report

A Further Assessment to confirm the requirement for an AQMA in Lowesmoor/ Rainbow Hill, Worcester and undertake modelling to inform potential solutions was completed by independent consultants AQC (Air Quality Consultants) on behalf of WC in July 2010. A summary of the findings of the Further Assessment are outlined below.

- The results indicate that the annual mean nitrogen dioxide objective is being exceeded at a number of properties along Astwood Road up to the brow of Rainbow Hill and in Lowesmoor and therefore the AQMA should be retained.
- Concentrations are predicted at both ground-floor and first-floor levels; however ground-floor concentrations are discussed as these are worst case.
- The highest predicted concentration in 2009 is $51.6 \mu\text{g}/\text{m}^3$, at receptor L2 in Lowesmoor area and $56.2 \mu\text{g}/\text{m}^3$ at receptor L10 in the Rainbow Hill area. Concentrations are predicted to exceed the annual mean objective at 12/16 receptor locations.
- 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.
- Receptors L14, L15 and L16 are located outside of the AQMA boundary. Modelled concentrations at receptors L14 and L15 exceed the objective, with concentrations of $48.8 \mu\text{g}/\text{m}^3$ and $42.5 \mu\text{g}/\text{m}^3$, whereas the modelled concentration at receptor L16 is below the objective. Although modelled concentrations could be slightly over predicting in this area, it is considered appropriate to adopt a precautionary approach.

- On this basis AQC recommend that the AQMA boundary needs to be extended to the north to encompass residential properties on Astwood Road extending to the roundabout which forms a junction with Brickfields Road and Tintern Avenue.

Figure 3-18 shows location of 16 worst case receptors, monitoring locations and AQMA boundary



3.6.3 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 3-19 and Figure 3-19 (AQC, 2010) set out the relative contributions of traffic emissions to the total predicted nitrogen dioxide concentration at sixteen worst case receptor locations.

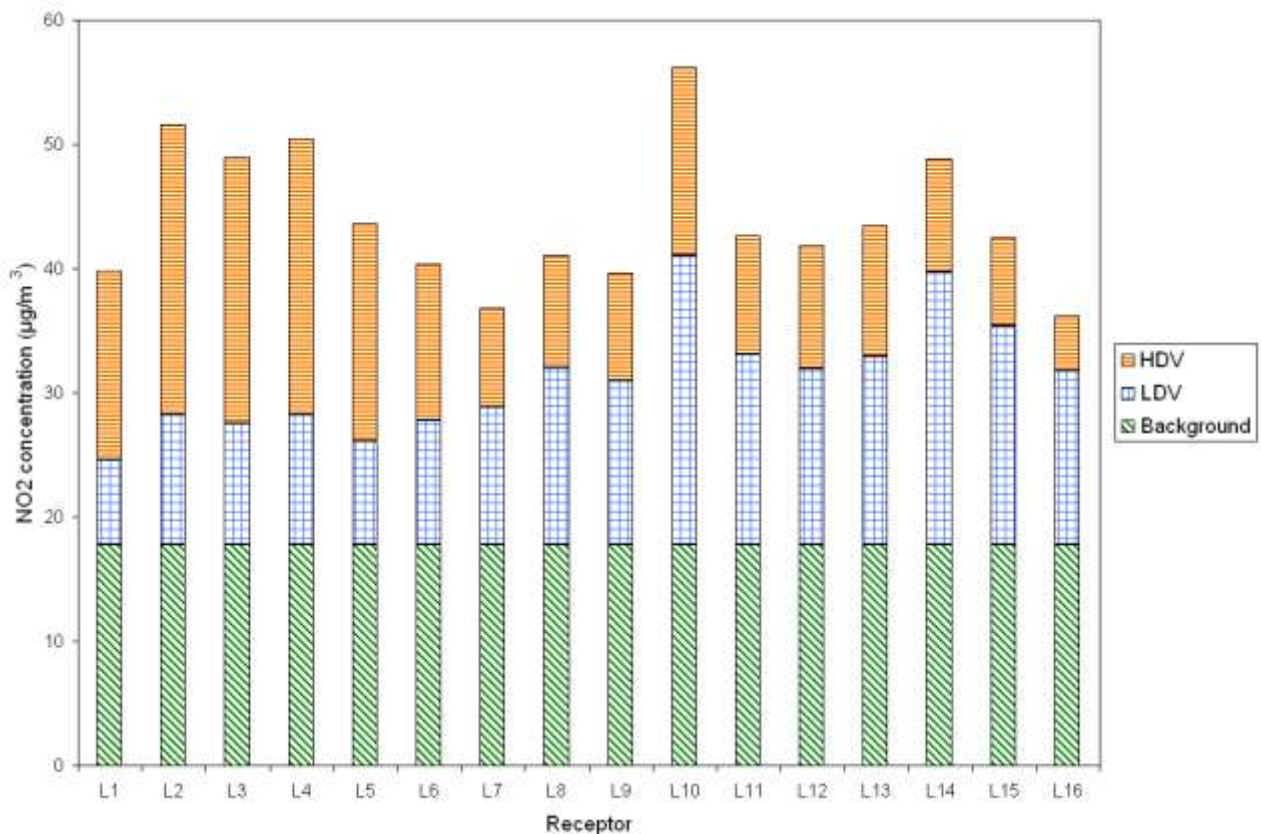
Table 3-19 Predicted Annual Mean (2009) Nitrogen Dioxide Concentrations and the Contribution of Each Source Type to the Total

	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) ^a			
	Background	LDV	HDV	Total
L1	17.8	6.8	15.2	39.8
L2	17.8	10.4	23.4	51.6
L3	17.8	9.7	21.5	49.0
L4	17.8	10.4	22.3	50.5
L5	17.8	8.3	17.5	43.6
L6	17.8	10.0	12.5	40.3
L7	17.8	11.1	8.0	36.8
L8	17.8	14.2	9.1	41.1
L9	17.8	13.2	8.6	39.7
L10	17.8	23.2	15.2	56.2
L11	17.8	15.3	9.5	42.6
L12	17.8	14.1	9.9	41.8
L13	17.8	15.1	10.5	43.4
L14	17.8	21.9	9.1	48.8
L15	17.8	17.6	7.1	42.5
L16	17.8	13.9	4.5	36.2
	% Contribution to Total			
	Background	LDV	HDV	Total
L1	44.8	17.1	38.2	100
L2	34.5	20.1	45.3	100
L3	36.4	19.8	43.8	100
L4	35.3	20.6	44.1	100
L5	40.8	19.1	40.1	100
L6	44.2	24.9	31.0	100
L7	48.3	30.0	21.7	100
L8	43.4	34.6	22.1	100
L9	44.9	33.3	21.8	100
L10	31.7	41.4	27.0	100
L11	41.8	35.8	22.4	100

L12	42.6	33.8	23.6	100
L13	41.0	34.7	24.3	100
L14	36.5	44.8	18.7	100
L15	41.9	41.4	16.7	100
L16	49.2	38.4	12.4	100

The sixteen worst case receptor locations identified within the Further Assessment have been used to provide an overview of source contributions. Table 3-19 and Figure 3-19 show that in most cases, the most significant component is the background concentration. In the Lowesmoor area (receptors L1-L6), emissions from HDVs (HGVs and Buses) contribute significantly to the overall concentration (30%-45%), despite making up a relatively small proportion to the total traffic volume (9%). In the Rainbow Hill area (receptors L7-L16), emissions from LDVs (Cars and LGVs) contribute a significant proportion (30-45%) to the overall concentration.

Figure 3-19 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, 2010)



3.6.4 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 predicted nitrogen dioxide concentration is $56.2 \mu\text{g}/\text{m}^3$ (at L10), requiring a reduction of $16.24 \mu\text{g}/\text{m}^3$ 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 3-20 below sets out the required reduction in local emissions of NO_x in Lowesmoor/Rainbow Hill AQMA to achieve the annual mean objective where an exceedence was predicted in 2009. At Receptor L10, local emissions would need to have been 52.2% lower in order to meet the objective.

Table 3-20 Required reduction in Annual Mean Nitrogen Dioxide Concentrations and in Emissions of Nitrogen Oxides at Receptors in the Lowesmoor/Rainbow Hill AQMA in 2009

Receptor	Required reduction in annual mean nitrogen dioxide concentration ($\mu\text{g}/\text{m}^3$)	Required reduction in emissions of oxides of nitrogen from local roads (%)
L2	11.6	42.7
L3	9.0	35.8
L4	10.5	39.9
L5	3.6	17.5
L6	0.3	1.7
L8	1.1	5.7
L10	16.2	56.2
L11	2.6	13.2
L12	1.8	9.4
L13	3.4	16.7
L14	8.8	35.4
L15	2.5	12.6

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 50% would be a potentially effective measure for achieving the objectives at most receptor locations in the AQMA in 2009.

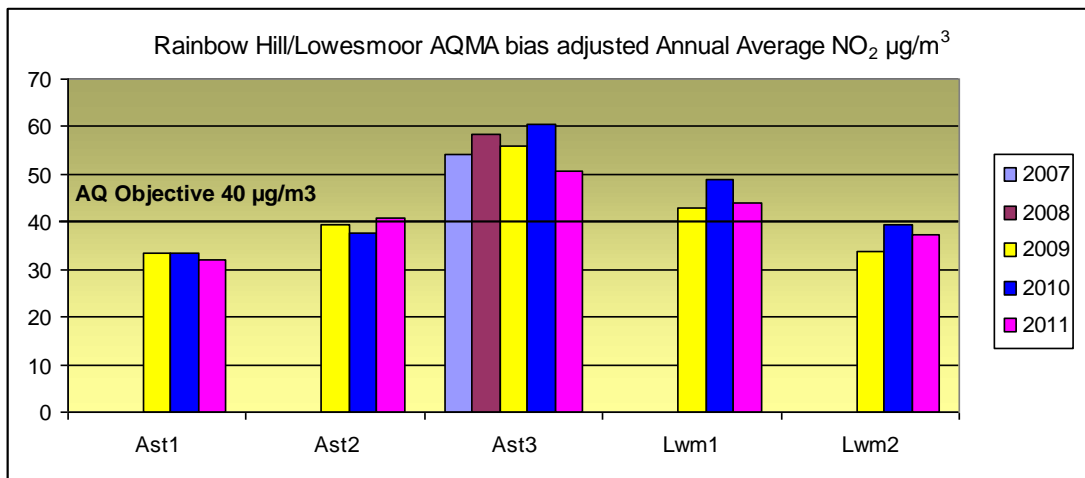
Measures within the Action Plan need to be proportionate to the scale of the exceedence of the objective and the number of people affected. In this case, 100 to 350 people are likely to be subject to exceedences of the annual mean and the magnitude of the exceedence ranges from relatively small to large (0.3 to $16.2 \mu\text{g}/\text{m}^3$ above the objective).

3.6.5 Long term local trends in NO₂

As part of the AQAP process data has been collated from previous Worcester City yearly progress reports and screening assessments to produce meaningful picture of long term trends in monitoring results of nitrogen dioxide in Lowesmoor/Rainbow Hill.

The graph below depicts these long term trends from bias adjusted annual average results of NO₂ at relevant exposure receptor locations in Lowesmoor, however Astwood Road locations require some adjustment.

Figure 3-20 Bias adjusted Annual Average NO₂ monitoring results 2007 - 2011 Lowesmoor/Rainbow Hill AQMA



Loc Ast 1 – Astwood Road nr opposite New Chequers PH; Loc Ast 2 - Green lane/Church Street; Loc Ast 3 – Brow of Rainbow Hill; Lwm 1 – 61 Lowesmoor; Lwm 2 – 18 Lowesmoor

The Astwood Road monitoring positions do not represent relevant receptor locations. Accordingly the measured data from all the positions should be adjusted back from the roadside position to nearest relevant exposure receptor locations (i.e. residential dwelling) using the calculator tool provided by Defra. The calculation requires an appropriate background level to be used within the calculation. As an appropriate local urban background monitoring position is not available for the majority of the years it has not been possible to undertake the necessary calculations satisfactorily prior to the completion of the 2013 AQAP. Calculations will be undertaken for future versions of the AQAP utilising available background map data from Defra.

3.6.6 Summary of progress of actions identified or implemented to date

No previous action plans have been produced for the Lowesmoor/Rainbow Hill AQMA.

3.6.7 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 Lowesmoor/Rainbow Hill AQMA. The LTP3 scheme code, brief description and current status as provided by WCC Highways in February and updated in June 2013 is shown in Table 3-21.

Table 3-21 LTP3 actions impacting Lowesmoor/Rainbow Hill AQMA.

LTP3 Scheme	Description of Improvements	Current Status
W1 - Worcester Foregate Street Enhancement.	Indirect: Significant improvement to passenger facilities including quality of interchange with other transport modes	Scheme is currently in progress and is due for completion in Autumn 2013.
W2 - Worcester Shrub Hill Station Enhancement	Indirect: Improvements to infrastructure and facilities	Proposals exist within future phases of the Worcester Transport Strategy and also the South Worcestershire Development Plan – Infrastructure Development Plan
W7 - Worcester Shrub Hill and Lowesmoor Area Maintenance & Improvement	Direct: A comprehensive programme of junction and traffic signals enhancements, street furniture decluttering, replacement and enhancement, and improved information systems	Scheme is currently in progress and will be delivered in stages. Lowesmoor completes in Autumn 2013. Lowesmoor Place/Terrace and Shrub Hill Road/Tolladine Road/Lowesmoor Place junctions will be delivered by 2015.
W11 - Worcester – City Secure Cycle parking.	Indirect: Provision of indoor cycle parking facilities in City Centre to make cycling more attractive	Scheme is currently in progress and is due for completion in Autumn 2013. E.g. Foregate Street Station Scheme which includes significant indoor cycle parking provision.
W17 - Worcester – Rail capacity Improvement	Indirect: Upgrading rail signalling and junctions, removal of single track operations, enhance capacity and improve reliability	Not in current Network Rail work scheme. Likely to be 2021-2025.

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

Issue LRH1 - The Astwood Road/Rainbow Hill B4550 provides an alternative route into the City centre for commuters via the Warndon, Blackpole and Perdiswell areas from the A449 and A38 and J6 of the M5. It connects to the City centre via Lowesmoor and cut throughs such as Lansdowne Road.

Issue LRH2 – Extension of the current boundary of the AQMA to include further properties along Astwood Road to the north is recommended by AQC within the Further Assessment. Furthermore the current AQMA boundary could be amended to comply with Defra (LAQM.TG(09) and LAQM.PG(09)) and EPUK guidance e.g. along physical or administrative boundaries and exclude rear residential garden areas.

Issue LRH3 – There are a number of schools in the area although none within the AQMA itself. Traffic to these various education institutions is likely to contribute significantly to the AM peak traffic volumes.

Issue LRH4 – The majority of the AQMA is narrow, leading to a street canyon effect in most parts which is particularly evident in Lowesmoor.

Issue LRH5 – Delivery vehicles are often observed obstructing the flow of traffic in the Lowesmoor area.

Issue LRH6 – are a number of bus routes and stops into the City Centre from Warndon, Blackpole and Perdiswell. There are a number of bus routes on AQMA and no pull-in bus stops causing traffic queues behind buses as street is too narrow to overtake.

Issue LRH7 – Set of traffic signals at the exit from Lowesmoor onto Lowesmoor Terrace causes traffic to back up into the street canyon in Lowesmoor. WCC (June 2013) indicates this traffic is caused by contravention of Traffic Regulation Orders at Trinity Gate Junction which limit access into Lowesmoor during the afternoon peak westbound.

Issue LRH8 – Source apportionment in the Further Assessment demonstrated that the most significant component is the background concentration. In the Lowesmoor area emissions from HDVs (HGVs and Buses) contribute significantly to the overall concentration (30%-45%) and in the Rainbow Hill area emissions from LDVs (Cars and LGVs) contribute a significant proportion (30-45%) to the overall concentration.

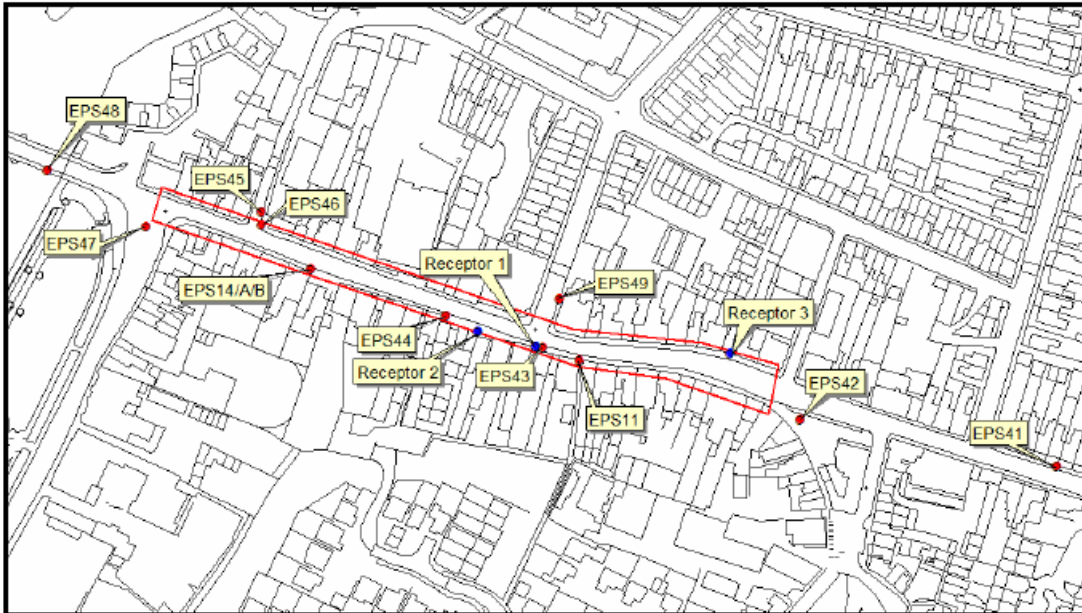
Issue LRH9 – The results of modelling in the Further Assessment indicate greater than 100 people are subject to exceedences of the annual mean and the magnitude of the exceedence ranges from 0.3 to 16.2 $\mu\text{g}/\text{m}^3$ above the objective. Reducing total vehicle emissions by around 50% would be a potentially effective measure for achieving the objectives at most receptor locations.

Issue LRH10 – Recorded data must be worked back to facades of residential properties from roadside monitoring locations using available calculator tools and background maps to be representative of relevant exposure.

3.7 Port Street, Evesham AQMA - Wychavon District Council

Date of Detailed Assessment: April 2007
Date of Declaration: 1st September 2007
Date of Further Assessment: 1st September 2008

Figure 3-21 Plan of Port Street AQMA:



The current area of the AQMA comprises a ¼ km section of the B4035 single carriageway from the corner of Shor St at the eastern extent up to the T junction with B4035 Waterside and Bridge Street.

Beyond the eastern extent of the AQMA Port Street continues for a further 200m through residential areas up a gradual incline to a roundabout. From here the outlying villages of Offenham and Badsey are accessed via the B4035 as it continues east as Elm Road changing to Badsey Road up to the A46 Evesham Bypass. In a south easterly direction from the roundabout Broadway Road passes the Lidl superstore and continues through residential areas up to the bypass where it continues onwards as the A44 in the direction of the Cotswolds.

At the western extent of the AQMA the B4035 turns sharply along Waterside to the A4184 Cheltenham Road junction. The road then continues westwards as the B4084 Pershore Road to Pershore and Worcester City beyond. Evesham town centre is accessible from the south side of the River Avon at just two crossing points, Bridge Street at the bottom of Port Street and via Abbey Bridge at the Cheltenham Road junction.

A 7.5 tonne weight restriction has been in place on Abbey Bridge for several years. Heavier vehicles are directed around the bypass but potentially access the Town Centre along Port Street to cross the river via Bridge Street. This restriction will be lifted when the Abbey Bridge replacement has been completed in 2014.

The current boundary of the AQMA cuts through buildings and 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.

3.7.1 Prevailing Conditions

AM and PM peak traffic time site observations of the Port Street AQMA were undertaken in 2012 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 length of the AQMA is predominately a mixture of retail and commercial establishments at street level with residential dwellings above on the 1st and 2nd floors. On the north side of the narrow road there were only two ground floor residential properties were noted between Burford Road and Shor Street.

On the southern side of the road there is one residential building, (No.12 Port Street containing 6 residential flats) adjacent to monitoring location EPS14/a/b approximately 60m east of the Waterside/Bridge Street junction. The next ground floor residential property is Shawcross Walk; a number of flats slightly setback from neighbouring commercial properties opposite the cinema on the corner of Burford Road. There are 5 more residential properties between Shawcross walk and the eastern extent of the AQMA.

Port Street is a relatively busy road in terms of both vehicles and pedestrian traffic. During site visits in 2012 traffic was observed to be a mixture of commuters, general public, some LGVs and buses including a school bus but no HGVs.

It is narrow along the whole length of the AQMA creating a street canyon effect and is on an incline rising eastwards from the Waterside/Bridge Street junction to the end of the AQMA.

There are three sets of traffic lights within the AQMA. At the western extent is the busy Waterside/Bridge Street junction where traffic queues back up the incline. Then there are two sets pedestrian lights; one adjacent to the cinema at Burford Road and Shawcross Walk and the other at the eastern boundary of the AQMA just beyond Shor Street. Both sets of pedestrian traffic lights were in frequent use and observed to cause traffic to queue temporarily. Going west towards Evesham at Shor Street traffic lights break up the flow of traffic entering the AQMA and potentially queuing further along. Of course the opposite is true for traffic exiting the AQMA at the top of the incline.

Additionally there is a single bus stop (roadside, no pull in) just beyond the pedestrian crossing at Shor Street going east. This was observed to cause congestion as buses took several minutes while passengers alighted. Vehicles travelling east could only move forward by moving around into the oncoming lane. Routes marked for 247 and Henshaws 552,553,559 services were observed.

There are single yellow lines along the length of Port Street with increased restrictions around the kerbs at Burford Road, Castle Street and Shor Street turnings and either side of the pedestrian crossings. Several incidents of cars dropping off passengers at the side of the road or a van unloading at a convenience store were observed causing traffic congestion.

Burford Road and Church Street, which is just east of the AQMA boundary, are two relatively busy side roads adjacent to Port Street. They are both narrow with high sided buildings restricting the visibility of drivers exiting onto Port Street. Vehicles exiting both were observed to cause congestion within Port Street. Additionally there is a pull in area for parking outside the Talbot Public House between Church Street and the pedestrian crossing which has the potential to cause blockages to traffic on the southern side of the road. This may cause vehicles to swerve into oncoming traffic.

Bengeworth First School is located just beyond a poorly utilised pay and display car park a short distance along Burford Road, which joins Port Street on the northern side about halfway along the AQMA. No school buses were observed turning in or out of Burford Road but a lot of pedestrians and vehicles were observed heading for that destination during AM visits. Three more schools are located within a mile south of Port Street but there is no direct access to these from the AQMA.

Adjacent to the EPS14/a/b monitoring position mentioned above there is a pavement area used for unloading or parking outside two setback commercial properties although the kerb is not dropped to allow this. This potentially causes congestion when vehicles back out onto Port Street.

Photo 1: Looking SE from Bridge Street at traffic turning onto Port Street from Waterside.



Photo 2: Looking NE to pedestrian crossing, cinema and Burford Road.



Photo 3: Looking W to Shawcross Walk, Pedestrian Crossing and Waterside



Photo 4: Looking W along AQMA from Shor Street



Photo 5: Looking SE to Church Street turning from bus stop at Shor Street



Photo 6: Bus at stop and pedestrian crossing at Shor Street blocking traffic



Photo 7: Bus at stop causing congestion back along AQMA



3.7.2 Summary of any Further Assessment report

A Further Assessment to confirm the requirement for an AQMA in Port Street, Evesham and undertake modelling to inform potential solutions was completed by independent consultants AQC (Air Quality Consultants) on behalf of Wychavon District Council in September 2008. A summary of the findings of the Further Assessment is 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 only being exceeded at one ground floor property within the AQMA. The highest predicted concentration in 2007 is $41.5 \mu\text{g}/\text{m}^3$, at 38 Port Street (R1).
- The results indicate concentrations of NO_2 greater than $36 \mu\text{g}/\text{m}^3$ but below $40 \mu\text{g}/\text{m}^3$, at one other receptor, Shawcross Walk (R2).
- 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 is a predicted exceedence of the annual mean objective within the existing AQMA and therefore the AQMA should be retained.

3.7.3 Source Apportionment Data

Sources contributing to the objective exceedences within the AQMA have been identified within the Further Assessment.

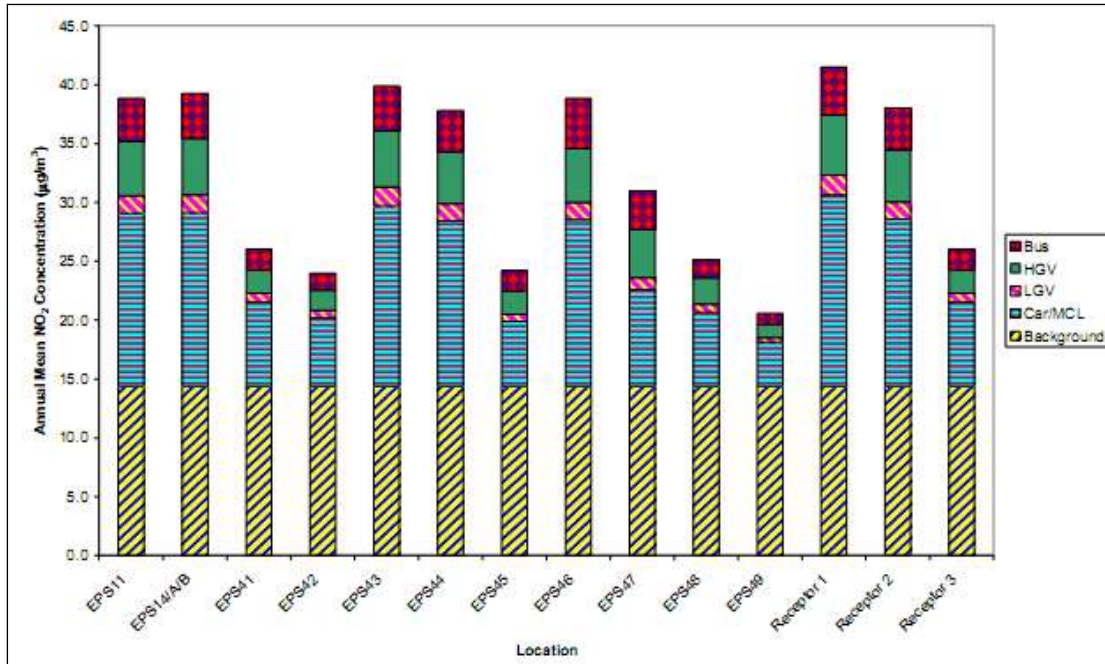
Table 3-22 and Figure 3-22 (AQC, 2008b) set out the relative contributions of traffic emissions to the total predicted nitrogen dioxide concentration at eleven monitoring and three receptor locations. They include worst-case locations for nitrogen dioxide concentrations, and are a geographical spread across the study area.

Table 3-22 Predicted Annual Mean (2007) Nitrogen Dioxide Concentrations at each Monitoring Location and the Contribution of Each Source Type to the Total

Monitor	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)					
	Background	Car/MCL	LGV	HGV	Bus	Total
EPS11	14.4	14.7	1.5	4.6	3.7	38.8
EPS14/A/B	14.4	14.8	1.5	4.8	3.8	39.3
EPS41	14.4	7.2	0.7	2.0	1.7	26.0
EPS42	14.4	5.8	0.6	1.7	1.4	24.0
EPS43	14.4	15.3	1.6	4.8	3.8	39.9
EPS44	14.4	14.1	1.5	4.4	3.5	37.8
EPS45	14.4	5.5	0.6	2.0	1.7	24.2
EPS46	14.4	14.2	1.5	4.6	4.2	38.8
EPS47	14.4	8.2	1.0	4.1	3.3	31.0
EPS48	14.4	6.3	0.7	2.2	1.5	25.1
EPS49	14.4	3.8	0.4	1.1	0.9	20.5
Receptor 1	14.4	16.3	1.7	5.1	4.1	41.5
Receptor 2	14.4	14.2	1.5	4.4	3.6	38.0
Receptor 3	14.4	7.2	0.7	2.0	1.7	26.0
% Contribution to Total						
	Background	Car/MCL	LGV	HGV	Bus	Total
EPS11	37.0	37.9	3.9	11.8	9.4	100 %
EPS14/A/B	36.6	37.6	3.9	12.2	9.7	100 %
EPS41	55.1	27.7	2.8	7.6	6.7	100 %
EPS42	59.9	24.3	2.5	7.2	6.0	100 %
EPS43	36.0	38.5	4.0	12.0	9.6	100 %
EPS44	38.0	37.2	3.9	11.6	9.3	100 %
EPS45	59.3	22.8	2.4	8.4	7.1	100 %
EPS46	37.0	36.5	3.8	11.8	10.9	100 %
EPS47	46.3	26.5	3.3	13.2	10.6	100 %
EPS48	57.2	25.2	2.7	8.8	6.1	100 %
EPS49	69.9	18.4	1.9	5.3	4.5	100 %
Receptor 1	34.6	39.3	4.1	12.3	9.8	100 %
Receptor 2	37.7	37.3	3.9	11.7	9.3	100 %
Receptor 3	55.2	27.7	2.8	7.6	6.7	100 %

Table 3-22 (and Figure 3-22) shows that at each location, the most significant proportion of the locally-generated road component can be attributed to emissions from cars. HGVs and buses also contribute a significant proportion despite making up a relatively small proportion of the total traffic volume (less than 4 % combined). At all but two of the locations (EPS43 and Receptor 1), the background concentration contributes the largest proportion to the overall concentration.

Figure 3-22 Relative Contribution of Each Source Type to the Total Annual Mean Nitrogen Dioxide Concentration ($\mu\text{g}/\text{m}^3$) at Monitoring and Receptor Locations within, and in close proximity to, the Port Street, Evesham AQMA.



3.7.4 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 Receptor 1 requiring a reduction of $1.5 \mu\text{g}/\text{m}^3$ 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). Table 3-23 below sets out the required reduction in local emissions of NO_x at Receptor 1 to achieve the annual mean objective in 2007. Local emissions would need to fall by less than 6%.

Table 3-23 Required reduction in Annual Mean Nitrogen Dioxide Concentrations and in Emissions of Nitrogen Oxides at the Worst case representative Receptors in 2007

Receptor Number	Receptor	Required Reduction in Annual Mean NO_2 Concentration ($\mu\text{g}/\text{m}^3$)	Required reduction in Emissions of NO_x from Local Roads (%)
R1	38 Port Street	1.5	5.8%

The results presented above highlight that targeting vehicle types in isolation would achieve very little. The most effective measure for improving air quality would be to reduce total vehicle emissions by 10%. This measure would reduce the concentrations at Receptor 1 to below the annual mean objective in 2007.

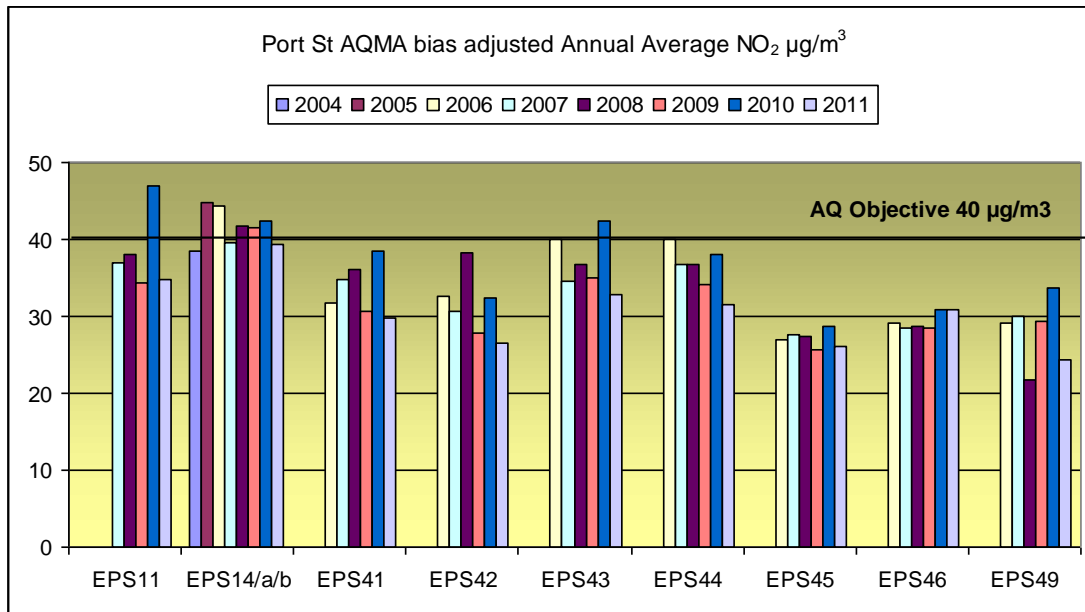
Measures within the Action Plan need to be proportionate to the scale of the exceedence of the objective and the number of people affected. In this case, less than 10 people are likely subject to exceedences of the annual mean and the magnitude of the exceedence is relatively small ($1.5 \mu\text{g}/\text{m}^3$ above the objective).

3.7.5 Long term local trends in NO₂

As part of the AQAP process data has been collated from previous Wychavon District Council's yearly progress reports and screening assessments to produce a meaningful picture of long term trends in monitoring results of nitrogen dioxide in Port Street.

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

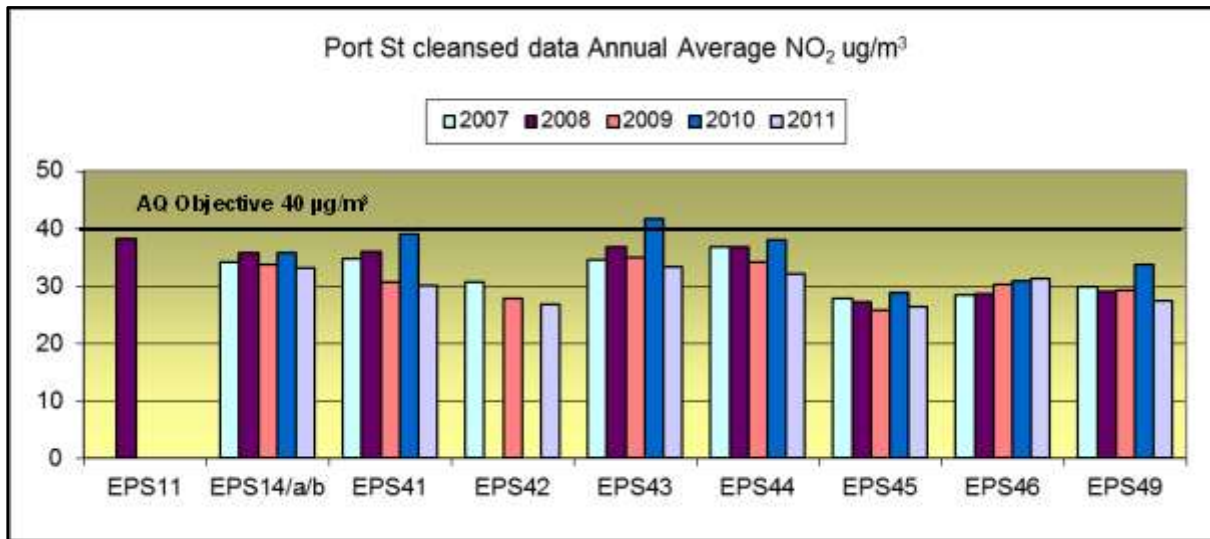
Figure 3-23 Bias adjusted Annual Average NO₂ monitoring results 2004 - 2011 Port Street AQMA



The graph above indicates there may be some anomalies within the datasets reported in previous years, for example EPS11 2010 shows a substantial rise from previous years and then falls back to a more regular pattern in 2011. Following an initial review of available historic monitoring results a number of anomalies and required adjustments have been identified:

- Less than 9 months results (75% of data) were recorded for EPS11 in 2007 and 2009 - 10, and EPS42 in 2008 and 2010.
- Four anomalously low and high results, likely due to contamination of diffusion tubes, were noted and removed from the datasets (EPS42 2008, EPS46 2009, EPS14b 2009 and 2010)
- Data for EPS14/a/b required adjustment back to the façade of the nearest residential property to demonstrate relevant exposure.
- Historic monitoring results have only been verified for 2007 – 2011.

The resulting changes to the dataset highlight a different picture as demonstrated in the updated graph below.

Figure 3-24 Cleansed NO₂ monitoring results 2007 - 2011 Port Street AQMA

Defra advises where less than 9 months of diffusion tubes results are available the annual average should be annualised following the process outlined in Box 3.2 LAQM.TG(09) (Defra, 2009). The method involves obtaining period means for each of the datasets from comparative hourly data from a number of background sources available from the AURN website. It has not been possible to undertake this process prior to the finalisation of the 2013 AQAP, however this process will be completed for future revisions of the AQAP.

The adjustments for EPS14/a/b were undertaken utilising the NO₂ Distance calculator tool version available from Defra. A height adjustment was also taken into consideration as there are no ground floor residential properties at that location. Recorded data from EPS6 Civic Centre, Pershore has been used as an Urban Background position for the calculation.

Historic monitoring results for 2004 to 2006 were only available in paper format at time of initial review. A more detailed review of this data will be undertaken for inclusion in future versions of the AQAP.

The revised chart indicates only one exceedence of the annual average objective in five years to 2011 at EPS43 in 2010. It is recognised that 2010 was a particularly bad year for air pollution across the UK. However, it is noted there are no results for July or August within the annual mean for EPS43 in 2010. Generally the summer months record the lowest levels of nitrogen dioxide. It is quite possible the absence of summer data is leading to an overestimation of that annual average. The revised data casts doubt on the requirement for an AQMA in Port Street however a more detailed review as outlined above is required.

It is also noted that no Automatic Monitoring has previously been undertaken in Port Street, Evesham which is not compliant with current guidance. Defra LAQM.TG(09) (section A1.42) states '...Local Authorities are advised not to rely upon diffusion tube data alone as the basis of a Detailed Assessment or declaration of an AQMA for NO₂.'

3.7.6 Summary of progress of actions identified or implemented to date

A Draft Air Quality Action Plan was produced by WDC in December 2009. Following stakeholder consultation a number of direct and indirect options were identified within the plan to action '...if exceedence of the annual mean objective for nitrogen dioxide continues to be a probability' (WDC, 2009). An update on these options was included within 2010

Progress Report. A brief description of the actions and progress to date is summarised below in Table 3-24

Table 3-24 Summary of targeted actions from Wychavon DC Draft AQAP 2009

Action ID	Description	Outcome to Date
Direct Option 1	Alteration to the phasing of the traffic lights at the Port Street/ Waterside junction	Communications had taken place with County Council in 2010. This action is identified within LTP3 – see SW6 below
Direct Option 2	Upgrading of the two Pelican crossings to Puffin crossings in Port Street	No progress identified to date
Direct Option 3	Restrictions on the loading and unloading of delivery vehicles in Port Street	No progress identified to date
Direct Option 4	Review of Wychavon car parking policy to encourage the use of most appropriate car park	No progress identified to date
Direct Option 5	Review of the signage for traffic coming into Evesham to encourage use of bypass (A44) by through traffic	No progress identified to date
Indirect Option 9	Lobby and support WCC to improve cycle network provision throughout district	This action is identified within LTP3 – see SW19 below
Indirect Option 10	Lobby and support WCC for footway and footpath improvements	No progress identified to date.
	Encouraging car-sharing scheme in Evesham and Wychavon	No progress identified to date.
	Encouraging the uptake of Workplace Travel Plans for major employers in Evesham and Wychavon	No progress identified to date.
Indirect Option 21	Implementing Wychavon District Council's Travel Plan	TBC - LK
	Ensuring that air quality is taken into account in the planning process	WRS review planning applications and comment on developments where appropriate. Ongoing.
	Working with developers to improve sustainable transport links serving new developments	Partnership working with LPA and developers as part of the planning process. ongoing
	Developing advice to assist with air quality assessments of development proposals	H&W Air Quality Planning Protocol adopted by WDC 2009

3.7.7 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 Port Street AQMA. The LTP3 scheme code, brief description and current status as provided by WCC in February 2013 are shown in Table 3-25.

Table 3-25 LTP3 actions impacting Port Street AQMA.

LTP3 Scheme	Description of Improvements	Current Status/Timeline for completion
SW6 - Evesham B4035 Port St/Waterside Junction Enhancement	Directly linked to AQMA: Maintenance and upgrading of this busy junction including MOVA intelligent traffic signal control system.	Related to replacement of Abbey Bridge, works beginning in 2013.
SW13 - Worcester to Evesham Rail line Dualling Scheme	Indirect: Reinstate dual track increase capacity on Cotswold Line	No proposals at this time.
SW19 - Evesham River Avon Walk Cycle Bridge (north of Walkman's bridge)	Indirect: Development of a walk cycle bridge from new Offenham Rd Estate to High St/Railway station in Evesham providing link to key facilities and Evesham Town Centre	No proposals at this time.

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

Issue PS1 - The current boundary of the AQMA could be amended to comply with Defra (LAQM.TG(09) and LAQM.PG(09)) and EPUK guidance e.g. along physical or administrative boundaries and exclude rear residential garden areas.

Issue PS2 - Port Street is a narrow road enclosed in by 2 to 3 storey buildings creating a perfect street canyon and is on an incline along the entire length.

Issue PS3 – A 7.5 tonne weight restriction has been in place on Abbey Bridge for several years. Heavier vehicles are directed around the bypass but potentially access the Town Centre along Port Street to cross the river via Bridge Street.

Issue PS4 – At the western extent is the busy Waterside/Bridge Street junction where traffic queues back up the incline.

Issue PS5 – There are two sets of pedestrian traffic lights in frequent use and observed to cause traffic to queue temporarily in both directions.

Issue PS6 - There is a single bus stop on the road just beyond the pedestrian crossing at Shor Street going east. This was observed to block traffic and cause congestion back into AQMA.

Issue PS7 - Several incidents of cars dropping off passengers at the side of the road or a van unloading at a convenience store were observed to cause traffic congestion.

Issue PS8 - There are two relatively busy side roads, Burford Road and Church Street, with poor visibility when exiting onto Port Street. Vehicles exiting both these and a pull in for parking outside the Talbot Public House were observed to cause congestion within Port Street.

Issue PS9 – There is a poorly utilised pay and display car park a short distance along Burford Road connected to Port Street.

Issue PS10 – Modelling within the Further Assessment identified an exceedence at only one receptor and levels of NO₂ between 36 µg/m³ but below 40 µg/m³ at one other receptor. Therefore less than 10 people are likely subject to exceedences of the annual mean and the magnitude of the exceedence is relatively small (1.5 µg/m³ above the objective).

Issue PS11 – Following an initial review and adjustments, revised Long Term Local Trend data indicates only one exceedence of the annual average objective in five years to 2011. This indicates the frequency and severity of exceedences may not be as high as previously reported and subsequently has implications on the level of potential actions to reduce NO₂ within the AQAP. A more detailed review and cleansing of data is required before considering appropriate response required.

Issue PS12 – No Automatic Monitoring has previously been undertaken in Port Street, Evesham which is not compliant with current guidance.

3.8 Horsefair/Coventry Street, Kidderminster AQMA – Wyre Forest District Council (WFDC)

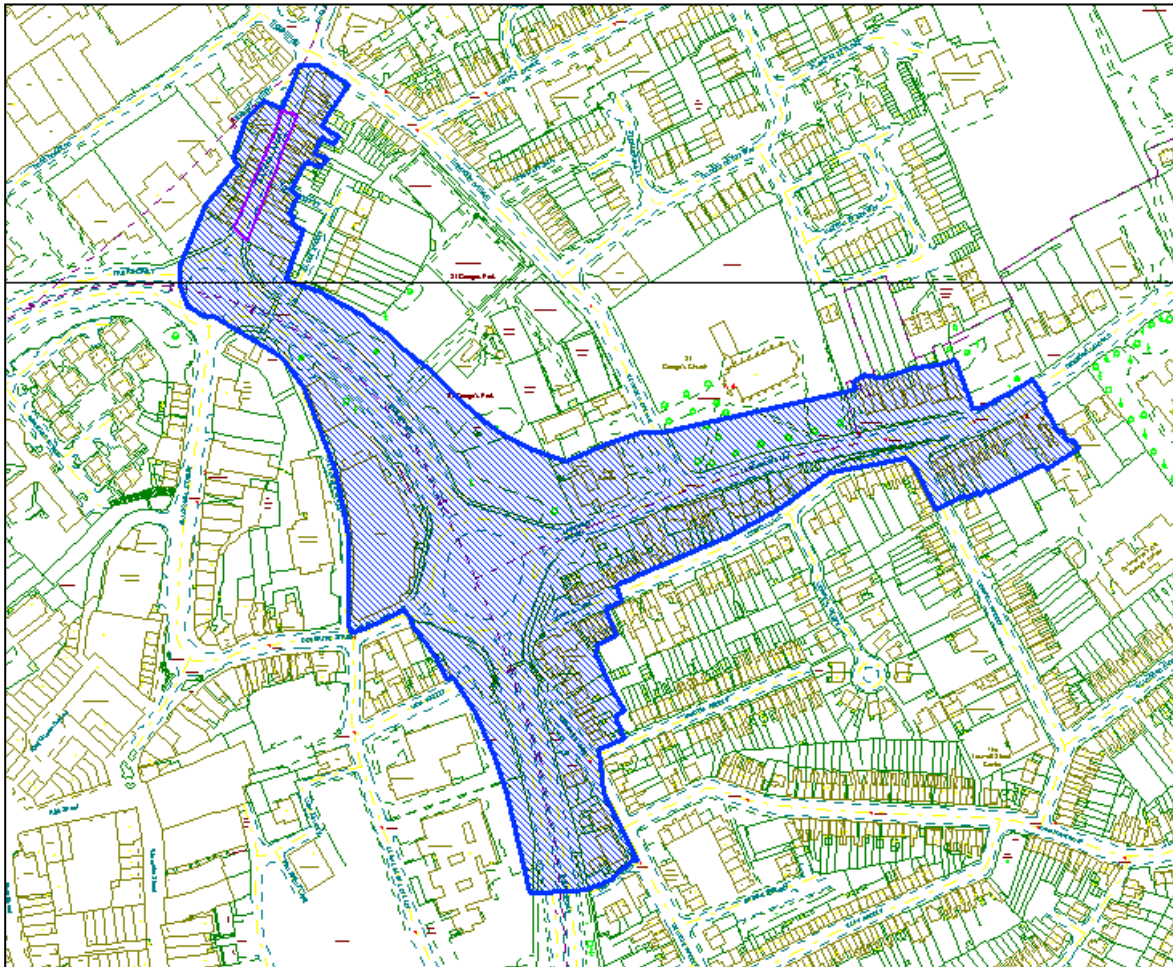
Date of Detailed Assessment: Stage 3 air quality review and assessment recommended AQMA Jan 2003

Date of Declaration: Horsefair first declared 6 January 2003

Date of Further Assessment: Stage 4 air quality review and assessment declared AQMA valid March 2004

Horsefair /Coventry Street declaration: 29 July 2009

Figure 3-25 Plan of Horsefair/Coventry Street AQMA



The Horsefair/Coventry Street AQMA extends from the Horsefair at its junction with Radford Avenue to the ring road, along the ring road in a southerly direction and extends up Coventry Street.

The 2003 declared Horsefair AQMA ran in an approximate north south direction from a point adjacent to The Peacock public house on Blackwell Street to the junction of Blackwell Street with the Ring Road. The majority of the properties in the AQMA were ground floor retail units with residential first floor. In 2007 a detailed assessment recommended an extension of the area required to be covered by the AQMA and in 2009 it was extended to the footprint shown in the above plan.

The AQMA now extends from the north at the Junction of Blackwell Street to the Horsefair and Radford Avenue on the eastern side of Blackwell Street and from The Peacock public house on the western side of Blackwell Street to the ring road island. The AQMA follows the ring road in a southerly direction to a second island where it continues in a north easterly direction along Coventry Street to a point level with number 50 Coventry Street to the western side of the road and a point level with St Ambrose Roman Catholic Church to the eastern side of the road. The AQMA also extends in a further more southerly direction along the ring road to a point level with South Street.

The current boundary of the AQMA follows the contours of predicted pollution levels produced in the Detailed Assessment (November 2007). However these straight contour lines have been extrapolated to cover additional properties and the rear gardens of the properties and may not necessarily be correct. No further assessment or further diffusion tube monitoring at new locations to determine the extent of the AQMA boundary or up to date traffic data collated to allow more accurate modelling as recommended in the 2007 Detailed Assessment has taken place to date.

3.8.1 Prevailing Conditions

AM and PM peak traffic time site observations of the Horsefair/Coventry Street AQMA were undertaken in 2012/2013 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.

To the north of the AQMA there are traffic lights with pedestrianised crossing points at the junction of A451 Blackwell Street (south) Broad Street (west), Radford Avenue (east) and A451 Horsefair (north). Yellow hatching crosses this junction to ensure the junction is not blocked and traffic can flow at all times. A small local street parking area lies to the north west of the junction. Double yellow lines extend partly down Broad Street and Radford Avenue but are ignored especially along Radford Avenue where both sides of the road are subject to parking exacerbated by a local park, school and a religious building. There are bus stops located by the small parking area on either side of the Horsefair for the number 7, 9, 9A and 580 busses that when they stop block the flow of traffic.

The AQMA extends south down A451 Blackwell Street and is a narrow street with tall buildings either side creating a canyon effect. The majority of the properties in this part of the AQMA are ground floor retail units with residential first floor.

Double yellow lines extend down Blackwell Street to the ring road, with no loading markings on the yellow lines and the plates indicate that restrictions apply to loading and unloading at the following times: Mon – Fri 8-9:30, 12-13:30, 16:30-18:30 and Sat 8-9:30, 12-13:30. The loading and unloading restrictions are ignored quite regularly by people popping in to the local shops and just pulling up if they cannot park anywhere else.

Traffic exits A451 on to the Ring Way and tailbacks can be quite considerable along the length of the A451 to Stourbridge Road; exit from the A451 is dependent on traffic flow on the Ring Way. Traffic entering A451 from the Ring Way is queued back on to the Ring Way at peak times due to sheer volume of traffic being held up at the traffic lights at the Horsefair junction.

Traffic flow along the Ring Way is dependent on general flow and volume of traffic in the area generally, queues can be found at the island points in most directions at peak times. Between the north island on the Ring Way and the southern island on the Ring Way in the AQMA there are few receptors in the area to the eastern side of the Ring Way which is

mainly park and open space. Whilst the area to the western side of the Ring Way is mainly office/ retail units with no identified receptors. There are some residential properties in the area of St Georges Court that face out across the Ring Way at the southern island and some residential properties to a point level with 90 St Georges Street and 2 South Street.

The AQMA extends north east along A456 Coventry Street to a point level with the property 50 Coventry Street to the western side of the road and a point level with St Ambrose church on the eastern side of the road. There are mainly residential properties along this section of the AQMA. Double yellow lines extend the length of the AQMA with no specific loading or unloading restrictions. There are bus stops either side of Coventry Street located adjacent to the side of St Georges Church, with no 'pull-ins' which blocks traffic flow. A pedestrianised crossing traverses Coventry Street halfway between the Ring Way and Radford Avenue.

Entry and exit from this section of the A456 is dependent on the queues that build up further north along the A456 at the Land Oak junction and the traffic flow on to the Ring Way. This section of the AQMA includes residential properties to the northern side of Leswell Street.

Site observations during the a.m. and p.m. peak traffic hours noted the majority of traffic consisted of cars/commuters with some LDVs and buses. Lengthy queues were observed along Horsefair /Blackwell Street in the direction of the Ring way and also along A456 Coventry Street in the direction of the Ring Way. Queues developed along the Ring Way due to traffic accessing Blackwell Street and Coventry Street.

Pedestrian traffic in the Coventry Street section of the AQMA was quite high due to the 3 schools: St Ambrose School, St Georges School and Holy Trinity located at Leswell Street, Plane Tree Close and Birmingham Road A456 respectively.

The length of the AQMA can be traversed comfortably in about 20 to 30 minutes' walk by an average person. Therefore the area 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).

Photo 1 – View of queuing traffic along Blackwell Street section of AQMA looking south from the Horsefair to the Ring Way.



Photo 2 – View of queuing traffic along Horsefair north of the AQMA looking from Blackwell Street towards the Horsefair.



Photo 3 – View of queuing traffic along Horsefair north of the AQMA looking from the corner of Broad Street, note the small off road parking area.



Photo 4 – View of Ring Way part of the AQMA looking south east from Blackwell Street island to Coventry Street island, note open space to the left of the photo.



Photo 5 – View of queuing traffic along Coventry Street section of the AQMA looking south west from the junction of Radford Avenue towards the island, note the pedestrian controlled lights.



Photo 6 – View of queuing traffic along Coventry Street section of AQMA looking from Radford Avenue junction north east along A456.



Photo 7 – View of part of the AQMA looking north west from Coventry Street island to Blackwell Street island, note open space to the right of the photo



Photo 8 – View of part of the AQMA at Coventry Street island, note closeness of receptors to Ring Way.



Photo 9 – View of part of the AQMA at Coventry Street island at the junction with Coventry Street, note closeness of receptors to Ring Way.



Photo 10 – View of part of the AQMA at George Street, looking south note all residential.



Photo 11 – View of part of the AQMA at George Street, looking north to Coventry Street island, note residential area and proximity of Ring Way to left of photo.



Photo 12 – View of part of the AQMA at George Street, looking north note residential proximity to Ring Way to the right of the photo.



3.8.2 Summary of any Further Assessment report

There has been no specific Further Assessment of the Horsefair AQMA as the declaration of the AQMA was around 10 years ago and guidelines for LAQM have changed. However the AQMA area was extended in 2007 and a Detailed Assessment for the extension area was undertaken.

The Horsefair AQMA was declared and validated following the 4th stage air quality review and assessments cycle. It was identified that Horsefair, utilizing continuous and passive monitoring data, was likely to exceed the appropriate objective and an AQMA was recommended, the likely geographical extent of the area considered at risk of exceedence of the relevant AQ objectives, where members of the public are likely to be exposed over the relevant averaging period was defined.

The 4th Stage Updating and Screening Assessment report confirmed the findings of the previous USA, concluding that a detailed assessment of NO₂ was required for the AQMA. This conclusion was reached upon consideration of NO₂ diffusion tube monitoring data, in conjunction with a DMRB assessment. The following stage 4 review and assessment by Faber Maunsell was to provide a detailed study of modeling of nitrogen dioxide for the AQMA. The results of the modeling were compared against nitrogen dioxide diffusion tube data. The results validated the declaration of the AQMA, it was suggested that the AQMA may need extending to encompass Coventry Street from its junction with Radford Avenue and the Ring Way.

In 2007 a Detailed Assessment of air quality was carried out for properties located in close proximity to the junction of Coventry Street with the Ring Way roundabout in Kidderminster. The Detailed assessment undertaken utilized the relevant receptor locations shown in Table 3-26 below.

These areas were identified as being at risk of exceeding the annual mean air quality objective for nitrogen dioxide in the Updating and Screening Assessment (Wyre Forest

District Council, 2006). The Detailed Assessment was carried out using a combination of monitoring data and modelled concentrations. Concentrations of pollutants were modelled using the dispersion model ADMS Roads for 2005 at specific monitoring locations (for the purposes of model verification) and for the wider study area for 2006.

Monitoring confirmed that the annual mean objective is being exceeded. Modelling showed the objective is being exceeded at properties alongside Coventry Street and the Ring Way, closest to the roundabout in 2006.

Recommendations were made to declare an AQMA including all residential properties which lie within the $40\mu\text{g}/\text{m}^3$ contour as a minimum, and consideration should be given to declaring those properties which lie within the $36\mu\text{g}/\text{m}^3$ contour, to allow for any uncertainty within the model. It was also recommended that further diffusion tube monitoring is carried out at the closest residential properties to the Roundabout and at additional residential locations alongside Coventry Street and the Ring Way to determine the extent of the AQMA boundary. It was stated that additional up-to-date count data, including annual average speed data, would allow more accurate modelling to be carried out as part of the Further Assessment required once the AQMA has been declared.

Table 3-26 Annual Mean NO₂ Concentrations measured using Diffusion Tubes.

Site Reference	Site	2005 ^a	2006 ^b
(F) 69 Cov	Façade of 69 Coventry Street, Kidderminster	47.0	51.2
(F) SGC	Façade of 6/7 St George's Court, Kidderminster	41.0	35.7

3.8.3 Source Apportionment Data

The additional modelling undertaken within the Stage 4 assessment utilised basic source apportionment data based on 2003 traffic data. The percentage contribution from HGV against total traffic volume identified in the report is shown below in Table 3-27.

Table 3-27 Percentage contribution of HGVs in 2003 in Horsefair AQMA

Street	HGV %	AM Peak Hour Traffic Flow	
		2003	2005
Blackwell St (N)	2.8	1133	1158
Blackwell St (S)	4	234	239
Broad St	3.9	335	342
Coventry St (E)	4.18	1489	1522
Coventry St (W)	4.62	446	456
Radford Avenue	4.33	321	328
Ring Way NB 2-3	5	1191	1218
Ring Way NB 3-4	5	1228	1256
Ring Way SB 2-3	6.37	1631	1668
Ring Way SB 3-4	6.37	1376	1408
St Marys Ring Way EB	5.68	1651	1689
St Marys Ring Way WB	5.68	1170	1197
Stourbridge Road	4.34	860	879

The detailed Assessment in 2007 utilised the following source apportionment data as shown in Table 3-26

Table 3-28 Summary of Traffic Flows

Road Link	2005		2006	
	AADT	HDV AADT	AADT	HDV AADT
The Ringway	30,753	2,266	30,999	2,284
St Mary's Ringway	29,138	1,426	29,371	1,437
Birmingham Road	15,793	1,188	15,919	1,198

3.8.4 Air Quality Improvement Required.

The requirements for improvement identified in the Stage 4 assessment are detailed in Table 3-27 below.

Table 3-29 Air Quality Improvements Required in 2004 in Horsefair AQMA

Kidderminster	Receptor	Easting	Northing	Modelled NO ₂ , 2005	% Contribution		Required NO ₂ decrease from Traffic sources (%)
					Traffic	Background	
	6	383322	277130	35.8	46	54	-
	7	383312	277064	44.0	56	44	19
	8	383291	277038	44.2	57	43	20
	9	383552	276870	38.5	50	50	-

Table 3-27 lists the modelled 4 sensitive receptor locations, the modelled NO₂ concentrations for 2005, and the percentage contribution to these concentrations from traffic. Also shown is the required percentage decrease of traffic related NO₂, based on the modelling results, to reduce the NO₂ concentration to below the 2005 annual mean air quality standard of 40 µg/m³. It should be noted that to reduce the concentrations below 36 µg/m³, to take into account model error, a further decrease in NO₂ (in addition to that detailed in Table 3-27) is required.

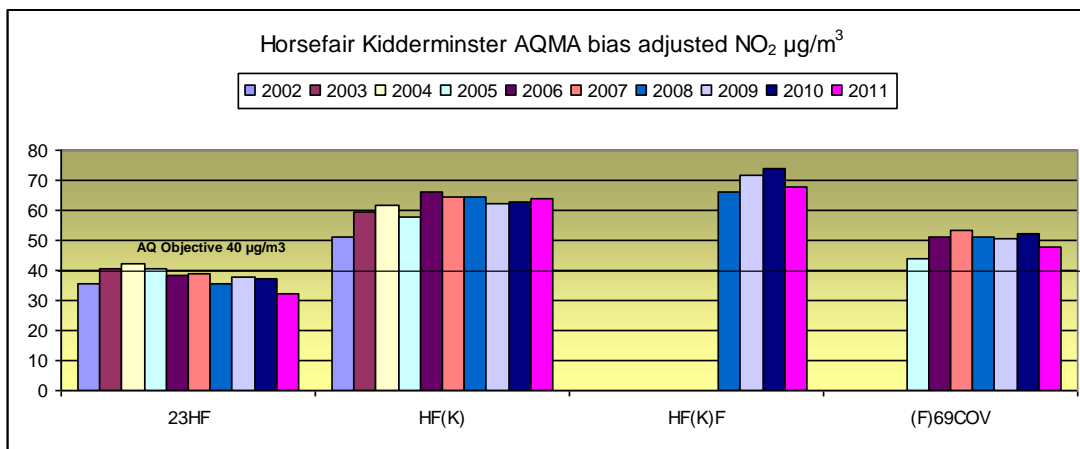
The 2007 Detailed Assessment did not include any source apportionment data.

3.8.5 Long term local trends in NO₂

As part of the AQAP process, data has been collated from previous Wyre Forest District Council's yearly progress reports and screening assessments to produce a meaningful picture of long term trends in monitoring results of nitrogen dioxide in Horsefair/Coventry Street, Kidderminster.

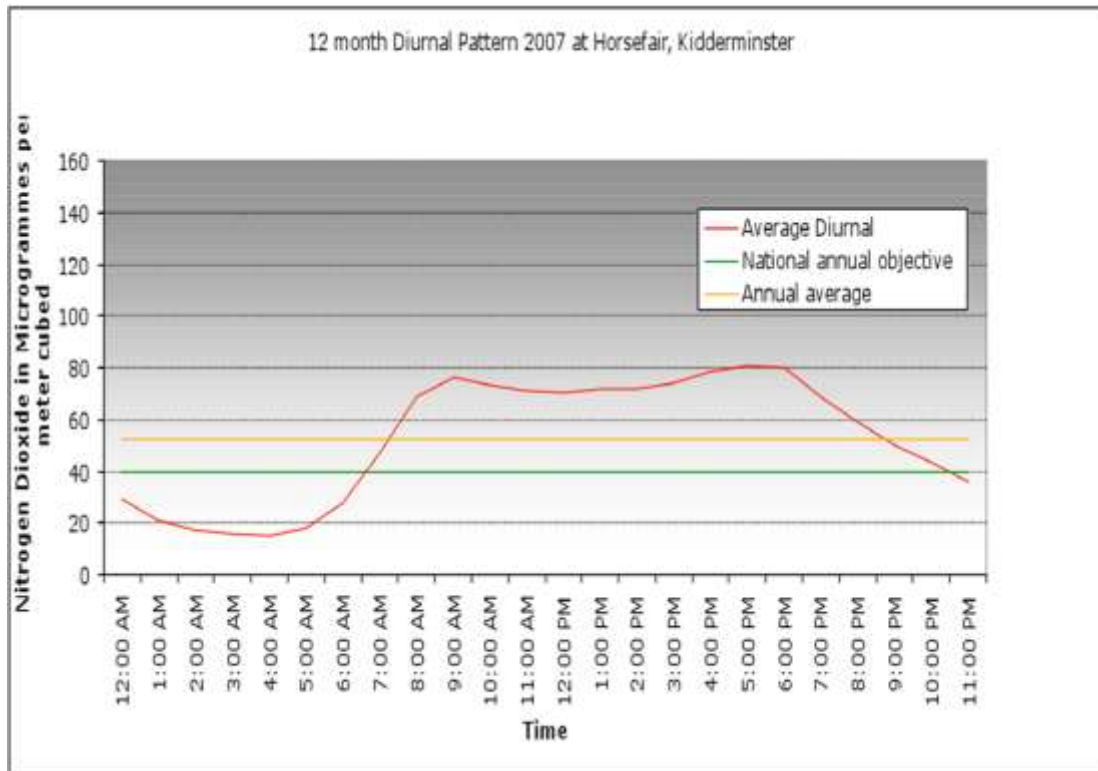
The graph below depicts these long term trends from bias adjusted annual average results of NO₂ at relevant exposure receptor locations.

Figure 3-26 Bias adjusted Annual Average NO₂ monitoring results 2002 - 2011 Horsefair AQMA



Since the stage 4 review and assessment the Horsefair/Coventry Street diffusion tube monitoring has continued to show exceedences of the AQ objectives and the existence of the AQMA is valid.

In addition to diffusion tube locations real time analyses was undertaken for at least 12 months and produced a full year of results for 2007 using Airpointer equipment.

Figure 3-27 Diurnal patterns of NO₂ from Air pointer in Horsefair 2007

The Airpointer was installed in a council owned vacant property in the AQMA in Blackwell Street, and the sampling tube was installed through the property onto the external façade on Blackwell Street. Nitrogen Dioxide diffusion tubes were also tri-located on the property façade to establish a local correction factor for nitrogen dioxide diffusion tubes. The Graph above sums twelve months results of the diurnal patterns to an average daily value. The trace confirms that air quality deteriorates quickly from approximately 6:00am and continuously builds to about 9:00 am where it reaches a peak reading corresponding with the morning rush hour period then drops slightly till about 3:00 pm approximately where it starts to rise again, cumulating to a peak around rush hour 5:00 -7:00pm. NO₂ levels then tail off and only dip below the objective levels around 10:00pm. The graph confirms that the degradation in air quality is attributable to road vehicles traversing the AQMA.

3.8.6 Summary of progress of actions identified or implemented to date

An Air Quality Action Plan was produced by Wyre Forest District Council in October 2004. A number of options were identified within the plan to improve air quality within the original Horsefair AQMA. An update on these options was regularly produced for annual Progress Reports for Defra. An action plan has not yet been produced for the extended Horsefair/Coventry Street AQMA declared in 2009. A brief description of the actions and progress to date is summarised below in Table 3-30

Table 3-30 Summary of targeted actions from previous AQAP for Horsefair AQMA

Action ID	Description	Outcome to Date
Option WF1	Review of make-up & condition of WFDC transport fleet with a view to improving fleet quality, maintenance & emission levels	Improvements achieved - Part of WFDC climate change strategy
Option WF2	Increase in WFDC fleet use of alternative fuels (e.g. LPG & combined fuel vehicles)	Part of WFDC climate change strategy

Action ID	Description	Outcome to Date
Option WF3	Review of the WFDC employee / contract car user & leasing policy to give incentives for greener vehicle ownership / use	Part of WFDC climate change strategy
Option WF4	Workplace charging schemes where employees are charged to use car park provision	Part of WFDC climate change strategy
Option WF5	Promote WFDC use of public transport during working day	Part of WFDC climate change strategy
Option WF6	Car sharing and work travel planning for staff to encourage take-up of public transport / reduced car journeys	Part of WFDC climate change strategy - Green Travel Plan to be implemented.
Option WF7	Restriction and better timing of WFDC delivery and service schedules	Not known.
Option WF8	Alterations to parking provision & pricing throughout district to ease traffic around AQMA and to deter local car use	Part of WFDC climate change strategy – on going through planning policy implementation
Option H1	Review of signage for traffic coming into Kidderminster to encourage use of alternative routes in to town centre. Electronic signage may be appropriate indicating potential traffic congestion / air quality problems. Possible use of 'Town Centre only signs'	Part of Wyre Forest Transport Package in LTP3.
Option H2	One way system on Blackwell Street so that southbound traffic heading for Kidderminster / Ringway is forced to turn left and go down Radford Avenue and only northbound traffic permitted along the AQMA	No Progress, not viable since extension of AQMA.
Option H3	One-way system incorporating improvements in public transport. Vehicles allowed northbound along Blackwell St / Coventry St but prohibited travelling southbound (except buses, taxis & cycles) [referred to as 'Do Something 1 traffic proposal' in Stage 4 Air Quality Review and Assessment]	One way traffic flow systems are part of the Churchfields Local Plan and ReWyre strategy for the area. No progress.
Option H4	A scheme to address congestion in the north-eastern section of Kidderminster - to re-design junctions of Blackwell St / Coventry St & Ringway & to signalise roundabouts allowing traffic to be controlled more easily [referred to as 'Do Something 2 traffic proposal' in Stage 4 Air Quality Review and Assessment]	One way traffic flow systems are part of the Churchfields Local Plan and ReWyre strategy for the area. No progress.
Option H5	Introduction of a feeder/merger lane at the Kidderminster end of the AQMA to facilitate the better flow of traffic away from AQMA & on to the Ringway. Traffic will be forced to turn left. Option may require the introduction of traffic lights on the roundabout	One way traffic flow systems are part of the Churchfields Local Plan and ReWyre strategy for the area. No progress.
Option H6	Traffic calming measures (speed zones/bumps etc.) for local road network around AQMA to help the continual flow of traffic	No progress
Option H7	Park and ride scheme for Kidderminster	No progress
Option H8	Pedestrianisation of Blackwell Street	No progress
Option H9	HGVs restriction on Blackwell Street (particularly top end)	No progress
Option H10	Loading / unloading restrictions during congested periods	Implemented
Option H11	Co-ordinated system of traffic lights at north end of Blackwell St. Needs to include easy exit from Churchfields Part time lights on island may be needed.	Partly implemented.

3.8.7 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 Horsefair / Coventry Street AQMA. The LTP3 scheme code, brief description and current status as provided by WCC in February 2013 are shown in Table 3-31.

Table 3-31 LTP3 actions impacting Horsefair/Coventry Street AQMA

LTP3 Scheme	Description of Improvements	Current Status
K2 - Kidderminster – Ring Road Junction and Public Realm Improvement Scheme	Enhancement/redevelopment of the ring road to improve efficiency, functionality and appearance, in particular to mitigate the AQMA	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.
K3 -Kidderminster – Station Enhancement	Upgrading railway station to more attractive and appropriate transport gateway to town and integrated with Severn Valley Railways.	On hold pending identification of funding.
K5 - Kidderminster – Traffic & Parking Study	Study would identify where to focus investment to improve the operation of the local transport network.	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.
K6 - Kidderminster – Minor Transport Improvements Scheme	Minor complimentary transport improvements to enhance safety, accessibility, information & travel choice integrated with other schemes	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.
K 7 -Kidderminster – Secure Cycle Parking Scheme	Provision of indoor cycle parking facilities in Town Centre to make cycling more attractive	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.
WF 1 - A456 Kidderminster – M5 (J3 and J4) Inter urban corridor maintenance and improvement	Adjacent. Improvements to connecting route - A comprehensive corridor length programme of improvements including junction enhancements, street furniture decluttering, replacement and enhancement	No proposals at this time.
WF 2 - A448 Kidderminster – Bromsgrove Inter urban corridor maintenance and improvement	Adjacent. Improvements to connecting route - A comprehensive corridor length programme of improvements including junction enhancements, street furniture decluttering, replacement and enhancement	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.
WF 3 - A449 Kidderminster – Worcester Inter urban corridor maintenance and improvement	Adjacent. Improvements to connecting route - A comprehensive corridor length programme of improvements including junction enhancements, street furniture decluttering, replacement and enhancement	No proposals at this time.

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

Issue HF1 – The detailed Assessment of 2007 recommended further diffusion tube monitoring is carried out at the closest residential properties to the island and at additional residential locations alongside Coventry Street and the Ring Way to determine the extent of the AQMA boundary. Up-to-date count data, including annual average speed data, would allow more accurate modelling to be carried out as part of the Further Assessment.

Issue HF2 – The current boundary of the AQMA follows the contours of predicted pollution levels produced in the Detailed Assessment (November 2007). The current boundary of the AQMA could be amended to comply with Defra (LAQM.TG(09) and LAQM.PG(09)) and EPUK guidance e.g. along physical or administrative boundaries and exclude rear residential garden areas.

Issue HF3 – The main issue identified is the sheer volume of traffic in the area both entering the Kidderminster Ring Way and exiting it.

Issue HF4 - The narrowness of Horsefair and the tall buildings creates a canyon effect on air quality in the Blackwell Street part of the AQMA.

Issue HF5 – Two way traffic on all roads in the vicinity of the AQMA and the AQMA itself creates queues due the narrowness of the roads.

Issue HF6 – 2 Local primary schools and a high school provide an additional burden to traffic numbers and pedestrian footfall in the area.

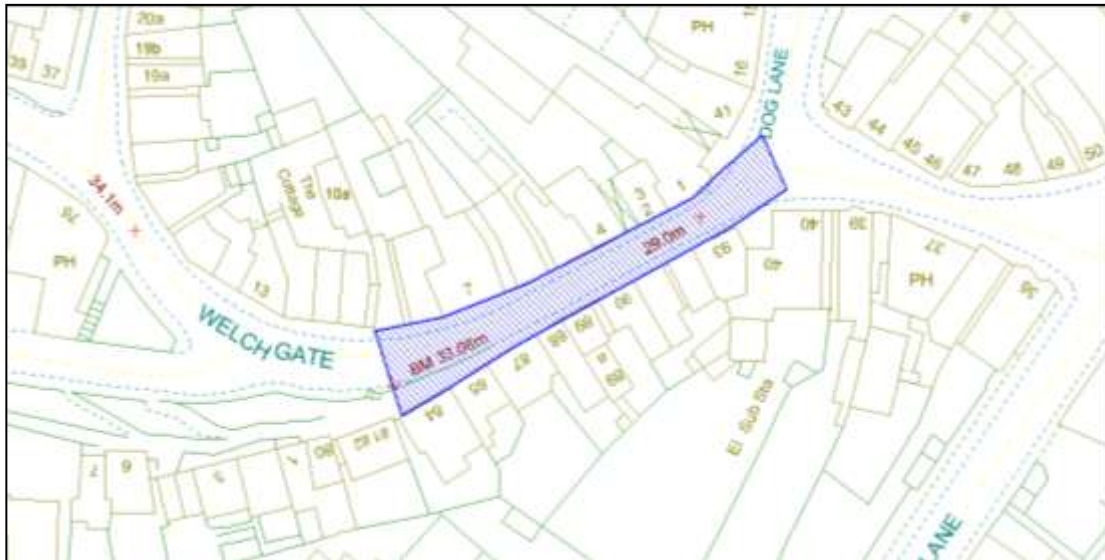
3.9 Welch Gate, Bewdley AQMA – Wyre Forest District Council (WFDC)

Date of Detailed Assessment: Jan 2003 (Stage 3 air quality review and assessment recommended AQMA)

Date of Declaration: 6 January 2003

Date of Further Assessment: March 2004 (Stage 4 air quality review and assessment declared AQMA valid)

Figure 3-28 Plan of AQMA



The B4190 runs along Load Street from an easterly direction and then turns left up Welch Gate continuing on out of Bewdley in a westerly direction. The road numbering follows the previous layout of the junction where it was a through road from Bewdley town centre and out along Welch Gate.

The current area of the Welch Gate AQMA encompasses a short section of the B4190 Welch Gate from the junction with Dog Lane and Load Street to a point level with property number 84 Welch Gate and runs in a east north east to west south west direction. The AQMA is predominately residential.

At the eastern end of the AQMA there is a now a junction on the B4190 where Dog Lane (B4194) extends to the north and Load Street (B4190) to the east. Dog Lane (B4194) continues for approximately 75m to a forked junction where the B4194 now named as Dowles Road continues north and Dog Lane forks to the north east. The Dog Lane properties at the closest point to the junction of the AQMA consist mainly of ground floor retail units with residential units at first floor level. Load Street (B4190) continues in an easterly direction through the town centre and out across the bridge, river crossing and towards Kidderminster. Load Street properties at their closest point to the junction of the AQMA Load Street consist mainly of ground floor retail units and residential units at first floor level.

At the western end of the AQMA the B4194 continues in a west north westerly direction and is predominately a residential area. Sandy Bank joins the B4190 approximately 20m to the west of the AQMA, Sandy Bank is a steep residential area that becomes Wyre Hill further to the west where the local primary school is located. Approximately 50m to the north-west of the AQMA Richmond Road joins the B4190. Richmond Road is a residential area.

3.9.1 Prevailing Conditions

AM and PM peak traffic time site observations of the Welch Gate AQMA were undertaken in 2012/2013 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 area of the AQMA in Welch gate itself is mainly residential with properties that typically reach 3 storeys in height that coupled with the narrowness of the street create a canyon effect locally. The boundaries of the AQMA follow the facades of the buildings in Welch Gate.

There are no taxi ranks, bus stops or loading bays to hinder traffic flow in the AQMA but the traffic light pedestrian crossing in the centre of the town on Load Street appears to create traffic queues that back up to Dog Lane and hinder the flow of traffic out of the junction of Welch Gate. There is a traffic light pedestrian crossing located at Dog Lane by the Horn and Trumpet public house that can be beneficial when there are high pedestrian numbers wishing to cross Dog Lane as the traffic flow out of Welch Gate is difficult to traverse but consequently commuters regularly block the Welch Gate junction using this crossing.

Double yellow lines exist the full length of the AQMA and for a considerable distance either side. There are no restrictions on loading or unloading and there are no restrictions on lane turning or directions. There are no weight restrictions in the AQMA however there are weight restrictions on the Bewdley bridge river crossing. The speed limit for the area is 30 mph.

Queues develop regularly at all times due to abuse of the double yellow lines. Commercial and residential vehicles loading and unloading regularly park on the double yellow lines and create queues as traffic cannot easily get round parked vehicles.

The length of the AQMA can be traversed comfortably in less than a minute's walk by an average person. Therefore the area 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).

Site observations during the A.M. and P.M. peak traffic hours noted the majority of traffic consisted of cars/commuters with some LDVs and buses. The direction of the traffic flow was almost a 70/30% split of commuter/cars observed travelling east and west respectively at a.m. peak time. A quarter of vehicles were noted to have more than one occupant travelling west corresponding with the school run, and those travelling east the majority had just one occupant. Buses were quite regular at A.M. peak times heading to the school and residential areas located to the west of the AQMA and back in to Kidderminster.

Queuing traffic was observed at the junction of Welch Gate and Dog Lane/Load Street heading east on the B4190. These queues were observed to be the from the high volume of slow moving vehicles due to the narrowness of the street that wish to turn right at the junction and continue on the B4190 towards Kidderminster. The queues appeared to be worse due to the high number of vehicles also travelling down Dowles Road and Dog Lane B4194 to continue along the B4190 to Kidderminster using the river crossing. The B4190 east by The Swan public house has a narrowing of the road that hinders traffic flow especially when large goods vehicles or buses wish to pass, having to wait for a clear road which creates queues.

The amount of pedestrians using the pavements during school times was observed to be very high with many school children travelling from the estates in the west of Bewdley by foot

to the high school along the Stourport Road. There are no official crossing points in Welch Gate so there is a tendency for pedestrians to cross anywhere between the queuing traffic. Queuing traffic was also observed on Load Street at the junction of Welch Gate heading west. These queues were mainly observed to be as the result of the narrowness of Welch Gate and busses or large vehicles blocking the access of vehicles wishing to travel west.

Photo 1 – Looking towards east down the length of the AQMA to the Junction with Load Street/Dog Lane



Photo 2 – Looking towards west from the western end of the AQMA to where Richmond Road junctions with Welch Gate



Photo 3 – Looking towards west from the western end of the AQMA to where Sandy Bank junctions with Welch Gate



Photo 4 – The pedestrian crossing outside the Horn & Trumpet public house on Dog Lane, Looking north from junction of the AQMA with Dog Lane / Load Street.



Photo 5 – Looking towards the west down the length of the AQMA, note the bus waiting for a clear road to travel down the AQMA.



Photo 6 – Looking east down Load street from the junction of the AQMA with Load Street / Dog Lane, note the narrow road approximately where the van is opposite the Swan public house.



Photo 7 – The AQMA at junction of Load Street/Dog Lane, looking west, note the bus waiting to enter the AQMA as the street is narrow and the bus cannot swing round.



3.9.2 Summary of any Further Assessment report

There has been no specific Further Assessment of the Welch Gate AQMA as the declaration of the AQMA and guidelines for LAQM have changed.

The Welch Gate AQMA was declared and validated following the 4th stage air quality review and assessments cycle.

It was the third stage, utilizing continuous and passive monitoring data, that identified Welch Gate was likely to exceed the appropriate objective and an AQMA was recommended. The likely geographical extent of the area considered at risk of exceedence of the relevant AQ objectives where members of the public are likely to be exposed over the relevant averaging period was defined.

The 4th Stage USA report confirmed the findings of the previous report, concluding that a detailed assessment of NO₂ was required for the AQMA. This conclusion was reached upon consideration of NO₂ diffusion tube monitoring data, in conjunction with a DMRB assessment. The following stage 4 review and assessment by Faber Maunsell was to provide a detailed study of modeling of nitrogen dioxide for the AQMA. The results of the modeling were compared against nitrogen dioxide diffusion tube data. The results validated the declaration of the AQMA, it was suggested that the AQMA may need extending to encompass the Dog Lane, Load Street junction area however later monitoring has ruled this out.

3.9.3 Source Apportionment Data

The additional modelling undertaken within the Stage 4 assessment utilised basic source apportionment data based on 2003 traffic data. The percentage contribution from HGV against total traffic volume identified in the report is shown below in Table 3-32.

Table 3-32 Percentage of HGV contribution in 2003 to Welch Gate AQMA

Street	HGV %	AM Peak Hour Traffic Flow	
		2003	2005
High St	3	319	326
Load St S	3.6	326	333
Load St N	3.3	917	938
Load St	3.45	1243	1271
Welch Gate	3.5	559	571
Winbrook	3.5	335	343
Dowles Road	3.5	383	392
Sandy Bank	3.5	66	68
Park Lane	1.1	173	177

3.9.4 Air Quality Improvement Required.

The requirements for improvement identified in the Stage 4 assessment are detailed in Table 3-33 below.

Table 3-33 Air Quality Improvements required in 2004 in Welch Gate AQMA

	Receptor	Easting	Northing	Modelled NO ₂ , 2005	% Contribution		Required NO ₂ decrease from Traffic sources (%)
					Traffic	Background	
Bewdley	1	378452	275294	37.2	48	52	-
	2	378481	275300	40.5	53	47	2.5
	3	378506	275320	40.2	52	48	1
	4	378510	275309	39.5	51	49	-
	5	378527	275311	39.9	52	48	-

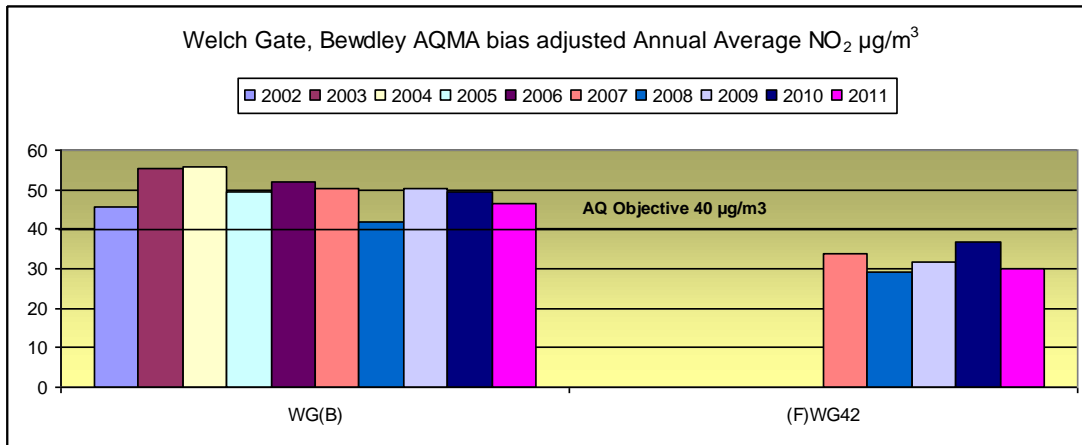
Table 3-33 lists the modelled 5 sensitive receptor locations, the modelled NO₂ concentrations for 2005, and the percentage contribution to these concentrations from traffic. Also shown is the required percentage decrease of traffic related NO₂, based on the modelling results, to reduce the NO₂ concentration to below the 2005 annual mean air quality standard of 40µg/m³. It should be noted that to reduce the concentrations below 36 µg/m³, to take into account model error, a further decrease in NO₂ (in addition to that detailed in Table 3-33) is required.

3.9.5 Long term local trends in NO₂

As part of the AQAP process data has been collated from previous Wyre Forest District Council's yearly progress reports and screening assessments to produce a meaningful picture of long term trends in monitoring results of nitrogen dioxide in Welch Gate, Bewdley.

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

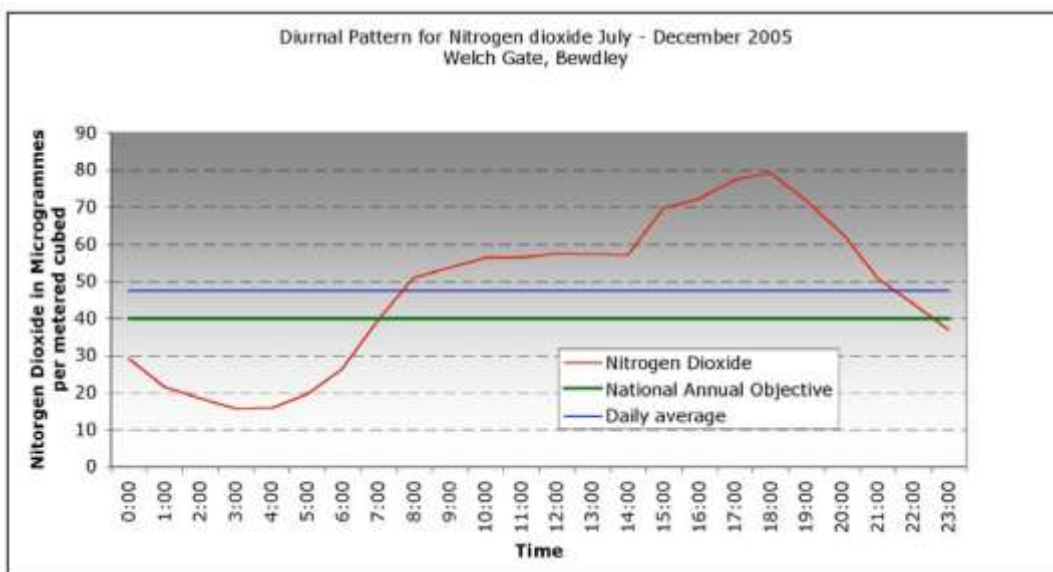
Figure 3-29 Bias adjusted Annual Average NO₂ monitoring results 2002 - 2011 Welch Gate AQMA



Since the stage 4 review and assessment the Welch Gate diffusion tube monitoring has continued to show exceedences of the AQ objectives and the existence of the AQMA is valid.

In addition to diffusion tube locations real time analyses was undertaken from July 2005 to May 2006 using Airpointer equipment.

Figure 3-30 Diurnal patterns of NO₂ in 2005-06 in Welch Gate AQMA



The Airpointer was installed in the cellar of a residential property and the sampling tube was installed through the property onto the external façade on Welch Gate thus representative of relevant exposure. Nitrogen Dioxide diffusion tubes were also tri-located on the property façade to establish a local correction factor for nitrogen dioxide diffusion tubes. The Graph above sums six months results of the diurnal patterns to an average daily value. The trace confirms that air quality deteriorates quickly from approximately 6am and continuously builds through the day, cumulating to a peak around rush hour 5-7pm. NO₂ levels then tail off and only dip below the objective levels around 10pm. The graph confirms that the degradation in air quality is solely attributed to road vehicles traversing Welch Gate.

3.9.6 Summary of progress of actions identified or implemented to date

An Air Quality Action Plan was produced by Wyre Forest District Council in October 2004. A number of options were identified within the plan to improve air quality within the AQMA. An update on these options was regularly produced for annual Progress Reports for Defra. A brief description of the actions and progress to date is summarised below in Table 3-34

Table 3-34 Summary of targeted actions for Welch Gate AQMA from previous AQAP

Action ID	Description	Outcome to Date
Option WF1	Review of make-up & condition of WFDC transport fleet with a view to improving fleet quality, maintenance & emission levels	Improvements achieved - Part of WFDC climate change strategy
Option WF2	Increase in WFDC fleet use of alternative fuels (e.g. LPG & combined fuel vehicles)	Part of WFDC climate change strategy
Option WF3	Review of the WFDC employee / contract car user & leasing policy to give incentives for greener vehicle ownership / use	Part of WFDC climate change strategy
Option WF4	Workplace charging schemes where employees are charged to use car park provision	Part of WFDC climate change strategy
Option WF5	Promote WFDC use of public transport during working day	Part of WFDC climate change strategy
Option WF6	Car sharing and work travel planning for staff to encourage take-up of public transport / reduced car journeys	Part of WFDC climate change strategy - Green Travel Plan to be implemented.
Option WF7	Restriction and better timing of WFDC delivery and service schedules	Not known.
Option WF8	Alterations to parking provision & pricing throughout district to ease traffic around AQMAs and to deter local car use	Part of WFDC climate change strategy – on going through planning policy implementation
Option B1	Review of signage for traffic into Bewdley to encourage use of the bypass. Electronic signage may be able to indicate traffic congestion / local air quality problems. Possible use of 'Town Centre only signs'	Trialled recently - failure of signs to reduce traffic in AQMA – Part of Wyre Forest Transport Package in LTP3.
Option B2	Use of traffic lights to prevent traffic up & down Welch Gate at the same time. Traffic lights on Cleobury Rd, corner of Load St /Welch Gate & corner of Dowles Rd/ Welch Gate. May only need to operate in 'busy period'. Possible 'one way' up Sandy Bank, The Hollow, Bark Hill or traffic lights. Could include pavement widening scheme. (For scheme see Appendix B)	Trialled recently - failure to improve air quality in AQMA - Part of Wyre Forest Transport Package in LTP3.
Option B3	One way traffic permitted uphill (westward) along Welch Gate as far as Sandy Bank Junction, two way thereafter. Suggested corresponding one way up Sandy Bank and Richmond Rd. (See diagram of scheme in Fig	Support for this option was withdrawn by the originators in preference for Option B18

Action ID	Description	Outcome to Date
	E, appendix D)	
Option B4	Change the priority of the junction at the bottom of Welch Gate so that traffic from Dog Lane must give way.	This was the previous set up of road priority. Part of Wyre Forest Transport Package in LTP3.
Option B5	A one way system for West Bewdley: Traffic to go up Park Lane to Wyre Hill and down Sandy Bank / Winbrook and Welch Gate. Includes proposals for connection from Wyre Hill (near Merricks Lane) to the by-pass.	Part of Wyre Forest Transport Package in LTP3
Option B6	Traffic lights on the bridge to control flow of traffic through Bewdley	Part of Wyre Forest Transport Package in LTP3.
Option B7	Traffic calming measures, particularly in and around AQMA (speed zones/bumps etc.)	Subject of debate in area, currently not implemented.
Option B8	Bridge Closure	Not viable, only 2 river crossings in Bewdley.
Option B9	Bridge Closure with possible timed control of movements over the bridge	Not viable, only 2 river crossings in Bewdley.
Option B10	Close Load St entrance to car park, pedestrianise current short-stay Load St car park areas and move car park entrance to Dog Lane	Part of Wyre Forest Transport Package in LTP3 and current planning considerations as part of the new re located medical centre.
Option B11	Car park on North East side of river (with free or cheap charging scheme to motivate use)	Part of Wyre Forest Transport Package in LTP3.
Option B12	Park and ride scheme for Bewdley to take traffic away from AQMA	Part of Wyre Forest Transport Package in LTP3.
Option B13	Tonnage limit on Bridge / along Welch Gate. Also suggestions for possible restrictions on High Street and Park Lane	Weight restriction in place on bridge, no other limits imposed in area.
Option B14	Signage on Safari Park Island, or other appropriate position, giving directions to Bewdley Business Park	Part of Wyre Forest Transport Package in LTP3.
Option B15	Pedestrianisation of Bewdley Town Centre	Not currently viable due to the need to access the bridge as a river crossing.
Option B16	Continue the Bypass on to Habberley Road	Little benefit to AQMA – ruled out.
Option B17	Ventilation System under footpath / on houses	No funding and technology not proven – ruled out.
Option B18	Reviewed and amended Option B3	Part of Wyre Forest Transport Package in LTP3.
Option B19	Introduction of Bewdley walking initiative (particularly for journeys to school and home delivery scheme)	Implemented in areas of Bewdley but not in AQMA area, footpaths narrow and no plans to change width of footpaths.
Option B20	Bewdley Park and Ride options to be assessed	Implemented in part of Bewdley but failed due to low take up – no benefit to AQMA.

3.9.7 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 Welch Gate AQMA. The LTP3 scheme code, brief description

and current status as provided by WCC in February and updated in June 2013 are shown in Table 3-35.

Table 3-35 LTP3 actions impacting Welch Gate AQMA

LTP3 Scheme	Description of Improvements	Current Status
BE1 - Bewdley (Welch Gate) AQMA Remediation	Direct - Involve changing traffic flows through Bewdley Town Centre using a variety of measures, to manage traffic flows through Town Centre to manage traffic flow and mitigate AQMA at Welch Gate	Trials have been held but unfortunately none were successful. The majority of the traffic flow in the AQMA is locally generated so attention will be refocused on campaigns to encourage modal shift to sustainable modes to access town centre services and facilities for local residents
BE3- Bewdley – Traffic & Parking Study	Indirect - Study would identify where to focus investment to improve the operation of the local transport network.	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.
BE4- Bewdley – Minor Transport Improvements Scheme	Indirect - Minor complimentary transport improvements to enhance safety, accessibility, information & travel choice integrated with other schemes	This scheme was delivered during late 2012/early 2013.
BE5- Bewdley – Walk/Cycle Bridge Scheme	Indirect - Development of a walk/cycle bridge over River Severn south of Bewdley bridge	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.

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

Issue WG1 – It has been more than 8 year since real time analyses has been undertaken at the AQMA or any detailed modelling.

Issue WG2 – The main issue identified is the sheer volume of traffic in the area proceeding to one of the 2 river crossing bridges in the Bewdley area.

Issue WG3 - The narrowness of Welch Gate and the tall buildings creates a canyon effect on air quality.

Issue WG4 – The longer length variety of buses are regularly used in the area and block the road as they cannot negotiate the narrow bends of Welch Gate unless the road is clear.

Issue WG5 – The traffic light pedestrian crossing at the Horn & Trumpet public house in Dog Lane creates queues that block the junction of Welch Gate. The yellow grid no entry/waiting box painted on the road to ease the flow of traffic out of the junction is not observed.

Issue WG6 – Traffic light pedestrian crossings at the Horn & Trumpet in Dog Lane and in Load Street in the centre of town can create queues and hinder flow of traffic at the junction of Welch Gate.

Issue WG7 – Heavy lorries and vehicles still traverse Welch Gate even though there is a weight limit on the bridge as some are short cutting through town and some may need to proceed along Dowles Road in a northerly direction.

Issue WG8 – Two way traffic on all roads in the vicinity of the AQMA and the AQMA itself creates queues due the narrowness of the roads.

Issue WG9 – Welch Gate is a gateway to the local primary school on Wyre Hill and for the access to cross the river to the east side of the river to the other primary school for the area and the only high school in the area.

4 Action Plan Options

Appropriate actions have been considered to improve Air Quality for all AQMAs. These include generic Countywide or National initiatives as well as focused local actions in specific AQMAs. The types of actions considered are broad and have been determined following a review of available sources including:

- Example Best Practice AQAPs (available from Defra website) produced by other councils in UK; Fife Council, Dudley Metropolitan Borough Council, Belfast City Council, West Oxfordshire District Council, West Sussex County Council.
- Defra guidance documents (see references)
- Existing Local Action Plans
- Local Transport Plan 3 and associated policy documents

Additionally some actions have been formulated from a requirement to mitigate a specific circumstance in an AQMA.

4.1.1 Type of Options

The Action Plan Options are in two sections relating to the effect the actions would have on air quality:

- **Generic Actions:** These are those Actions that are not AQMA specific and could be used in more than one scenario or could have a positive impact on more than one AQMA.
- **AQMA Specific Actions:** Where an action relates to a specific circumstance or characteristic that would be likely to only affect one AQMA.

For both types of action, the anticipated feasibility, impact on NO₂ levels, rationale and the AQMA issues (identified in Section 5) mitigated by each action are identified for each AQMA. A summary of actions against these specific AQMA issues is provided at the end of the section. The generic actions have been grouped into types under the following headings:

- Traffic Management
- Lowering Emissions
- Promotion of Alternatives
- Education & Information
- Planning Initiatives
- Policy & Guidance

Anticipated Costs, Timescale and air quality benefit i.e. pollution reduction details are referenced using the following category codes:

Cost of implementation

VH	= Very High	= greater than £100k
H	= High	= £25 to 100k
M	= Medium	= £5 to 25k
L	= Low	= up to £5k
NQ	= Not quantifiable	at this time

Timescale to implement

VL	= Very Long term	= greater than 10 years (after 2023)
L	= Long term	= 6 to 10 years (2019 to 2023)
M	= Medium term	= 3 to 5 years (2016 to 2018)
S	= Short term	= 1 to 2 years (2014 to 2015)
NQ	= Not quantifiable at this time	

Pollution Reduction Impact

5	=High
4	=Medium to High
3	=Medium
2	=Low to Medium
1	=Low
0	=Negligible impact
-1	=Detrimental Impact
NQ	=Not quantifiable at this time

It should be noted that costs, timescales and air quality benefit i.e. pollution reduction will be specific to the local circumstances and final scheme design to be implemented thus it is very difficult to accurately predict figures without specific detail. The anticipated values applied are estimates based on available information and experience.

4.1.2 Prioritisation of Options

To aid future prioritisation of actions, it is proposed that timescales are classified between short to very long term, costs could be scaled from 1 to 7, very high to very low, and impact classified as -1 to 5 where -1 indicates a potential detrimental impact on air quality to 5 a high reduction in existing pollutant levels. A simple cost-benefit analysis can then be implied by multiplying values applied to impact and cost. Cost benefit analysis and prioritisation will be undertaken at a later stage following further research into costs.

It is unlikely that adopting a single particular action will result in desired reductions in pollution levels in any AQMA and a range of options will be required to effect measurable improvements

Actions identified as a priority for implementation by the AQAP Steering Group will be identified in a future version of this AQAP. An Implementation Plan will be included in future updates with details on progress, stakeholders involved and measurement tools.

Clearly some options will not be viable and this may be identified through prioritisation of the options, the work of the Air Quality Action Plan Steering Group or previous work undertaken. When such a conclusion is reached it shall be documented within the Action Plan with a summary of the details surrounding that action and when reconsideration of that Option may be appropriate.

Potentially many of the preferred actions may be grouped into a coordinated countywide, or a specified regional, Low Emissions Strategy (see 4.1.3) which will be included as an addendum to the AQAP.

4.1.3 Low Emissions Strategy (LES)

As defined by the Low Emissions Strategy Partnership (LESP), 'a planning-based Low Emission Strategy (LES) provides a package of measures to help mitigate the transport

impacts of development. The primary aim is to reduce transport emissions by accelerating the uptake of low emission fuels and technologies in and around a development site.

Strategies may be secured through a combination of planning conditions and legal obligations (section 106 agreements), and potentially in future through the Community Infrastructure Levy. They may incorporate policy measures and/or require financial contributions to the delivery of low emission transport projects and plans, e.g. emission based parking policies, investment in low emission infrastructure, fleet emission improvement, low emission procurement and supply chain initiatives and contributions to local transport projects and strategic monitoring.

In reducing transport emissions, low emission strategies improve local air quality and reduce greenhouse gas emissions associated with climate change. They also contribute to local government performance targets, provide local economic benefits, help to streamline planning decisions and contribute to wider sustainable development goals.

Early LESP work focussed on establishing Low Emission Strategies adopted through the planning system. The partnership has developed a Procurement Guidance Document for Local Authorities. They are now working on a range of other applications, including incorporation of low emissions strategies into Local Transport Plans and Low Emission Air Quality Action Planning. (www.lowemissionstrategies.org/ accessed 26/07/2013)

Many local authorities in England have secured capital funding through Defra's Air Quality Grant programme to establish a LES in their area and many LA strategies are much broader in concept and objective than purely planning based LES. The process starts with a feasibility study to identify and assess options which will suit the local circumstances of the Local Authority. The range of measures identified for the LES are then put forward for consultation to be adopted by the Local Authority.

For example the neighbouring West Midlands Low Emission Towns & Cities Programme (LETCP) draft LES 2013 includes a Low Emission Zone feasibility study, best practice Procurement Guidance, best practice Planning Guidance, Low Emission Vehicle and Infrastructure plan and Health Awareness Campaign.

The stated aims of the draft LES are:

'The LETCP seeks to promote joint working to reduce regulated road transport emissions, primarily Oxides of Nitrogen (NO_x) and particulates (as coarse, PM₁₀ and fine, PM_{2.5}, fractions), while simultaneously seeking reductions in greenhouse gases and noise emissions where practicable. Building on policies and measures to discourage vehicle use and encourage a shift to sustainable transport modes, the LETCP seeks to target emission improvements of the vehicle fleet through the accelerated take-up of cleaner fuels and technologies and by discouraging the use of high emission vehicles.

Walsall Metropolitan Borough Council is the lead authority for this aspect of the work stream, and the strategy is the first step towards the development of an overarching Low Emission Strategy for the West Midlands, aimed at helping regional authorities to achieve the UK Air Quality Objectives and EU Air Quality Limit Values. The development of the LES is an Implementation Plan requirement of the West Midlands 3rd Local Transport Plan. The purpose of the LES is to outline policies and measures that can influence a reduction in road transport emissions, highlighting current good practice within the West Midlands.' (LETCP, 2013)

Fundamentally, a LES for Worcestershire would incorporate many of the potential solutions identified within this AQAP that could have an impact on improving air quality throughout all

areas of the county. Specifically, but not exclusively, these include most of the actions identified within the Lowering Emissions, Promotion of Alternatives, Education & Information and Planning Initiatives sections in the following chapter. However an LES could also include some specific actions from the other sections such as:

- Variable Messaging Signing (Traffic Management);
- Alterations to parking provision and pricing (Traffic Management);
- Influence Climate Change Strategy actions (Policy & Guidance);
- Forge closer links with local health agencies (Policy & Guidance).

Development of an overarching Low Emission Strategy for Worcestershire would be work undertaken by the Steering Group and any subsequent LES document would be included in this AQAP as an addendum.

5 Worcestershire Air Quality Action Plan – Generic Actions

5.1 Traffic Management Actions

These actions have a direct effect on traffic movements within AQMAs or surrounding areas. They are intended to reduce pollutant levels via changes in road infrastructure, restrictions on vehicle movements, reduction in traffic congestion and improving traffic flow.

Actions discussed in this section are as follows:

- Alteration to phasing of traffic light system (5.1.1)
- Change carriageway from two way to one way only (5.1.2)
- HGV or weight restriction on affected roads (5.1.3)
- Variable Messaging Signing (5.1.4)
- Loading and unloading restrictions during peak traffic periods (5.1.5)
- Priority bus and High Occupancy Vehicle (HOV) lanes (5.1.6)
- Improvement of signage for traffic to avoid AQMA (5.1.7)
- Introduction of traffic signals at roundabouts (5.1.8)
- Introduce or improve feeder/merger lanes to improve flow (5.1.9)
- Pedestrianisation of streets within area (5.1.10)
- Remove build out in streets to allow cars to pass simultaneously (5.1.11)
- Removal of parking bays in problem streets (5.1.12)
- Alterations to parking provision and pricing (5.1.13)
- Traffic calming measures (5.1.14)

5.1.1 Action: Alteration to phasing of traffic lights system – Intelligent Traffic Signals.

Altering the phasing of existing traffic light systems at key junctions could improve flow of traffic, reduce peak hour congestion and queuing. There are two types of intelligent traffic signal control systems used in Worcestershire; SCOOT and MOVA. Additionally there are a number of different pedestrian crossings such as Pelican and Puffin crossings.

LTP3: Intelligent Transport Systems Policy (WCC, 2011h) outlines the functions and benefits of the different systems as follows:

‘Junction Control - SCOOT

The SCOOT (Split Cycle Offset Optimisation Technique) Urban Traffic Signal Control System is designed for use in urban networks with large numbers of traffic signals (such as Town and City Centres). SCOOT is an adaptive system that responds automatically to fluctuations in traffic flow through the use of on-street detectors embedded in the road. A SCOOT system can deliver the following benefits:

- Reduced Delays and Congestion – SCOOT typically reduces traffic delay by an average of 20% in urban areas.
- Bus and Emergency Service Vehicle Priority
- Traffic Gating – Traffic flow can be limited to ensure that traffic flow is maintained through congested sections of the network.
- Incident Detection – Identification of the location of accidents. This information can be fed into the UTMC system to manage the flow of traffic.
- Vehicle Emissions Estimates (Local Air Quality) – This is particularly useful when traffic is flowing through known Air Quality Management Areas (AQMAs). The SCOOT system can feed information to the UTMC system to divert traffic away from

AQMAs when prevailing weather conditions will not enable dissipation of harmful emissions.

- On-line Saturation Occupancy Measurement – This can identify to the UTMC system when the network is reaching saturation point (full capacity), enabling investment focus and developing additional capacity

There is currently only one SCOOT Urban Traffic Control System in the County covering the city centre of Worcester.

Junction Control – MOVA

The MOVA (Microprocessor Optimised Vehicle Actuation) Traffic Signal Control System is suited to situations where junctions are some distance (greater than 1 kilometre) apart. Like SCOOT, MOVA is an adaptive system that responds automatically to fluctuations in traffic flow through the use of on-street detectors embedded in the road. A MOVA system can deliver... Reduced Delays and Congestion – MOVA significantly reduces vehicle delays when compared with vehicle activated control. MOVA is suited to the following location types:

- Sites with high traffic flow, particularly where these are seasonal or intermittent (for instance, motorway diversion routes and holiday routes).
- Sites experiencing capacity difficulties under vehicle activated control, with congestion on one or more of the approaches.
- Sites with high speed approaches and/or red light compliance problems.
- Where additional capacity is required to allow pedestrian facilities or a safety enhancements to be introduced.
- Where more than one junction is situated too close to be considered as an isolated junction, there are ways in which two or more junctions can be linked by the use of MOVA control. Partially or even fully signalised roundabouts are a good example of a MOVA linking opportunity.
- Puffin crossings where the call-cancel demands from kerbside detectors can be dealt with correctly and the identification of gaps in traffic can be considerably more effective than vehicle activated systems.
- Traffic Gating
- Incident Detection'

This action will require some feasibility study to determine most appropriate signalling system for any particular junction, likely costs and timelines have not been identified at this stage. Some actions are already identified within LTP3 for implementation such as installation of MOVA signals at Port Street/Waterside junction due to be implemented as part of Abbey Bridge development in 2013 (LTP3 reference SW6).

Action: Alteration to phasing of traffic lights system – Intelligent Traffic Signals.

Pros	Cons	Key Stakeholders	Cost	Time
Reduce congestion and queuing	Requires feasibility studies initially	WCC	NQ	NQ
	Costs and timelines unknown	Linked Policy		
	Disruption during works could cause temporary congestion and rising emissions	LTP3: AQ1-3, AQ5, AQ7, ITS3,ITS5		

Action: Alteration to phasing of traffic lights system – Intelligent Traffic Signals.

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	KR5	Required	NQ	Improvements to A491 Stourbridge Rd/A456 Kidderminster Rd/Hagley Hill junction essential to reducing pollutant levels in AQMA. Traffic light phasing should be considered as part of wider study. Impact depends on final junction solution
Lickey End	None	No	0	No problem junctions with traffic signals identified. Traffic signals on gyratory only improved in 2000s
Redditch Road	None	Limited	NQ	Improvements to Hagley Turn junction could be explored
Worcester Road	None	No	0	No problem junctions with traffic signals identified
Dolday	DD3	Required	NQ	Unknown if any improvements can be made to current phasing. Update from WCC required to assess if any benefit can be obtained from undertaking a review
Lowesmoor	LRH7	Yes	2 - 3	Improvements to lights exiting Lowesmoor onto Lowesmoor Terrace could benefit congestion within AQMA – this is currently being delivered as part of a major renovation scheme in Lowesmoor and will be completed by Autumn 2013
Port Street	PS4, PS5	Yes	2 - 3	Already planned works as part of LTP3
Horsefair	None	Yes	0 - 1	Unlikely to have a significant effect on existing system
Welch Gate	WG6	Yes	3	Improvement to pedestrian lights at crossings at the Horn & Trumpet PH in Dog Lane and in Load Street would reduce hinder to flow of traffic at the junction of Welch Gate in conjunction with improvement to road markings

5.1.2 Action: Change carriageway from two way to one way only

This action would only apply to AQMAs consisting of narrow single carriageways which potentially could benefit from this action rather than areas of key connecting routes. It will limit traffic using a route and subsequently emissions. A number of options are possible;

- Two one way lanes
- One lane dedicated for public transport or HOV (see below)
- One lane dedicated for parking
- Part pedestrianisation of one lane to improve pedestrian safety and ambience of street area, and encourage shopping
- Introduction of cycle lane
- A combination of the above

Action: Change carriageway from two way to one way only

Pros	Cons	Key Stakeholders	Cost	Time
Limits traffic using route and reduces emissions Allows for greater use of carriageway – dedicated bus lanes or stops, part pedestrianisation, cycle lanes, create additional parking. Improvements in ambience of street area could benefit local trade	Displaces traffic onto adjoining roads Could shift pollution issues onto other routes Impact on local residences	WCC, LA	NQ	NQ
		Linked Policy		
		LTP3: AQ1-3, AQ5, AQ7		

Action: Change carriageway from two way to one way only

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	None	N/A	N/A	Not applicable on this route
Lickey End	None	N/A	N/A	Not applicable on this route
Redditch Road	None	N/A	N/A	Not applicable on this route
Worcester Road	None	Required	1	May not be possible due to lack of alternative routes or have limited impact due to destinations within or through AQMA
Dolday	None	N/A	N/A	Already one way
Lowesmoor	LRH5, LRH6, LRH7	Further study required for Rainbow Hill. Yes for Lowesmoor	RH 1-2 Lwm 5	May have limited impact due to destinations or routes accessible via AQMA and effect of displacing traffic onto other routes at Astwood Road/Rainbow Hill end of AQMA. However far more merit in applying this action to Lowesmoor area. Changing to a single lane in the direction of City Walls Road would eliminate congestion due parked vehicles/delivery vans blocking two way movement, traffic light congestion and allows for part pedestrianisation, bus and delivery pull ins, additional parking facilities and improve general ambience of retail area for shoppers. However, WCC advise (June 2013) 'this option not applicable as Lowesmoor is an essential bus route and two way traffic flow must be maintained for buses due to a lack of suitable alternative routes. There is potential to reduce general traffic flows by making this an access-only route, however a one way route would increase traffic speeds, making the street less attractive for pedestrians and cyclists and causing deterioration in the public realm.'

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Port Street	PS6, PS7, PS8	Yes	3 - 5	Tackles several identified issues. Changing to single direction towards river/town would eliminate emissions from traffic travelling up gradient and congestion due to bus stops at Shor St. Reducing to single lane allows for part pedestrianisation, bus and delivery pull ins, additional parking facilities serving commercial and residential properties. More effective combined with other actions such as restrictions on HGV and improvement to bus emissions.
Horsefair	HR5	Yes	3 - 5	One way directional traffic flows are included in the Churchfields Masterplan and Rewyre prospectus for part of the area and are high in planning consideration. Impact will depend on final scheme.
Welch Gate	WG8	Yes	NQ	One way directional traffic flows have recently been trialled in one location of Welch Gate with traffic light controlled queues lengths and signage at the bypass. The results of this trial form part of the wider Wyre Forest Transport Package. WCC advise June 2013 These trials had no positive effects.

5.1.3 Action: HGV or weight restriction on affected roads.

Reviews of the AQMAs determined that HGVs are a disproportionately significant source of pollutant levels within most of them. Absolute restrictions to any such vehicles traversing AQMA could be achieved through conventional signage or Variable Messaging Systems (VMS) (see below) with agreement of LA and WCC. Signage may have to be quite extensive on some routes to ensure vehicles have enough spatial warning and do not cause road obstructions attempting U-turns at AQMA boundaries.

However an absolute ban will not be a viable option for AQMAs on major road arteries and will be difficult even on local roads, particularly where deliveries are made to commercial properties, unless alternative routes are available.

Similar results may be more achievable through Freight Quality Partnerships and updates to Worcestershire County Council Advisory Lorry Route Map (WCC, 2010) .

Action: HGV or weight restriction on affected roads

Pros	Cons	Key Stakeholders	Cost	Time
Removes highest polluting vehicles from AQMA	Requires alternative routes for HGVs Potential displacement of vehicles shifts pollutant issues onto alternative route Access still required for	WCC, LA	L - M	S - M
		Linked Policy LTP3: AQ1-3, AQ5, AQ7, F7, TMP2		

	deliveries within AQMA			
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Action: HGV or weight restriction on affected roads

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	KR7	No	1 - 2	Restrictions possible on vehicles heading to Kidderminster or M5 but unlikely an absolute restriction is achievable because of accessibility required to A491 Stourbridge Road from several directions.
Lickey End	None	Limited	NQ	Unlikely achievable without adding pressure onto the other AQMAs in Bromsgrove. Possible via J2 and A448 Redditch to Sideslow gyratory. Probably have adverse effect on Redditch Rd AQMA and other local roads. Detailed dispersion modelling required to ascertain up to date source apportionment data to determine impact
Redditch Road	RR11	Limited	1	Unlikely achievable without adding pressure onto the other AQMAs in Bromsgrove. Possibly redirect some traffic from Hanbury Industrial Areas to exit onto M5 via Stoke Prior and could shift pollutant to another local area.
Worcester Road	None	Limited	1	Unlikely achievable without adding pressure onto the other AQMAs in Bromsgrove. Could redirect traffic going through Worcs Rd to town centre from south onto bypass but may have adverse effect on levels in Charford Rd. HGVs not identified as dominant source of pollutants.
Dolday	DD11	No	0 - 1	Unavoidable major route through city for traffic crossing bridge. Source apportionment indicates HDVs issue in Dolday but individually action unlikely to have significant effect. BQP and FQP likely more effective.
Lowesmoor	LRH8	Yes	RH 0-1 Lwm 1-2	Low proportion of HGV vehicles traverse Astwood Road route currently. Source apportionment indicates HDVs issue in Lowesmoor. Not many HGVs observed in Lowesmoor except for local deliveries.
Port Street	None	Yes – in future	NQ	No source apportionment data to ascertain effect. Currently restriction on >7.5 tonne vehicles traversing Abbey Bridge will be lifted when works complete. A Vale of Evesham HGV Control Zone restricting and managing HGVs in sensitive areas is part of SWDP. Nor clear if the area includes Port St.
Horsefair	None	Yes	0 - 1	Low proportion of HGV vehicles traverse this route currently
Welch Gate	WG7	Yes	1	An extension of weight limit on bridge to the AQMA may be appropriate in conjunction with improvement of signage for alternative routes

5.1.4 Action: Variable Message Signing (VMS)

These are electronic messaging systems that disseminate Real Time Information (RTI) to the general public. VMS provide real time traffic conditions and travel information to enable users to make informed travel and route decisions and reduce the impact of events/incidents on the network (WCC, 2011h). Examples include matrix signs on motorways, train arrival and departure boards at stations, car park availability signage and bus information at stops.

VMS can be used to 'Enhance Network Efficiency' (WCC, 2011h) with warnings to road users of network congestion, traffic incidents, bus and rail connection information, presence of AQMA and potentially real time air pollution updates encouraging use of alternative transport methods (such as Park and Ride, Passenger Transport, Walking and Cycling).

VMS could be implemented as part of other initiatives such as Park & Ride schemes, priority bus corridors, train station enhancements or improve signage for car parking. A potential solution, which requires further research and potential development, is to link car park ticket machines to real time air quality information and VMS placed outside of the city which could direct traffic to park and ride alternatives during poor air quality events – see Introducing Differential Parking Rates 5.2.9.

'Real Time Passenger Information (RTPI) refers to the application of RTI for passenger transport. RTPI can be installed at key bus stops, interchanges and rail stations, and has the potential to deliver significant benefits' such as 'Modal Shift' and 'Enhanced Attractiveness of the Passenger Transport'. (WCC,2011h)

'The City of Worcester has six strategic VMS; five of which are located on radial routes into the city and the other is located on approach to the Perdiswell Park and Ride site. To complete the ring of VMS for the City of Worcester, three further signs are required on radial routes coming into Worcester from the north. There is significant scope to increase the provision of VMS across the county to enhance the capability of the Worcestershire UTMC to influence travel behaviour.' (WCC,2011h)

As part of the Worcester Transport Strategy, WCC have installed VMS at the entrances and exits of the main 6 car parks in the city centre in 2013. This will enable visitors and locals to know which car park has spaces available and will prevent recirculation of traffic around the city attempting to find a space thereby reducing emissions.

VMS offers many applications and opportunities for better traffic management, improvements to public transport and traveller information which could ease congestion in town centres and subsequently reduce pollution, however the costs of even a simple system could be very expensive. This solution is most effective for town centres with a number of AQMAs where economies of scale can be made.

Action: Variable Message Signing (VMS)

Pros	Cons	Key Stakeholders	Cost	Time
Real time public transport information improvements encourages greater uptake	Integrated system likely prohibitively expensive.	WCC, LAs, HA	H - VH	S - VL
Real time car park availability, traffic incidents, diversions from AQMA reduces congestion and emissions.	Availability of appropriate real time AQ monitoring network to link to	Linked Policy		
Real time multi-located		LTP3: AQ1-3, AQ5, AQ7, ITP8, ITS3-4,		

roadside air quality information in public view		ITS7-8		
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Action: Variable Message Signing (VMS)

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	KR7	More research required	3 - 4	Explore possibility of utilising existing matrix signs on M5 to divert all traffic around AQMA during high pollution episodes. Explore possibility of directing HGVs around to J4 of M5 instead of J3 Matrix signs at all times.
Lickey End	LE2	Yes	3 - 4	Additional matrix signs on M42 to provide relevant traffic info on M5 and A38. Divert via Redditch and other areas if possible during incidents or high pollution episodes
Redditch Road	RR2	Yes	1 - 2	Few public transport hubs in Redditch Rd and no public car parks as on outskirts of town, although erected signage could provide information on issues elsewhere. Congestion relief during incidents on motorways relies on diversion of traffic from A38 at much earlier intervention e.g. prior to vehicles exiting M42/M5, influencing level of impact.
Worcester Road	None	Yes	1 - 3	Signage in town centre at bus station in connection with new train station development could increase public transport take up, and provide info to public on air quality issues. Car park at top of Hanover Street. Divert via other routes during incidents of high pollution. Impact depends on how wide and integrated a scheme is.
Dolday	DD4, DD8	Yes	2 - 3	WCC to emplace car park availability VMS. Bus station adjacent to AQMA provides possibility of signs and warnings on air quality but only viewed by existing public transport users. Signage would be more effective in approaches to city along A38 both sides of river for example.
Lowesmoor	LRH8	Limited	1 - 3	Limited car parking or public transport hubs for signage in actual AQMA. WCC advise June 2013 'Significant parking availability immediately adjacent to AQMA. There is potential to reduce or remove on-street parking in this area and make better use of VMS and RTIS (Real Time Information System) to encourage increased bus use and more efficient use of local car parking infrastructure as part of a city-wide approach. VMS have now been installed on a number of major approaches into the city as part of the Worcester transport Strategy (Phase 1).'
Port Street	PS9	Limited	1	Most car parks and transport hubs other side of river. More conventional signage

				could be used to divert traffic on bypass. Could be used to display congestion and air quality info.
Horsefair	None	Limited	0 - 2	Limited opportunity to move traffic to alternative routes without impacting
Welch Gate	WG7	No	0	This has been trialled but was unsuccessful

5.1.5 Action: Loading and unloading restrictions during peak traffic periods.

This action requires enforcement of restrictions within AQMA and working with local businesses to ensure better timing of town centre deliveries. Restrictions can be displayed with conventional signage at relatively low cost. Will specifically apply to AQMAs with a high proportion of commercial activities.

Action: Loading and unloading restrictions during peak traffic periods.

Pros	Cons	Key Stakeholders	Cost	Time
Reduces congestion caused by blockages from delivery vehicles Reduction in LGVs and HGVs during congestion time	Potential effect on local businesses Extra traffic enforcement required	WCC, LA, Traffic Enforcers Linked Policy LTP3: AQ1-3, AQ5, AQ7, ITS6	L	S - M

Action: Loading and unloading restrictions during peak traffic periods.

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	None	Yes	0	Few commercial properties not observed to be a particular issue. Subject could be discussed with those business directly to avoid any such issues
Lickey End	None	Yes	0	Few commercial properties not observed to be a particular issue. Subject could be discussed with those business directly to avoid any such issues
Redditch Road	None	Yes	0	Few commercial properties not observed to be a particular issue. Subject could be discussed with those business directly to avoid any such issues
Worcester Road	WR6, WR8	Yes	1	Yes a few instances of deliveries to residential properties in street canyon area were observed during peak traffic times.
Dolday	None	N/A	0	No waiting at any time on this busy one way system
Lowesmoor	LRH5	Limited	0 - 1	Loading and unloading vehicles is a significant issue within the Lowesmoor area where there are already restrictions in place. Due to the number of commercial outlets these are already failing to have the desired effect. WCC June 2013 advise 'The maintenance and enhancement scheme will significantly improve traffic regulation in Lowesmoor.'

Port Street	PS7	Yes	1	A few instances of deliveries to residential properties in street canyon area were observed during peak traffic times.
Horsefair	None	Limited	0	Already in place but could have additional impact if in conjunction with other actions
Welch Gate	None	Limited	0	Already in place but could have additional impact if in conjunction with other actions

5.1.6 Action: Priority Bus and High Occupancy Vehicle (HOV) lanes and corridors.

Priority bus lanes have been successfully implemented in parts of Worcester City in association with introduction of Park and Ride scheme. They involve restricting parts of existing carriageway to Public Service Vehicles (PSVs) only (and potentially cyclists and goods vehicles making deliveries depending on local circumstance) and/or introducing PSV priority at traffic lights.

A bus priority measure improves speed and reliability of public service but require bus lane enforcement cameras. They reduce the amount of carriageway for other road users and encouraging uptake of sustainable transport. Other improvements possible with addition of real time passenger information (VMS – see below). Could be used in conjunction with other actions such as BQPs (see Lowering Emissions below) and Park and Ride schemes. Consideration needs to be taken for the effect on cyclists where not permitted to use the corridor and road width is restricted.

WCC, 2011g states: 'There is a range of potential measures that can be employed to deliver enhanced reliability and operating speeds on the bus network. These vary according to their cost and effectiveness, and thus their appropriateness. For example, a segregated busway (which is the highest form of bus priority, and more expensive to deliver) can usually only be justified where the levels of demand and/or the scale of the benefits to users, operators and the wider economy and environment, result in a strong business case. This is only likely to be the case in congested urban areas and along key inter-urban corridors.

In terms of existing bus priority measures, there is a major busway in Redditch which was incorporated into the design of the new town and enables the operation of the most efficient, heavily used and commercially viable part of Worcestershire's bus network. Elsewhere in the county there are a very limited amount of bus priority measures, including bus gates and bus lanes. These are principally in Worcester City.

Additional priority measures have been developed and are being installed during the LTP2 period:

- Newtown Road Corridor – linking Warndon Villages and Worcestershire Royal Hospital with Worcester City Centre via Worcester Shrub Hill station and Lowesmoor.
- Bromyard Road Corridor – linking Dines Green with Worcester City Centre via St John's'

High Occupancy Vehicle lanes are specially designated lanes on major routes that can only be used by vehicles carrying two or more people. They give priority to those travelling together; those who would normally travel alone can take advantage of them by sharing their journey with one or more others, reducing the number of cars on the road and so reducing congestion and harmful emissions. HOV lanes may use spare capacity in existing bus lanes, or may be introduced as part of a policy to encourage car sharing. It allows cost of journeys to be shared by both drivers and passengers which is desirable for many employees at a

time when fuel costs continue to rise. Travelling with others can reduce transport costs by up to £1000 a year (LACORS)

However, in June 2013 WCC advised WRS as part of the consultation of this AQAP: 'Worcestershire County Council does not support HOV or Bus lanes. Bus priority in Worcestershire is now provided using intelligent traffic signals instead.'

Action: Priority Bus and High Occupancy Vehicle (HOV) lanes and corridors.

Pros	Cons	Key Stakeholders	Cost	Time
Encourage uptake of public transport	Reduces carriageway for other users including cyclists and pedestrians	WCC, LA	NQ	NQ
Reduction in number of cars and emissions	Reducing carriageway could create congestion if switch to buses is not high enough			
Lower travel costs for drivers and passengers	Potentially displaces traffic onto other routes	Linked Policy		
Reduces need for private car ownership	Potentially shifts pollution issues onto other routes	LTP3: AQ1-3, AQ5, AQ7, ITP1, ITP5-7, ITS6, SMT5, TMP2		
Can be effective tool in Businesses Travel Plans				

Action: Priority Bus and High Occupancy Vehicle (HOV) lanes and corridors.

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	KR3	Yes	-1 to 3	Being dual carriageway there is possibly enough space to amend lanes. However not many buses have been observed in within AQMA so introducing a bus only lane could have detrimental effect. However a lot of vehicles with a single occupant were observed so a HOV only lane at peak times may have significant impact.
Lickey End	None	No	-1	Carriageway not wide enough
Redditch Road	None	No	-1	Carriageway not wide enough
Worcester Road	None	No	-1	Carriageway not wide enough
Dolday	None	No	-1	Carriageway not wide enough
Lowesmoor	None	No	-1	Carriageway not wide enough (without other changes such as one way system). Not supported, although there is potential to remodel Lowesmoor as a bus-only street given the availability of alternative routes for general traffic (WCC, 2013)
Port Street	None	No	-1	Carriageway not wide enough (without other changes such as one way system)
Horsefair	None	No	-1	Carriageway not wide enough (without other changes such as one way system)
Welch Gate	None	No	-1	Carriageway not wide enough

5.1.7 Action: Improvement of signage for traffic to avoid AQMA

Improving signage on approaches to AQMA or bypasses and ring roads can be a relatively low cost and effective way of encouraging vehicles to avoid AQMA and use alternative routes if available. They could be aimed at a specific group i.e. HGVs in conjunction with Freight Quality Partnership action (see Lowering Emissions) or HGV restrictions, or a broader message such as 'Please continue on bypass to avoid AQMA'.

More advanced electronic signage can go further in giving real time information to travellers on potential traffic congestion and air quality problems. This is explored further below in Variable Messaging Signage (VMS).

It should be noted this action is not the same as identifying an AQMA in order to effect behavioural change amongst drivers within the AQMA – this is discussed below under Lowering Emission actions.

Action: Improvement of signage for traffic to avoid AQMA

Pros	Cons	Key Stakeholders	Cost	Time
Diverts traffic from using AQMA route Reduces congestion Low cost and short timescale possible	Displaces traffic onto other routes May shift pollution problem onto other routes Relies on voluntary behaviour of drivers Loss of trade to local businesses	WCC, LA	L	S - M
		Linked Policy		
		LTP3: AQ1-3, AQ5, AQ7, F7, ITS3,ITS4		

Action: Improvement of signage for traffic to avoid AQMA

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	KR7	Yes	0 - 1	Unlikely to alter behaviour significantly due to lack of obvious alternatives close to AQMA. Diverting HGVs could be achieved more effectively from further afield via other methods e.g. VMS and Freight Quality Partnership
Lickey End	None	Limited	0 - 1	Few routes into or out of Bromsgrove without affecting an AQMA. Not appropriate for the M42 approaching AQMA. Unlikely to alter behaviour significantly for traffic exiting Bromsgrove as most direct exit to northerly destinations.
Redditch Road	RR6, RR11	Limited	0 - 1	Few routes into or out of Bromsgrove without affecting an AQMA . Possibly redirect some traffic from Hanbury Industrial Areas to exit onto M5 via Stoke Prior but could shift pollutant onto other local roads.
Worcester	WR14	Limited	0 - 1	Few routes into or out of Bromsgrove

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Road				without affecting an AQMA. Could redirect traffic going through Worcs Rd to town centre from south onto bypass but may have adverse effect on levels in Charford Rd. HGVs not identified as dominant source of emissions.
Dolday	None	N/A	2	WCC advise (June 2013): Southern Link Road enhancements currently programmed. A comprehensive programme of re-signage (both static and VMS) in the City Centre and along the Southern, Northern and Eastern Worcester Link Roads could do much to discourage through traffic. Current signage encourages through traffic to route via the City Centre.
Lowesmoor	LRH1 LRH8	Yes	0 - 1	Blackpole - Astwood Road – Rainbow Hill used by drivers to avoid congestion in A38. Unlikely to alter behaviour significantly without other deterrents in place. Specific signage aimed at HGVs could discourage vehicles coming from Blackpole area but low proportion.
Port Street	PS3	Limited	0 - 1	Believe signs already in place to direct traffic along A44 bypass to town centre. Review current signage with WCC to determine if any additional improvements can be made.
Horsefair	None	Limited	0 - 1	Problem of alternative routes in to town centre.
Welch Gate	WG7, WG9	Yes	0 - 1	Signage at appropriate points to promote use of bypass for HGV's and school traffic in conjunction with weight restriction in AQMA and Freight Quality Partnership would have significant impact

5.1.8 Action: Introduction of traffic signals at roundabouts

Introducing signals to a gyratory may seem counter intuitive but this solution can actually improve traffic flow within connecting roads. As traffic is paused at an earlier point it reduces the volume of stationary traffic within the AQMA at any one time and thus reduces emissions from idling vehicles. Introducing intelligent signalling systems controls queuing times and avoids build-up of traffic exiting an AQMA. Additionally it can provide for more pedestrian crossings for other road users improving pedestrian safety and encouraging uptake of alternative forms of travel. Such schemes are already in place in some AQMAs are planned for others. Clearly it will not be a shortlisted option for AQMAs where no gyratory exists. Specific junction modelling will be required to ascertain if there is any benefit from such schemes for a particular AQMA where this has not previously been considered. This potentially could be achieved via the planning regime where substantial new developments are involved.

Action: Introduction of traffic signals at roundabouts

Pros	Cons	Key Stakeholders	Cost	Time
<p>Reduces congestion within AQMA</p> <p>Increases pedestrian and cycle safety crossings</p> <p>Encourages uptake of alternatives</p>	Requires junction modelling to ascertain benefit.	WCC, LPA	NQ	NQ
	Costs of implementation likely to be high.			
	Time for implementation could be very long if not part of current LTP3 i.e. beyond 2026	Linked Policy		
	Disruption during construction could cause increase in emissions	LTP3: AQ1-3, AQ5, AQ7, ITS3, ITS5		

Action: Introduction of traffic signals at roundabouts

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	KR5	Yes	3 - 4	Planned as part of Hagley ADR development but not due completion until 2022. Will reduce traffic congestion entering Kidderminster Rd from south, but not impact congestion on Hagley Hill.
Lickey End	None	No	0	Already in place
Redditch Road	None	Yes	0	Possible at eastern end Morrison's roundabout at bottom of Buntsford Hill but this is not proximal to street canyons.
Worcester Road	WR13, WR14	Yes	NQ	Possible on A448 Kidderminster Road/Hanover Street/St Johns Street junction could help to reduce congestion entering north end of AQMA. Would require junction modelling to ascertain impact.
Dolday	None	No	0	Already in place
Lowesmoor	None	Yes	2	Lowesmoor Terrace/Place mini roundabout will be signalised as part of Worcester Transport Strategy (Phase 1) to improve and regulate traffic flow (WCC, 2013)
Port Street	None	No	0	No gyratory impact
Horsefair	HF3	Review required	NQ	Already tied in with one way action as part of LTP3
Welch Gate	None	No	0	No gyratory impact

5.1.9 Action: Introduce or improve feeder/merger lanes to improve flow.

Feeder/merger lanes allow traffic to enter/exit left onto destination carriageways without pausing at junction. It reduces congestion at junctions and therefore emissions.

It requires the width of the road to be sufficient to allow for an additional lane at approach to junction. Clearly this will not be an option in AQMAs with restricted narrow streets. Several

AQMAs already have feeder lanes and improvements are likely to be limited. Some junction modelling will be required in order to ascertain if any benefits can be gained from improvements.

Action: Introduce or improve feeder/merger lanes to improve flow

Pros	Cons	Key Stakeholders	Cost	Time
Feeder/Merger lanes improve flow and reduce congestion	Junction modelling required to ascertain benefits Sufficient road width required	WCC	NQ	NQ
		Linked Policy		
		LTP3: AQ1-3, AQ5, AQ7		

Action: Introduce or improve feeder/merger lanes to improve flow

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	None	Limited	0 - 1	Lanes already in place
Lickey End	None	No	0	Not applicable to gyratory and limited opportunity within A38
Redditch Road	None	Limited	0 - 1	Lanes already in place at Hanbury Turn. Requires feasibility study of junction to determine any possible improvements.
Worcester Road	None	Required	NQ	Possibility of feeder lane exiting Hanover Street onto A448 Kidderminster Road could be explored in a feasibility study combined with examining introduction of traffic lights.
Dolday	None	No	0	Not applicable on this one way system
Lowesmoor	None	No	2	Worcester Transport Strategy Phase 1 includes capacity, which will include redesign of street layout to improve traffic flow (WCC, 2013)
Port Street	None	No	0	Not applicable on this narrow street
Horsefair	None	No	0	Not applicable on this narrow street
Welch Gate	None	No	0	Not applicable on this narrow street

5.1.10 Action: Pedestrianisation of streets within area.

Similarly to one way street option this action would only be appropriate for AQMAs where alternative routes for travellers exist.

The benefits are clearly enormous as would lead to a total reduction in roadside emissions which would effectively guarantee revocation of AQMA, but the potential drawbacks are equally huge. Clearly this option will not be appropriate to AQMAs on major carriageways without a significant alternative to traffic routes.

Action: Pedestrianisation of streets within area.

Pros	Cons	Key Stakeholders	Cost	Time
Total reduction in emissions (maybe with exception of allowable delivery vehicles)	Displacement of all traffic onto alternative routes Could shift pollutant issues to another route	WCC, LA	NQ	NQ
Increased pedestrian		Linked Policy		

safety Potential benefit to businesses and retail outlets Allows for potential redevelopment such as cafes with outdoor seating Create secure cycle stores	Deliveries unable to get to businesses Residents unable to access properties.	LTP3: AQ1-3, AQ5, AQ7, TMP2		
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Action: Pedestrianisation of streets within area.

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	None	No	N/A	Not applicable
Lickey End	None	No	N/A	Not applicable
Redditch Road	None	No	N/A	Not applicable
Worcester Road	None	No	N/A	Not applicable. Not sufficient alternative routes
Dolday	None	No	N/A	Not applicable
Lowesmoor	LRH4 LRH6 LRH7 LRH8 LRH9	Possibly at Lowesmoor	RH n/a Lwm 5	Not applicable at Astwood Road/Rainbow Hill end of AQMA. Possible to apply this action to Lowesmoor. Would completely eliminate emissions and improve general ambience of retail area for shoppers extending the St Martins Gate area. WCC (June, 2013) advise: Lowesmoor could be made an 'access only' route for deliveries, residents and buses only, significantly reducing emissions and improving general ambience...'
Port Street	None	Unlikely (WCC)	5	Reduction in emissions would provide conditions to revoke AQMA. Create a pedestrian and shopper friendly environment. However business and residential areas would require some permitted access. WCC (June, 2013) advise '...scheme is unlikely to be feasible on accessibility grounds.'
Horsefair	None	No	N/A	N/A
Welch Gate	None	No	N/A	Only possible if another bridge built offering an alternative route

5.1.11 Action: Remove build-out in streets to allow cars to pass simultaneously.

Removing traffic calming measures or excessive pavement areas would increase road width and ease two way traffic flow where problematic areas exist.

Action: Remove build-out in streets to allow cars to pass simultaneously.

Pros	Cons	Key Stakeholders	Cost	Time
Improves traffic flow. Reduces congestion.	May reduce pedestrian safety areas	WCC, LA	NQ	S - M
		Linked Policy		
		LTP3: AQ1-3, AQ5, AQ7		

Action: Remove build-out in streets to allow cars to pass simultaneously.

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	None	N/A	0	Not applicable in this AQMA
Lickey End	None	N/A	0	Not applicable in this AQMA
Redditch Road	None	N/A	0	Not applicable in this AQMA
Worcester Road	WR7	Required	2 - 3	May help to reduce pinch point near Turks Head and busy Shrubbery Road junction. May not be possible to reduce pavement areas near Turks Head, reduction to other side of road could be explored in a feasibility study. Similar requirement as part of a wider review of potential improvements to Shrubbery Road junction.
Dolday	None	N/A	0	Not applicable in this AQMA
Lowesmoor	None	N/A	0	Complete streetscape redesign currently underway as part of Worcester Transport Strategy (Phase 1) Scheme due to complete in Autumn 2013
Port Street	None	N/A	0	Not applicable in this AQMA
Horsefair	None	N/A	0	Not applicable in this AQMA
Welch Gate	None	N/A	0	Not applicable in this AQMA

5.1.12 Action: Removal of parking bays in problem streets.

Removing parking availability would increase road width and ease two way traffic flow where problematic areas exist. This needs to be considered in conjunction with availability of car parking elsewhere and potentially other actions such as car parking pricing, policy and restrictions.

Action: Removal of parking bays in problem streets

Pros	Cons	Key Stakeholders	Cost	Time
Improves traffic flow. Reduces congestion.	Can create issues if appropriate parking levels not available in close vicinity. Detrimental effect on local business from reduction in delivery's	WCC, LA	NQ	S - M
		Linked Policy		
		LTP3: AQ1-3, AQ5, AQ7		

Action: Removal of parking bays in problem streets

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	None	N/A	0	Not applicable in this AQMA
Lickey End	None	N/A	0	Not applicable in this AQMA
Redditch Road	None	N/A	0	Not applicable in this AQMA
Worcester Road	WR6	Yes	2 - 3	Reducing ability to park outside residential properties near Turks Head (strictly speaking not parking bays) would increase road width and reduce congestion. Additional parking must be made available to local residents nearby. Explore opportunities with other actions.
Dolday	None	N/A	0	Not applicable in this AQMA
Lowesmoor	LRH5	Yes	0 - 1	Parking outside some businesses in Lowesmoor causes congestion. But removal of legitimate parking bays could affect businesses and current restrictions are ignored.
Port Street	None	Yes	0 - 1	Potential problematic parking areas noted from vehicles parking or reversing out of area just adjacent to the AQMA opposite Shor St and outside Pizza bar near Waterside junction lights – technically not a parking area. Latter requires some additional restrictions. Not significant impact enough to warrant priority.
Horsefair	None	No	0	Not applicable in this AQMA
Welch Gate	None	No	0	Not applicable in this AQMA

5.1.13 Action: Alterations to Parking Provision and Pricing

'Parking policies have an important role to play in reducing reliance on the car. It has been found that parking policy measures are likely to be relatively more important than many other traffic management measures in influencing mode choice. More specifically, the decision to use a car for the journey to work is greatly influenced by the availability and cost of parking. Hence parking policy has a major role to play in encouraging changes in travel behaviour in combination with strategies of increasing opportunities for travel by other modes.' (AEA, 2010))

'Traffic and Parking Management measures, when applied strategically, can act to significantly increase the efficiency of constrained transport networks by encouraging the use of more resource-efficient modes such as walking, cycling and passenger transport. The increasing use of more sustainable modes of transport can lead to a number of environmental benefits, including enhanced public health, reduced emissions, reduced congestion and increased accessibility to key services and facilities.' (WCC, 2011m)

This action would feature as part of other strategic measures such as introduction of a Park and Ride scheme or Priority Bus/HOV Lanes and public transport improvements. This is also linked to Introducing Differential Parking Pricing solutions 5.2.8 and 5.2.9.

Action: Alterations to Parking Provision and Pricing

Pros	Cons	Key Stakeholders	Cost	Time
Reduce car use and subsequently emissions	Alternatives to using car need to be provided to ensure traffic reduction e.g. Park & Ride, BQP, Bus Lanes	LA, WCC	L	S - M
Increase uptake in sustainable travel		Linked Policy LTP3: AQ1-3, AQ5, AQ7, TMP1, TMP3-5		

Action: Alterations to Parking Provision and Pricing

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	None	No	0	No car parking in vicinity. Large proportion of traffic in AQMA is not bound for local destinations.
Lickey End	None	No	0	No car parking in vicinity. Large proportion of traffic in AQMA is not bound for local destinations.
Redditch Road	None	No	0 - 1	No car parking in vicinity. Through route onto other destinations
Worcester Road	None	Yes	1 - 3	Close to town centre and several car parks in mile radius. Level of impact depends on final strategy.
Dolday	None	Yes	1 - 3	Close to town centre and several car parks in mile radius. Level of impact depends on final strategy.
Lowesmoor	None	Yes	1 - 2	Close to town centre and several car parks within 400 metres of the street. Through route onto other destinations and access to local residences. Impact depends on take up of alternatives
Port Street	PS9	Yes	1	Is a local car park but already underutilised. Through route onto other destinations and access to local residences. Impact depends on take up of alternatives
Horsefair	None	Yes	1	Better signposting for St Marys on approach to Kidderminster
Welch Gate	None	Possible	NQ	Due to Medical Centre development assessment

5.1.14 Action: Traffic calming measures

The rationale of introducing traffic calming measures (20 mph zones, speed bumps etc.) on local roads is the deterrent to drivers to use the route which leads to a reduction in traffic, congestion and an improvement in air quality. Additionally it could encourage uptake of walking and cycling around AQMA.

LAQM PG(O9) states: 'Local Authorities can set speed limits by making orders under the Road Traffic Regulation Act 1984. Reducing maximum speeds is likely to do more to improve flow and capacity on congested roads outside towns and cities, particularly on motorways, than in urban areas, but it may still have some benefit. Some authorities have piloted experimental variable mandatory 20 mph speed limits in urban areas on road safety grounds, but without complimentary enforcement or engineering measures there has been

limited effect. Much greater safety benefit is achieved with permanent 20 mph zones and speed limits, which rely on engineering measures or constraints of an existing road layout to ensure compliance with the lower limit. The resulting lower traffic speeds are unlikely to reduce emissions significantly, and may actually increase emissions of some pollutants. Speed limits below 30 mph generally have to be self-enforcing to be effective.'

Therefore in reality whilst these may provide significant safety improvements, it is unlikely that such measures will have the desired impact on reducing pollutant levels and more likely have a detrimental effect without provision of alternative routes for traffic.

Action: Traffic calming measures

Pros	Cons	Key Stakeholders	Cost	Time
Discourage traffic from using AQMA if alternative routes available Increased all road user safety	Reduces vehicle speed, increase emissions Displacing traffic onto other routes may shift pollutant issues elsewhere	WCC, Road safety partnership Linked Policy LTP3: AQ1-3, AQ5, AQ7, ITS6	NQ	NQ

Action: Traffic calming measures

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	None	No	-1	Would severely increase congestion and emissions on a major carriageway
Lickey End	None	No	-1	Would severely increase congestion and emissions on a major carriageway
Redditch Road	None	No	-1	Would severely increase congestion and emissions on a major carriageway
Worcester Road	None	No	-1	No alternative routes for local destinations. Likely detrimental effect within street canyon
Dolday	None	No	-1	Would severely increase congestion and emissions on a major town centre carriageway
Lowesmoor	None	Possible	-1 to 1	Potential detrimental effect due to street canyon and possibly shifting higher pollutant levels to alternative routes due to displaced traffic.
Port Street	None	Possible	-1 to 1	An alternative route is available, but potential detrimental effect due to street canyon and possibly shifting high pollutant levels to alternative Cheltenham Road due to displaced traffic.
Horsefair	None	No	- 1	Queuing traffic no change
Welch Gate	None	No	- 1	Already slow speeds

5.2 Lowering Emissions Actions

These are a broad range of actions generally incorporating technical changes to vehicles or effecting a reduction in volumes of most polluting vehicles or other strategies aimed at achieving a reduction in emissions within AQMAs.

Actions discussed in this section are as follows:

- Bus Quality Partnerships (5.2.1)
- Freight Quality Partnerships (5.2.2)
- Park and ride schemes (5.2.3)
- Railway enhancements (5.2.4)
- Greening Council and Business Fleets (5.2.5)
- Low Emission Zones (5.2.6)
- Introduce Fixed Penalty Notices for Stationary Idling (5.2.7)
- Introducing Differential Parking Rates - Engines (5.2.8)
- Introducing Differential Parking Rates – Car Parking (5.2.9)
- Installing Electric Vehicle Charging Points (5.2.10)
- Roadside Emission Testing (5.2.11)
- Signage identifying AQMA (5.2.12)
- Tree Planting (5.2.13)

Refer to sections 4.1.3 and 5.6.9 for information regarding development of an overarching Lower Emissions Strategy.

5.2.1 Action: Bus Quality Partnerships (BQP)

Buses and coaches constitute an essential component of public transport, representing an important alternative to cars. However, buses can make a significant contribution to emissions of NO_x and other emissions, and consequently it is important to assess what can be done to minimise emissions from fleet vehicles.

‘Bus services form the backbone of the passenger transport network in Worcestershire, carrying approximately 17.5 million passenger journeys annually. At the time of writing (LTP3), there were approximately 160 registered bus services, although levels of service are highly variable around the county, with the most frequent services provided on key urban and interurban routes.

In Worcestershire, the bus fleet is highly variable in terms of age, capacity, quality and levels of comfort provided. All buses in Worcestershire at the time of writing (LTP3) are fuelled with either diesel or petrol. The majority of buses are single-deck vehicles, with the newest vehicles operating in the main, but not exclusively, on the high frequency (most profitable) routes. On more marginal routes, the rolling stock is generally either older bus or coach stock which has 'retired' from more intensive use on urban or interurban routes... Double Decker vehicles are operated in Redditch and on a number of selected school routes in Worcestershire; although Worcestershire's generally constrained, historic urban street patterns are not suited to Double Decker or articulated vehicle operation.

The Worcester City Park and Ride routes (operated by Worcestershire County Council) use vehicles which meet the Euro V standard emissions. WCC continues to encourage operators to renew older vehicles with modern fleet with cleaner, more efficient engines using a variety of incentives.’ (WCC, 2011g)

Voluntary Bus Quality Partnerships are informal agreements between relevant bus operators and local authorities that are not enshrined in legislation. Such partnerships are usually

formed between one or more local authority and bus operator(s) but may also include large organisations or institutions (e.g. businesses). In these partnerships, each party makes a commitment to improvements that will result in enhancements to bus services in a given area through measures such as improved infrastructure or better vehicles. (AEA, 2010)

Strategy:

- Liaise with local bus operators to establish the potential for developing a local bus quality partnership.
- Target reduced emissions from buses operating within AQMAs.
- Encourage bus companies to improve emission performance of fleet through rolling vehicle replacement programmes (Eurocode VI comes into force in 2014) and/or retrofitting abatement equipment to existing vehicles.
- Integrate bus services with rail networks and new developments.
- Encourage transport providers to promote greater uptake of public transport
- Review and amend position of bus stops where appropriate
- Ensure ability to operate LEV in AQMA's forms part of contract tendering for all PSV routes and contracts in the future.

Could be undertaken in conjunction with other options e.g. priority bus lanes, LEZs.

Action: Bus Quality Partnerships (BQP)

Pros	Cons	Key Stakeholders	Cost	Time
Replacing older bus stock on AQMA routes reduces emissions Improve local public transport for passengers encouraging greater uptake	Take time to set up and companies to replace stock	WCC, bus companies, WRS	L	M - VL
	High cost to bus companies Many private bus companies with older stock operate within AQMA e.g. school runs	Linked Policy LTP3: AQ1-3, AQ5, AQ7, ITP1-11, ITP13, ITP16, ITP18, SMT5, TCC1, TMP2		

Action: Bus Quality Partnerships (BQP)

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	KR4	Yes	0 - 1	Not many public services observed within AQMA at peak times and not identified as a significant source within FA. Greater impact if BQP formed with private school bus companies.
Lickey End	LE5, LE10	Yes	1 - 2	Some public services observed within AQMA at peak times. Possibly greater impact if BQP formed with private school bus companies or in conjunction with other options such as Park and Ride scheme
Redditch Road	None	Yes	1 - 3	Few public services observed within AQMA at peak times. Greater impact if BQP formed with private school bus companies, several observed
Worcester Road	WR11	Yes	3 - 5	Regular public services observed within AQMA at peak times in street canyon.

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
				Lowest emission vehicles integrated with new developments including Bromsgrove train station essential to improving AQ on this route. 'Greater Bromsgrove Accessibility Enhancements Study identified that local accessibility in Bromsgrove is currently poor, particularly outside of peak times and over weekends. As a result, the study suggested the development of a Bromsgrove Town Bus Service, which would replace existing local services and provide significant accessibility enhancements to all trip attractors in Bromsgrove, in particular, the new bus/rail interchange. This was shown to deliver significant accessibility benefits, with wider social and economic benefits also apparent (WCC, 2011b).
Dolday	DD5, DD8	Yes	4 - 5	Bus station adjacent to AQMA so makes high proportion of traffic. Introducing lowest emission vehicles essential to improving AQ on this route. WCC advise (June, 2013): 'A bus quality partnership is being introduced for Worcs City in September 2013.'
Lowesmoor	LRH6	Yes	3 - 4	Regular public services observed within AQMA at peak times in street canyons. Introducing lowest emission vehicles on this route could have large impact at both end of AQMA. Greater impact at Lowesmoor west end of AQMA achievable if used in conjunction with other options such as amendment to one way street for general traffic. WCC advise (June, 2013): 'Lowesmoor is a critical east-west bus corridor in the city for which no suitable alternatives exist. A bus quality partnership is being introduced for Worcs City in September 2013.'
Port Street	PS6	Yes	1 - 2	Some public services observed within AQMA at peak times. Possibly greater impact achievable if BQP formed with private school bus companies and/or used in conjunction with other options such as amendment to one way street.
Horsefair	None	Yes	1 - 2	Move bus stop further away from AQMA to reduce congestion
Welch Gate	WG4	Yes		The longer length variety of buses regularly used in the area block the road due to narrow bends of Welch Gate. Encouraging bus companies to operate shorter length busses would be more advantageous. WCC have indicated that as bus contracts come up for renewal this will be considered along with lower

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
				emission buses.

5.2.2 Action: Freight Quality Partnerships (FQPs)

'The delivery and collection of goods is essential to the economy, is integral to the quality of people's lives and also has an impact on the environment. The movement of freight is currently dominated by road haulage. The results of the source apportionment exercise for several AQMAs indicated that HGVs make a significant contribution of emissions of NOx, but comprise a relatively small proportion of traffic. It is recognised that reducing emissions from HGVs may represent a targeted and effective approach to improving air quality within some AQMAs.

Freight Quality Partnerships (FQPs) are partnerships between local authorities, the freight industry and other interested stakeholders. FQPs encourage sustainable distribution by working together to develop environmentally sensitive, economic and efficient ways of delivering goods and establishing best practice.' (LACORS, 2008)

The Freight Strategy was developed by WCC in 2001 in partnership with the Road Haulage Association and Rail Operators. A countywide Freight Quality Partnership was established in 2002 and an advisory Lorry Route Map was published in 2003. The Worcestershire FQP Working Group is made up of the following members:

Worcestershire County Council, (WCC) 6 District Councils, Police, Freight Operators and Generators, Road Haulage Association (RHA), Freight Transport Association (FTA), National Farmers Union (NFU), County Association of Local Councils (CALC).

It is proposed that WRS will facilitate work with the above group to ensure air quality issues are recognised and addressed such as:

- Reviewing lorry route maps and ensuring AQMAs are recognised and avoided on routes as much as possible.
- Encourage a wider uptake of freight by rail – see below.
- Improving air quality by promoting the use of cleaner and more fuel efficient vehicles
- Encourage retrofitting abatement equipment to existing vehicles

Rail Freight

WCC,2011f states '...there are limited opportunities for rail freight within Worcestershire at present. The nearest major rail freight facilities exist in Coventry, Daventry and Swindon, with freight transported by road to these locations from Worcestershire... Rail is particularly well suited to bulk freight movements. New rail freight locations will in general require planning permission and suitable locations will need to be identified with the Worcestershire Borough, City and District Councils through the Local Development Framework process.'

Action: Freight Quality Partnerships (FQPs)

Pros	Cons	Key Stakeholders	Cost	Time
Reduces emissions from major contributing source Lorry maps amendments could be short timescale	Depends on availability of alternative routes (or availability of rail alternatives)	WCC, WFQP, LA, WRS	L	S - VL
	Greening of entire fleet	Linked Policy LTP3: AQ5, F1		

	or switching to rail freight could be very long timescale	- F10, TMP2		
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Action: Freight Quality Partnerships (FQPs)

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	KR7	Yes	4	HGVs identified as significant emissions source. Alternative routes for some journeys available via J4 M5.
Lickey End	LE2	Yes	3	Alternative routes for some journeys via J2 M42 Redditch but could displace traffic onto other AQMAs or shift pollutant issues onto other local routes.
Redditch Road	RR6, RR10	Yes	3	Alternative routes for some journeys via J5 M5 or J2 Redditch but could displace traffic onto other AQMAs or shift pollutant issues onto other local routes.
Worcester Road	None	Yes	3	Alternative routes for some journeys J2 Redditch but could displace traffic onto other AQMAs or shift pollutant issues onto other local routes
Dolday	DD11	Yes	1 - 2	HGVs only identified as significant emissions source in combination with buses. Alternative routes for some journeys available via ring roads. Updates to lorry maps may be beneficial
Lowesmoor	LRH8	Yes	2 - 3	HGVs identified as significant emissions source in combination with buses. Alternative routes for some journeys available via ring roads. Updates to lorry maps in conjunction with weight restriction or improved signage could have a reasonable impact on emissions
Port Street	None	Yes	1 - 2	Alternative routes into Evesham via A46 bypass believe signed already (review possible). HGVs not most significant source identified. Reopening of Abbey Bridge and lifting of weight restriction in 2014 will ease HGV flow in Port St, particularly in conjunction with action for review of requirements for additional signage on bypass.
Horsefair	None	Yes	1 - 2	Updates to lorry maps in conjunction with weight restriction and improved signage could have a significant impact on emissions
Welch Gate	WG7	Yes	1 - 2	Updates to lorry maps In conjunction with weight restriction and improved signage could have a significant impact on emissions

5.2.3 Action: Park & Ride Schemes

A Park and Ride scheme allows you to park your vehicle in a car park outside town, and then use a dedicated frequent bus service to get into the town centre or other destination. These schemes provide a cheaper and faster way for visitors to get into areas such as town centres, which are often congested and where parking may be both scarce and expensive.

Park and ride facilities will provide a higher reduction in car volumes, congestion and emissions if introduced in conjunction with other options as part of an integrated alternatives mode of transport strategy e.g. increase in parking pricing in town centres, priority bus lanes, Variable Messaging System, train station enhancements and Bus Quality Partnerships to ensure most emission efficient buses are used,

Traffic volumes may increase in the vicinity of park and ride sites however these are generally on the periphery of town centres where air quality is generally not an issue. Providing a Park and Ride facility can also increase the number of tourists and other visitors to your area by making access to town centres and attractions faster, cheaper and hassle-free.

'WCC have been supportive of Park and Ride proposals; however, a number of criteria must be met in order to deliver effective operation of these facilities:

- Reallocation of Long Stay Parking in Urban Centres to Short Stay 3 hrs max - This 'creates the market' for Park and Ride, by moving long-stay demand into Park and Ride sites. Additionally, this ensures that urban centre parking is not used by commuters, instead freeing up this capacity for use by residents and visitors. (This also enables the provision of enhanced disabled parking.)
- Consolidation of Urban Centre Off Street Car Parking - Small, surface level car parks represent an inefficient use of space, particularly in urban centres.
- Effective Management of On Street Car Parking in Urban Centre - Where parking capacity is constrained, it is common for parking demand to reallocate to nearby residential areas. Where this occurs, Worcestershire County Council will pursue the delivery of Controlled Parking Zones (CPZ) to protect residents' parking whilst limiting the use of capacity in residential areas for non-permit holders.
- On-going Removal of Private Non-Residential Parking in Urban Areas. This parking capacity is generally offered free-of-charge, and so can undermine parking policies unless properly managed.
- Effective Planning Policy Application - This will deliver urban environments which are supportive of parking policies.'

Action: Park & Ride Schemes

Pros	Cons	Key Stakeholders	Cost	Time
<p>Reduced cars travelling into town centres</p> <p>Reduces cars recirculating looking for parking spaces</p> <p>Reduced congestion in AQMA</p> <p>Update in Eurocode standards of PSV fleet will reduce emissions</p> <p>Quicker into town centres via priority bus lanes and traffic lights</p> <p>Parking normally cheaper than Town Centres</p>	<p>Requires large out of town site for car parking and Bus Station</p> <p>Change of PSV fleet required or could lead to increased emissions from PSVs; cost to bus companies</p> <p>Expensive set up costs</p>	<p>WCC, LA, LPA, Bus Co, Politicians</p> <p>Linked Policy</p> <p>LTP3: A3, AQ3, AQ5-7, ITP1, ITP5-7, SMT5, TCC1, TMP4</p>	H - VH	L - VL

Action: Park & Ride Schemes

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	KR3,	No	0	Too low a demand for Hagley Town Centre as a destination and too small to accommodate large amounts of buses
Lickey End	None	Yes	5	Lickey End is ideal situation for Park & Ride consideration. Location adjacent to M42 could have a great impact on reducing levels in Lickey End AQMA
Redditch Road	RR10, RR11,	Review required	-1 to 1	A southern Bromsgrove park and ride facility likely to have a minimal impact as Redditch Road acts largely as through route between east and west bypassing town centre. Possibly even cause detrimental effect by increasing volumes if Park & Ride was placed adjacent to AQMA
Worcester Road	WR13, WR14,	Yes	3 - 4	A southern Bromsgrove park and ride facility could have a beneficial impact on Worcester Road AQMA depending on location. Impact likely to be less than Lickey End as much traffic destined for local destinations e.g. schools.
Dolday	DD4, DD8, DD12,	Yes	2 - 4	Two facilities already in place on east of City. Additional benefit and reduction in vehicles possible if facility emplaced serving west side of City. Could also benefit air quality in St Johns area. To be delivered as part of LTP3 actions. WCC, 2011h states: 'The City of Worcester will be the initial focus for an Urban Car Parking Strategy...to implement a comprehensive network of Park and Ride sites to replace existing long stay parking within the city centre, encouraging a transfer of trips on the edge of the City Centre where their impact can be minimised. Car Parking VMS and web based RTI can provide the public with advance information to influence responsible travel choices...'
Lowesmoor	LRH1, LRH9,	No	0	Two facilities already in place on east of City
Port Street	None	Yes	1 - 3	Evesham could potentially benefit from park and ride facilities. Impact on AQMA would depend on proximity of location around the town.
Horsefair	HF3,	Limited	1	Been attempted in the past by WFDC and not successful due to financial viability. Put in place for special events
Welch Gate	WG2	Limited	1	Been attempted in the past by WFDC and not successful due to financial viability. Put in place for special events

5.2.4 Action: Railway enhancements.

Improved rail service frequency and pattern will increase rail patronage and help to ease congestion and reduce emissions. Additionally improvements to railway stations such as secure cycle stores, improved footpath lighting, Variable Message Signing and integrated bus services can encourage passengers to use alternative modes of transport to cars in accessing local train stations.

A number of railway enhancements and a major redevelopment in Bromsgrove Station are planned as part of LTP3. WCC are also currently bidding for funds for a completely new station just southeast of Worcester known as Worcestershire Parkway.

WRS support major public transport developments such as Bromsgrove Station or Worcestershire Parkway but recognise such schemes are unlikely to aid a reduction in existing pollutant levels because of the long timescales involved. However such schemes are important for maintaining air quality improvements in the future.

'WCC recognises that, whilst rail is a sustainable means of travel, the provision of parking at stations is not sustainable, as this encourages rail users to drive to access rail services (particularly for short trips). WCC will work with Network Rail and Train Operating Companies to identify optimum levels of car parking at rail stations, supported with Station Travel Plans (as identified in the LTP3 Smarter Choices Policy (WCC, 2011i)) to encourage greater use of sustainable modes of travel to access rail services.' (WCC, 2011m)

WRS will promote and support provision of integrated public transport systems between new developments and town centres and their enhancements which encourage public to use alternatives to cars.

Action: Railway enhancements

Pros	Cons	Key Stakeholders	Cost	Time
Improved public transport provision encourages switch to alternative modes of transport and reduces emissions Station enhancements encourage walking or cycling to station	Major developments prohibitively expensive and long timescale to deliver	WCC, LAs, LPAs Linked Policy LTP3: A3, AQ5, AQ7, F3, ITP1, ITP6-8, ITP10-11, ITP16, ITP18	M - VH	M - VL

Action: Railway enhancements

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Depends on WCC	NQ	Depends on planned and implemented WCC schemes

5.2.5 Action: Greening Council and Business fleets

Fleet management is the effective operation of an organisation's vehicles. A council's fleet might include council owned or leased company cars, buses, refuse collection vehicles, plant items etc.

Effective fleet management may include:

- Fleet inventory's which includes information such as individual vehicle details, mileage, maintenance costs etc.
- Rolling vehicle replacement programme requiring purchase of Lower Emission Vehicles complying with prevailing 'Euro-standard' for exhaust emissions
- Fuel Monitoring Management
- Commitment to using alternative fuelled vehicles e.g. electric vehicles, Liquefied Petroleum Gas (LPG), combined fuel (hybrid) vehicles
- Safe and Fuel Efficient Driving Training – more info in Education and Information section
- Undertaking a Green Fleet Review through the Energy Savings Trust to identify the environmental impact of fleet (>50 vehicles) and ascertain improvements to be made.
- Test fleet vehicle emissions whenever routine servicing is carried out.
- Retro fit pollution abatement equipment to Council HGVs e.g. fitting of particulate traps to refuse collection vehicles

Performance indicators (NI 194 & NI 185), brought into practice in 2008, required councils to reduce carbon dioxide, particulates and nitrogen dioxide emissions from their own estate and vehicles.

The above fleet considerations should already have been actioned by the Local Authorities in Worcestershire already or are included in their Council Transport Strategies for on-going action following the introduction of the performance indicators. Significant reductions in local emissions are therefore unlikely to be achieved by focussing attention on improving Council fleets further.

However such experience does provide an opportunity for LAs to become leaders in emissions reduction in their communities, disseminating information and best practice and encouraging local businesses to follow suit. There are also financial benefits to be achieved by implementing green fleet policies, through fuel efficiency and tax savings.

WRS could undertake a review of fleet management strategies adopted by LAs in Worcestershire and promote appropriate examples of best practice to encourage local businesses for inclusion in their own Fleet Management Strategy and those LA's that are the best at implementing such schemes.

Action: Greening Council and Business fleets

Pros	Cons	Key Stakeholders	Cost	Time
LAs leading by example Potentially replace some higher polluting vehicles on road with lower emission vehicles Potential reduction in fuel costs	Council fleets are relatively small proportion of vehicles contributing to local emissions Many authorities will have enacted previously Time dependent on expiry of vehicle leases Increased capital costs and specialist maintenance for alternative fuel vehicles Converting vehicles can	WRS, LA Procurement officers	NQ	NQ
		Linked Policy LA Climate Change Strategy, LA Procurement Strategy, LTP3: ITP11, ITP16, SCP15, TCC1		

	be high cost			
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Action: Greening Council and Business fleets

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	RR6	Review required	NQ	Impact from greening council and business fleets depends on take up

5.2.6 Action: Low Emission Zones (LEZ)

The following information is a summary of LAQM Practice Guidance 2 (Defra, 2009d).

A Low Emission Zone (LEZ) is a geographically defined area where the most polluting of vehicles are restricted, deterred or discouraged from access and use by setting particular emission standards or criteria.

LEZs tend to be focussed on city and town centres, where land-use is dense, traffic is heavy and population exposure is high. There is the highest value in such areas from restricting, discouraging or deterring the use of more polluting vehicles. LEZs have been successfully implemented and run for a number of years in Sweden and the Greater Tokyo Area, and more recently in London and cities in Germany and the Netherlands. The impact can be similar to an acceleration of fleet turnover or the fitting of abatement devices, thereby reducing emissions sooner than would otherwise have happened.

It should be noted that reducing the number of more polluting vehicles might be achieved by a range of other methods. For example, incentivisation mechanisms, partnerships or regulations that focus on specific sectors of road transport might be used to encourage lower emission vehicles or take-up of emission abatement technologies.

The economic rationale for LEZs is linked to the external costs of operating polluting vehicles. Previous studies have demonstrated that the most common vehicles to target in a scheme with enforceable restrictions are diesel powered Heavy Duty Vehicles due to their cost-effectiveness relative to schemes that would restrict other vehicle types.

There are a number of considerations and options for any LEZ which will need to be determined once the objectives of the scheme have been established i.e. targeting pollutants emitted by specific vehicle type(s). These are briefly described in Table 5-1 below:

Table 5-1 Summary of considerations for Low Emission Zones

Scheme Aspects	Options
Legal basis	Two main routes to setting up an area (or zone) with traffic or parking controls based on vehicle emission criteria: <ul style="list-style-type: none"> • Traffic Regulation Orders for enforceable restrictions on the public highway; • Section 106 agreements as planning obligations for development sites and private land.
Enforcement powers and penalties	<u>Vehicle Restrictions</u> - Outside London the relevant moving vehicle offences are currently enforceable by Police. Powers under Traffic Management Act 2004 (TMA 2004) may provide civil enforcement powers to local authorities. These are necessary to effectively enforce a scheme. <u>Parking restrictions</u> - TMA 2004 provides for the civil enforcement of most types of parking contraventions. LA appointed Civil Enforcement Officers can issue Penalty Charge Notices (PCN) for parking contraventions. <u>Planning system</u> - Following a breach of planning control the Planning Authority (Local Authority or Council) has the option to take enforcement action via notice or court injunctions.
Vehicle emissions standards and vehicle type	Defining vehicle standards and vehicle type on which to base enforceable restrictions could be determined in one or a combination of the following criteria: <ul style="list-style-type: none"> • Euro standards (the term for European type approval standards on the emission performance of new vehicles over a defined test cycle); • Age of vehicle/ Year of first registration (because older vehicles tend to be more polluting, largely because Euro standards have progressively raised performance in this area); • Particular fuel/technology combination (if they are considered to have particular benefits, such as hybrid, gaseous or renewable fuels); • Retrofit technology (which can be used on older vehicles to clean up exhaust emissions); • Vehicle type (cars, vans, heavy goods vehicles (HGVs), emergency vehicles etc.) that is to be included or excluded.
Management of permitted vehicles	The scheme operator maintains the definition of what is a permitted vehicle. Management of the permission to enter the zone requires information and identification of individual vehicles with administration systems to cross-check permissions e.g. London LEZ has a database with links to the DVLA. If a scheme is small-scale, affecting relatively few vehicles or one focussed on local fleets, then a basic permit management and verification system might be sufficient. Access control schemes in Cambridge and Bath are examples of where transponders (wireless electronic devices) are provided to a relatively small number of exempted vehicles (taxis and buses).
Vehicle detection	Detection of a vehicle for subsequent identification of emission status could be carried out by a variety of methods, sometimes in combination: <ul style="list-style-type: none"> • Manual methods, whereby enforcement personnel visually check vehicles travelling within or parked within the scheme area for identification marks (Vehicle Registration Mark and/or a permit/sticker). Some post checking against a database of compliant vehicles would then be necessary. • Digital cameras and Automatic Number Plate Recognition (ANPR) – all passing number plates are recorded and using

	<p>Optical Character Recognition (OCR) for matching against a database of vehicle data. A network of cameras would be installed on the key routes into/out of the boundary of the scheme and possibly at key junctions within the zone if it is very large. Mobile ANPR cameras could be used to monitor key junctions and/or 'hot-spots' of possible non-compliance. ANPR is used in London LEZ</p> <ul style="list-style-type: none">• Dedicated Short Range Communication (DSRC) – tags and beacons, more suitable for schemes with relatively few and pre-determined users which comply with the scheme criteria. Tags or proximity smartcards are commonly issued to vehicle owners for accessing private car parks, or can be scanned through a wind-screen, and can also be used to trigger bollards which control access on the public highway.
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While the choice of how any particular LEZ may be set up is a choice for local authorities, Defra and the Department of Transport are currently considering how to approach vehicle classification to ensure that there is a level of consistency between schemes. This work will also be relevant for those authorities considering LEZ schemes as to increase efficiency across scheme types through added consistency.

Existing LEZ that target toxic pollutants most commonly use Euro standards as the basis for setting emission. In a great number of cases there exist supplementary criteria to allow some exemption (or time-extensions) for retrofitting emission abatement technology. Age as a proxy for Euro standard is also a common accompanying basis.

The benefits of manual detection methods are lower capital costs, and some flexibility over future operating costs if enforcement levels can be reduced. Manual enforcement is suitable for parking schemes, whether on-street parking on development sites. A drawback of manual enforcement is the limit on the number and speed of vehicles that can be checked by a person.

The benefits of automated enforcement systems are that high speed and volume flows of vehicles can be detected and recorded, and that every vehicle can be checked. Drawbacks can include the relative inflexibility of fixed camera systems once they are installed and the up-front capital costs.

For any scheme, in order to demonstrate value for money local authorities will need to analyse both set up costs and operational costs. Table 5-2 below considers the various cost elements that need to be considered.

Table 5-2 Various cost considerations for LEZs

Capital costs	Operating costs
<ul style="list-style-type: none"> • Scheme design and planning • Legal support • TRO review and update • Consultation process • Marketing and information campaign • Traffic management / safety • Roadside equipment (signing, detection, enforcement) • Central administration and IT systems (back-office functions: vehicle record, certification, enquiry handling) <ul style="list-style-type: none"> - project management - systems design and configuration control - systems integration and implementation - systems testing and acceptance 	<ul style="list-style-type: none"> • Accommodation • Staff costs • Training • Registration and validation of vehicles • Any new vehicle identification method (for example windscreen stickers) and the issuing process for this • Equipment / software replacement and maintenance costs • Vehicle immobilisation and removals • PCN processing • Adjudication and appeal costs • Supplies, services and transport <ul style="list-style-type: none"> - contingency plans for business continuity and disaster recovery; - data retention and archiving; • Monitoring and evaluating the scheme impacts • Certification of retrofit devices, suppliers and vehicles fitted with retrofit devices

LEZs are potentially an effective method of achieving the air quality objectives within Worcestershire. However it is complex subject because of the various options and considerations, the significant costs involved and resources required. Initial screening assessments to identify whether there is any potential in such a scheme followed by more

detailed feasibility studies, where appropriate, will be required to be undertaken by a Steering Group to ascertain if LEZs are a viable option.

Clearly LEZs are likely to provide a higher cost-benefit in large urban areas where a number of AQMAs exist (e.g. Worcester City and Bromsgrove) and economies of scale can be achieved through implementation.

A possible UK network of LEZs may be proposed as part of future changes of LAQM currently under review by Defra (Defra, 2012).

Action: Low Emission Zones (LEZ)

Pros	Cons	Key Stakeholders	Cost	Time
Significant reductions in emissions can be achieved through implementation	Several stages of assessment and significant cost-benefit analysis required to determine feasibility	WCC, LA, LPA, Politicians, WRS	VH	L - VL
	Agreement required of many stakeholders			
	Significant costs in set up and operation	Linked Policy		
	Long timescale before assessments and agreement and resources achieved	LTP3: AQ5-7, TCC1, TMP2		

Action: Low Emission Zones (LEZ)

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Required	NQ	Further assessment required

5.2.7 Action: Introduce Fixed Penalty Notices for Stationary Idling

The Roadside Vehicle Emissions (Fixed Penalty) Regulations 2002 permit Local Authorities to take action against drivers who leave their vehicle engines running unnecessarily when parked (it does not apply to vehicles in traffic, or where engines are being examined, or where a vehicle is required to run machinery e.g. a refrigeration unit.)

Councils can request drivers to turn off their engines and issue a Fixed Penalty Notice to those who refuse to cooperate, which will result in fine of £20. This increases to £40 if not paid within 28 days. (LACORS, 2008)

Buses and taxis may be a significant source of emissions from idling vehicles. Issues may be avoided by working with local companies prior to enforcement action being undertaken and introducing appropriate signage in AQMAs such as 'Switch engines off – AQMA'.

Action: Introduce Fixed Penalty Notices for Stationary Idling

Pros	Cons	Key Stakeholders	Cost	Time
Reduction in idling vehicles causing unnecessary pollution, create noise and waste fuel.	May only have significant effect where taxi ranks and bus stations impact on AQMA. Situation may be avoided through other collaborative means.	LA, Traffic enforcers	L	S - M
		Linked Policy		
		LTP3: TMP3		

Action: Introduce Fixed Penalty Notices for Stationary Idling

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	n/a	0	No taxi ranks or outdoor bus depot in AQMA

5.2.8 Action: Introducing Differential Parking Rates - Engines

These distinguish between vehicles of different engine sizes, or levels of pollutants emitted, with the costs of parking permits issued by Local Authority reflecting these. Smaller engines and environmentally friendly vehicles such as those that run on electricity are given preferential rates with largest engines paying more. Some schemes differentiate between vehicles by engine size, other by carbon dioxide emissions. Vehicles with lower CO₂ emissions tend to be those with smaller engines and therefore less fuel use and subsequently less air pollutant emissions but this may not always be the case. Some diesel vehicles may have lower CO₂ emissions but higher air pollutant emissions (LACORS, 2008).

Introducing differential parking rates at car park ticket machines linked to real time air quality information database directing traffic to outside park and ride services as an alternative to increased car parking costs during poor air quality events.

Action: Introducing Differential Parking Rates - Engines

Pros	Cons	Key Stakeholders	Cost	Time
Can help to improve air quality by encouraging use of more efficient and less polluting vehicles or alternative transportation.	May only have significant effect where LA provides parking permits for areas in vicinity of AQMA. Some diesel vehicles may have lower CO ₂ emissions but higher air pollutant emissions	LA, Traffic enforcers, LPA	L	S - M
		Linked Policy		
		LTP3: ITS4, ITS8, TMP1, TMP4		

Action: Introducing Differential Parking Rates - Engines

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	n/a	0	No chargeable residential parking facilities identified in vicinity of AQMA

5.2.9 Action: Introducing Differential Parking Rates – Air Quality Events

A potential solution is to link car park pricing at ticket machines to real time air quality information used in conjunction with out of town park and ride facilities. During anticipated poor air quality days or events, the car parking prices centred in town and city destinations could be increased remotely at the start of a chosen period e.g. day or week. Messages would then be relayed to drivers of increased costs via VMS e.g. matrix signs placed outside of the city prior to Park and Ride services and encouraging drivers to take advantage of reduced parking costs at those facilities.

This solution will clearly only be appropriate and have a benefit for town centre and city AQMAs where there are a number of car parks and either existing or potential for out of town Park and Ride facilities. Furthermore this solution requires further research into available technologies.

Action: Introducing Differential Parking Rates – Air Quality Events

Pros	Cons	Key Stakeholders	Cost	Time
Encourage modal shift to sustainable Park and Ride services	Research and potential development of technology required. Will require significant investment in infrastructure.	WCC, LA	NQ	M - L
Avoids potential detrimental impact on local economy from permanent increased car parking pricing		Linked Policy		
Reduces emissions in towns and cities during worst conditions leading to improvement in measured levels in AQMAs.		LA Climate Change, LTP3: AQ2-3, AQ5-6, DC4, IPT6, IPT8-10, ITS3, ITS5, ITS7-8, SCP6, SCP11, TCC1-2		
Reduction in emissions during worse conditions protects health of most vulnerable to AQ events and reduces hospital admissions.				

Action: Introducing Differential Parking Rates – Air Quality Events

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley		No	0	Limited amount of car parks or requirement for Park & Ride facility
Lickey End		Yes	3 - 4	Park and Ride is considered appropriate solution for Lickey End and there are a number of attractive low cost car parks within Bromsgrove Town Centre
Redditch Road		Review required	0 to 1	A southern Bromsgrove park and ride facility not considered major impact on Redditch Road
Worcester Road		Yes	2 - 3	A southern Bromsgrove park and ride facility considered to have a beneficial impact on Worcester Road AQMA and there are a number of attractive low cost car parks within Bromsgrove Town

				Centre. However reduced impact as much traffic is local destined for schools
Dolday		Yes	3 - 4	Two Park & Ride facilities already in place on east of City with more planned for west side of city. Several City centre car parks are destinations for drivers. Car park prices have been concern for local businesses.
Lowesmoor		Yes	2 - 3	Two Park & Ride facilities already in place on east of City and Lowesmoor is major bus route. Several City centre car parks are destinations for drivers. Impact may be lessened by highway alterations currently underway in Lowesmoor area.
Port Street		Limited	1	Evesham could potentially benefit from park and ride facilities. Impact on AQMA would depend on proximity of location around the town. Low cost car park nearby currently under utilised
Horsefair		Limited	1 - 2	Park and Ride attempts in the past have not proved financial viability or successful but are put in place for special events. A number of public car parks are easily available from Kidderminster Ring Road.
Welch Gate		Limited	1	Park and Ride attempts in the past have not proved financial viability or successful but are put in place for special events. A few car parks are currently available

5.2.10 Action: Installing Electric Vehicle Charging Points

Cars powered solely by electric and hybrid cars (cars that combine a battery with a conventional engine) have been around for a number of years now but only make up a small proportion of traffic on our roads. There are a number of factors why this is the case:

- Purchase and operating costs of vehicles
- Range of vehicles
- Availability of public electric charging points

There is an increased initial cost of these vehicles even with the government available 'Plug in Car Grant' of £5000 and their can be additional costs for leasing the battery. There are currently 32 hybrid and electric cars models on sale in the UK and these cost up to £10k more than a conventional family car (Which, 2012).

Electric powered only vehicles have a range of less than 100 miles before requiring a recharge making them unsuitable for long distance travel but they cost less to refuel. Hybrid cars offer a greater range utilising the battery at lower speeds making them more suitable for use as a main car.

To be of benefit to both drivers and in encouraging greater uptake of these vehicles, a local network of charging points is required, particularly given the limited range of battery powered only vehicles. At the time of printing it has been difficult to establish the exact number of publicly available charging points in Worcestershire as there are a number of different providers competing to present charging point location maps. However each district has at least between one and four charging points. There are a further number of sites accessible within the Birmingham area with potentially more in the future planned as part of the West Midlands Low Emissions Towns and Cities Programme. Across the UK there are

approximately 1500 charging points with a further 8500 planned with support of the UK government's 'Plugged in Places' initiatives.

At present WRS have not been able to establish any costs or timescales for implementation of charging points to determine how viable an option this will be. But it could be considered in conjunction with other options or forming part of a wider Lower Emissions Strategy.

Action: Installing Electric Vehicle Charging Points

Pros	Cons	Key Stakeholders	Cost	Time
Reduces emissions	Requires a network of charging points Additional initial costs to owners for vehicles	WCC, LA	NQ	S - VL
Reduce purchase cost grants available		Linked Policy		
Reduced running costs for car owners for fuel, vehicle duties and through other incentives		LA Climate Change, LTP3: A1, AQ3, AQ5-7, DC1		

Action: Installing Electric Vehicle Charging Points

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	RR10, RR11, WR13, WR14, DD12, LRH9	Review required	NQ	Depend on outcomes of cost benefit analysis and uptake of ultra-low emission vehicles

5.2.11 Action: Roadside Emission Testing

Under the Roadside Vehicle Emissions (Fixed Penalty) Regulations 2002, Local Authorities are able to undertake roadside emission testing of vehicles. The aim is to identify those vehicles that make a disproportionate contribution to emissions though poor maintenance with on the spot fines for those that fail. Wide scale emission testing will ensure more highly polluting vehicles can be identified. Clearly such an action requires a large amount of resources, personnel and equipment, to police a sufficiently large vehicle testing programme. Success also relies on an element of enforcement officers being in the right place at the right time to catch offending vehicles in the act. The number of offending vehicles is likely to be low proportion of traffic. However undertaking one off roadside events may be beneficial in raising awareness of Air Quality work and AQMA issues rather than enforcement actions.

Action: Roadside Emission Testing

Pros	Cons	Key Stakeholders	Cost	Time
Targets worse polluting vehicles	Large amount of resource required to make worthwhile	WCC, HA, LA, Traffic enforcers, Police	NQ	NQ
Creates revenue to put back into other air quality mitigating programs	High costs			
Advertisement of practice could act as deterrent to	Requires being in right place at right time			

owners to use polluting vehicles	May result in further congestion and subsequently emissions at time of testing As emissions testing is part of MOT Number of vehicles identified likely to be relatively low Certain road conditions required to enable this to be undertaken safely and effectively.	Linked Policy		
		LTP3: TMP3		

Action: Roadside Emission Testing

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	RR10, RR11, WR13, WR14, DD12, LRH9	Yes	0	For all the reasons stated above

5.2.12 Action: Signage identifying AQMA

This action would involve the design and erection of signs at various locations within or adjacent to an AQMA to alert drivers to the presence of the AQMA and encourage behavioural change e.g. reduce vehicle idling. This is an action which has been considered or promoted by some local authorities in the UK.

However there are a number of potential issues with this approach. Firstly no evidence or guidance has been found that this approach will have a significant reducing effect on pollutant levels. It relies on voluntary action by drivers concerning themselves with air quality issues to amend behaviour or altering journey at the point of entering AQMA. It is less likely to be effective where drivers are travelling from outside the local area i.e. where AQMA is a through route.

Additionally local residents may perceive that highlighting the presence of the AQMA results in 'blighting' the value of their properties. This action not only risks alienating that community but also potentially encourages legal challenges against the Local Authority.

Thus before taking such action the residents of an AQMA should be consulted for their views and permission to undertake this option. And, as previously stated, WRS at this time would be unable to provide any specific evidence to those residents that this action will have desired effect in reducing emission levels.

Action: Signage identifying AQMA

Pros	Cons	Key Stakeholders	Cost	Time
Encourage behavioural change to reduce emissions	No evidence has desirable impact	WCC, LA, Local residents	L	S
	Relies on voluntary action of drivers	Linked Policy		

	Perception of blighting properties	LTP3: AQ1, AQ3, AQ5		
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Action: Signage identifying AQMA

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Yes	0	Unlikely to have a measurable impact on reducing levels

5.2.13 Action: Tree Planting

There is a general perception that planting trees benefits air quality. The available guidance from Defra on the effectiveness of tree planting schemes in reducing air quality pollutants in AQMAs has been reviewed. The beneficial impacts of reducing some pollutants such as carbon dioxide, ozone and particulate matter and other social community benefits are relatively well documented. However, no definitive evidence has been identified that tree planting within AQMAs has a significant impact in reducing levels of NO₂, the key pollutant of concern within this AQAP.

The review of available information determined a number of additional issues with this potential solution:

- Trees can emit gases known as volatile organic compounds VOCs which, in combination with NO_x, can contribute to the production of other pollutants, especially ozone and particles.
- The removal of pollutants by trees is a local effect, whereas the formation of pollutants from compounds emitted by trees happens downwind of the trees themselves.
- Trees can have an adverse effect by suppressing the mixing of air between a street canyon and the wider atmosphere through a process called “fumigation”.
- Where street level emissions are high, i.e. AQMAs, tree planting should be used with utmost caution. Specific combinations of tree species, canopy volume, geometry, wind speed and direction must be modeled on a case by case basis. As this is beyond typical models used in air quality this is likely to require a highly specialist consultant to undertake such modeling.
- No available Defra document covered this subject or provides any guidance.
- Most Local Authority AQAPs provided by Defra as examples of best practice did not shortlist this solution for further action.

Costs would depend on number of trees to be planted.

Action: Tree Planting

Pros	Cons	Key Stakeholders	Cost	Time
<p>Green infrastructure improves visual perspective of urban environment</p> <p>Creates shade and cooling effect</p> <p>Benefit in reducing some other pollutants and CO2</p>	<p>No evidence provides reduction in NO₂ levels</p> <p>Has an adverse effect on other pollutant levels</p> <p>Not appropriate in street canyons</p> <p>Unique modelling required to ascertain if any benefit</p> <p>Long time to wait till trees reach potentially most effective mature stage (approx. 20 years)</p> <p>On-going maintenance costs and potential ownership issues</p> <p>Introduction of fatal accident hazard along roadside</p> <p>Requires large space to plant large areas of trees required to remove significant levels of ambient pollution</p> <p>Risk of subsidence to local properties</p>	WCC, LA,	L – M	L - VL
		Linked Policy		

Action: Tree Planting

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	None	Limited	-1 to 0	Not desirable along AQMA as could create street canyon effect by reducing air flow and creating fumigation. Space available on gyratory at bottom of AQMA but would reduce driver vision and introduce hazard. Also upwind of majority of road source thus anticipated limited effect, possibly worsen air quality for receptors downwind.
Lickey End	None	Limited	-1 to 1	Space available on gyratory but would reduce vision of drivers and introduce driver hazard. At centre of receptors thus upwind may benefit in long term but worsen air quality downwind.
Redditch Road	None	Possible	-1 to 0	Possible to plant in open areas south of Redditch Road but receptors

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
				downwind, possibly worsen air quality
Worcester Road	None	No	-1	Street canyon
Dolday	None	No	-1	Street canyon
Lowesmoor	None	No	-1	Street canyon
Port Street	None	No	-1	Street canyon
Horsefair	None	No	-1	Street canyon
Welch Gate	None	No	-1	Street canyon

5.3 Promotion of Alternatives (Smarter Choices)

Also known as Smarter Choices or 'soft' measures, these are actions which stimulate and encourage modal shift to sustainable transport options, through intensive marketing and information dissemination.

Actions discussed in this section are as follows:

- Travel Planning (5.3.1)
- Encourage car sharing (5.3.2)
- Promote Teleconferencing facilities and encourage uptake (5.3.3)
- Promote flexible working arrangements (5.3.4)
- Workplace charging schemes (5.3.5)
- Improve cycling and walking routes in local areas (5.3.6)
- Install secure cycle parking shelters (5.3.7)
- Promote and support walking and cycling initiatives (5.3.8)
- Smarter choices – 'Choose How You Move - Worcestershire' (5.3.9)

5.3.1 Action: Travel Planning

A Travel Plan is a package of measures, initiatives and targets tailored to enable an organisation to reduce its impact from travel and transport on the environment. Travel plans encourage changes in travel behaviour and reductions in single occupancy car journeys, leading to reduced congestion and emissions.

Travel plans have been widely adopted across the UK and have been shown to be cost-effective at reducing car usage in numerous situations. As a result, the adoption of Travel Plans is now widely promoted by the UK Government. There are a number of types of travel plans that differ based on the type of organisation: Councils, Schools, Workplace and Residential Travel Plans.

Most local authorities have been proactive in the development of Travel Plans for their own employees, and by providing guidance and support to schools, businesses and organisations in relation to the design and implementation of successful Travel Plans.

Council and Workplace Travel Plans are a package of measures produced by employers to encourage staff to use alternatives to single occupancy car-use. Such plans typically recognise that one solution is unlikely to be suitable for everyone and may include:

- A reduction in the number of single occupancy car journeys to work aim
- An increase in the use of more sustainable forms of travel to work
- A reduction in the amount of travel undertaken at work (e.g. Tele and video conferencing)
- Car-share to work schemes with designated parking;
- The development and implementation of Car Park Management Guidelines e.g. revising allocation of parking spaces or restricting their use;
- Enhancing facilities for passenger transport users (such as negotiated season ticket prices or free fare schemes, new or improved bus stop infrastructure, new or improved bus services and improved access to rail stations and services, for example)
- The support and promotion and enhancing facilities for cycling and walking e.g. provision of secure cycle store, discounts for purchasing bicycle schemes, lockers, showers and pedestrian/cycle paths;
- A dedicated bus service

- Reducing the need of staff to travel (e.g. flexible working arrangements such as remote access)

Employer/workplace travel plans can offer real benefits not only to the organisation and its employees, but also the community that surrounds it. It may help to relieve local parking or congestion problems or improve public transport connections across the area. It may also relieve stress on employees through reducing delays or providing the opportunity to cut their travel commitments by working from home on occasion. They can also be applied to new commercial/industrial developments that meet certain criteria i.e. greater than 2500m² office area or number of employees or car parking spaces.

'There are 35 active Workplace Travel Plans in the County, including some of the major employers such as the NHS Worcestershire Royal Hospital and QinetiQ. Bosch Thermotechnology Ltd is currently updating their Workplace Travel Plan with the assistance of Worcestershire County Council.' (WCC, 2011i)

School Travel Plans represent a commitment from schools to develop a package of measures aimed at encouraging healthier, safer and more environmentally friendly methods of travelling to and from school by parents, pupils and staff. They can be particularly effective in reducing emissions in AQMAs with lots of schools nearby.

Some UK councils have employed School Travel Plan Coordinators to assist teachers, pupils and parents in the development and implementation of Travel Plans, together with promoting health and environmental benefits of alternative travel choices. The Travel Coordinators provide guidance, and where appropriate, help establish a link between schools and other stakeholders. The Plans incorporate established programmes such as 'Safer Routes to School' and 'Active School Travel' but also aim to initiate a change in transport culture through education and encouraging change through initiatives like walking buses.

WCC are already proactive in encouraging uptake of School Travel Plans having developed documents and guidance for schools to develop their own plans available to download from dedicated webpages.

A number of local planning authorities require and support residential travel planning which involves the production of a travel plan for new (or existing) residential developments. 'Essentially, a Residential Travel Plan is a package of measures designed to reduce car use originating from new housing by supporting sustainable alternative modes of transport, and reducing the need to travel in the first place. As a result, Residential Travel Plans are focused on journeys made from one base location to a number of destinations and may include provisions for measures such as:

- Car Clubs;
- Car sharing schemes;
- Cycle stands, cycle lanes and cycle training;
- Bicycle user groups;
- Public transport information and marketing;
- High quality bus services;

WCC's Development Control team require all new developments of greater than 70 dwellings to produce a Residential Travel Plan. It is the developer's responsibility to set up the Residential Travel Plan and provide or procure a travel plan coordinator throughout the intended period of its operation.' (WCC, 2011i)

'Station Travel Plans are aimed at encouraging rail users to access their local station using sustainable modes, whilst also seeking to encourage greater use of rail travel. A Station Travel Plan is developed in partnership with the Train Operating Company that owns the station and key stakeholders to deliver against the objectives mentioned above. Station Travel Plans can bring about enhancements to the station to improve facilities, such as secure cycle parking, car sharing initiatives and improved bus and taxi facilities and information at stations.

Online Travel Plan Builder - Worcestershire County Council has developed a web-based Workplace Travel Plan Builder to allow organisations to create and maintain travel plans online, replacing paper based documents and reducing associated administration costs. It is intended that. It is proposed that this online tool will be extended to Station Travel Plans, Residential Travel Plans and School Travel Plans. ' (WCC, 2011i)

A comprehensive list of benefits of Travel Plans are outlined in LTP3: Smarter Choices Policy (WCC, 2011i) accessible at:

http://www.worcestershire.gov.uk/cms/pdf/LTP3_SCP_PUBLIC_FINAL.pdf

It is proposed that WRS will facilitate the Steering group in seeking to promote greater take up of Travel Plans in Worcestershire via:

- Review existing Council Travel Plans to ascertain best practice and work with WCC to promote Travel Plans and encourage take-up of voluntary travel plans among Worcestershire employers
- Work with WCC and local schools near AQMAs to implement School Travel Plans
- Support and promote to LPAs to require Residential and Employment Travel Plans for large developments, for developments that will generate a large amount of travel, or for development that may cause local traffic problems such as unacceptable congestion or off-site parking problems. (All new developments of greater than 70 dwellings are expected to produce a Residential Travel Plan by WCC's Development Control Team (WCC, 2011i)).

Action: Travel Planning

Pros	Cons	Key Stakeholders	Cost	Time
Reduce traffic congestion and pollution, including greenhouse gas emissions, as part of an integrated transport strategy	Impact depends on voluntary uptake by external organisations	WCC, LPAs, WRS	L	S - L
LAs and WRS leading by example		Linked Policy		
For businesses: recruit and retain staff more effectively, save money on car parking spaces and business travel, promote a more environmentally friendly corporate image		LA Climate Change; LTP3: A1, AQ1, AQ3, AQ5-7, C10, C14, DC1, DC10-11, SCP11-17, SMT2, SMT6, TCC4		

Action: Travel Planning

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	KR3, KR4, LE2, LE5, RR8, RR10, RR11, WR5, WR9, WR13, WR14, DD4, DD9, DD12, LRH1, LRH3, LRH9, HF3, HF6, WG2, WG9	Yes	1 - 5	Impact depends on uptake but could have significant impact on all AQMAs. Requirement to consider key employers affecting the AQMA's.

5.3.2 Action: Encourage car-sharing

Car sharing is when two or more people share a car and travel together. One of the people travelling is usually the owner of the vehicle and the other(s) usually make a contribution towards fuel costs. It allows people to benefit from the convenience of the car, whilst alleviating the associated problems of congestion and pollution, car parking requirements and costs of travel for individuals who participate. It also retains the usefulness of car travel for those for whom walking, cycling or passenger transport may not be an appropriate or viable option.

There are many socio-economic advantages for public including lower travel costs for drivers and passengers: 'travelling with others can reduce transport costs by up to £1000 a year' (LACORS, 2008). It gives employees and employers more transport options which can be included as part of Business Travel Plans.

WCC already operate a Car Share Database at www.worcshirecarshare.org.uk which currently has 1450 members and 23 businesses. The database could be promoted via the WRS website and in conjunction with other options e.g. raising awareness of air quality campaigns and other strategies such as Business Travel Plans for new developments.

Action: Encourage car-sharing

Pros	Cons	Key Stakeholders	Cost	Time
Fewer cars on road reducing congestion, parking issues and emissions	Requires significant behavioural change – people are very 'attached' to their cars	WCC, LA, LPA, WRS	L	S
Reduces need for car ownership		Linked Policy		
Lowers travel costs for drivers and passengers		LTP3: A3, AQ7, TCC2		

Action: Encourage car-sharing

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	KR3, LE2, RR10, RR11, WR13, WR14, DD12, LRH1, LRH9, HF3, WG2	Yes	1 - 4	Impact depends on amount of take up. Requirement to consider key employers affecting AQMA's.

5.3.3 Action: Promote Teleconferencing facilities and encourage uptake

A teleconference or teleseminar is the live exchange of information among several persons and machines remote from one another but linked by a telecommunications system. Audio teleconferencing involves no more complicated machinery than office or home telephone but videoconferencing and web-conferencing are also widely available via the internet. In addition to tailored tools for business to facilitate teleconferencing there are many free services and software available also.

Teleconferencing offers huge savings to business through saved hours travelling to meetings, fuel, vehicle hire or company car purchase and maintenance and accommodation removing the need to travel at all. There are additional benefits for employees through improved moral, health and wellbeing, due to reduced travelling sitting in fixed position for long periods, overnight stays away from home and avoiding frustration or stress due to congestion.

This option can be included as part of employer travel plans, as discussed above, or as a standalone action. Details of best practice from review of Councils Travel Plans and links to free services could be promoted on WRS air quality webpages.

Action: Promote Teleconferencing facilities and encourage uptake

Pros	Cons	Key Stakeholders	Cost	Time
<p>Reduces car journeys</p> <p>Cost savings to employers on fuel, car hire, company cars & maintenance, car mileage allowances, overnight accommodation</p> <p>Health benefits to employees through removal of travel stress and improved work life balance</p>	Do not have one to one contact with clients	WRS, WCC, LPAs	L	S
	Networking opportunities lost			
	Some messages require demonstrating to live audience			
	Message can be misunderstood due to lack of visual communication	LA Climate Change; LTP3: SCP11-17, TCC4		

Action: Promote Teleconferencing facilities and encourage uptake

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	KR3, RR10, RR11, WR13, WR14, DD12, LRH1, LRH9, HF3, WG2	Yes	1 - 4	Impact depends on take up. Requirement to identify Businesses that would benefit from this and have an effect in AQMA

5.3.4 Action: Promote flexible working arrangements

These are types of working arrangement which give some degree of flexibility regarding how long, where and when employees work. The flexibility can be in terms of time, location and the pattern of working.

Types of flexible working that could provide air quality benefit through reduced travel to workplaces are:

- Working from home – some or all working days per week
- Part time - Working less than full-time hours (usually by working fewer days).
- Compressed hours - Working full-time hours but over fewer days.

All of the above flexible arrangements reduce the number of journeys taken during the working week. They provide cost saving benefits for employees through saved fuel, car maintenance or ownership and parking. Due to work-life balance employees moral, health and wellbeing improves from reduced travel stress and increased time at home.

Working from home arrangements also provides cost savings and benefits to employers through:

- additional hours gained from employees reduced journey time
- additional hours gained from employees potentially working from home when ill
- elimination of lost working days due to poor weather preventing employees travelling to workplace
- reduction in desk furniture required
- reduction in office floor space required
- reduction in car parking spaces required
- reduction in company cars and maintenance
- increased staff moral

Working from home arrangements may not be suitable for all industry and commercial practices and roles. There can be initial costs for some equipment for employee at home e.g. computer, phone, desk, chair depending on requirements and clearly IT network needs to be able to support remote working.

Many large employers including Local Authorities already have flexible working arrangements in place although not all will include working from home practices. Local businesses could be encouraged to consider these measures within employer travel plans, as discussed above, or as a standalone action. Details of best practice from review of Council's Travel Plans and policies and links to external companies that can assist could be promoted on WRS air quality webpages.

Action: Promote flexible working arrangements

Pros	Cons	Key Stakeholders	Cost	Time
LAs leading the way	Requires cultural change in many businesses as element of trust required for WFH	WRS, WCC, LPA	L	S - VL
Travel cost savings to employees and improved work-life balance	Network connections, appropriate space & equipment required for working from home	Linked Policy		
Cost savings to employers in terms of employees hours gained and infrastructure savings	Additional fuel costs to employee through heating etc.	LA Climate Change; LTP3: TCC4		

Action: Promote flexible working arrangements

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	KR3, RR10, RR11, WR13, WR14, DD4, DD12, LRH1, LRH9, HF3, WG2	Yes	1 - 5	Impact depends on take up. Key businesses need to be identified.

5.3.5 Action: Workplace parking charging schemes

These are schemes where employees are charged to use their workplace car park provision and are intended to discourage reliance on single occupant car journeys to work and encourage uptake of more sustainable modes of transport e.g. walking, cycling, public transport and car sharing.

The employer will need to set up and operate a system for enforcing the scheme e.g. through issue of permits to those wishing to pay for provision and verifying offenders who have not made contributions.

Workplace charging schemes are voluntary actions by employers but could be promoted as part of Employer Travel Plans and other air quality promotional campaigns and material. But there are advantages to be gained for the employer by a reduction in land for car parking spaces required or freeing up spaces making more attractive for visitors to the business. Clearly the success relies on the availability and efficiency of more sustainable forms of travel and could be promoted in conjunction with a number of other options: for example, Council car parking pricing and provision, Park & Ride schemes, HOV and priority bus lanes, working from home initiatives and as part of Employer Travel Plans.

Such schemes are unlikely to be popular in times of economic austerity, but in locations where parking is already at a premium may be more acceptable.

Action: Workplace parking charging schemes

Pros	Cons	Key Stakeholders	Cost	Time
Disincentive to use vehicle to travel to work reduces vehicle trips Reduces congestion and emissions Increase uptake in journeys via more sustainable transport	Unpopular increased costs to employees	LA, LPA, Businesses	L	M - VL
	Penalise staff that live further afield from workplace			
	Effect on businesses from lower staff morale, compromise service provision and staff retention	Linked Policy		
	Requires investment in provision of alternatives e.g. Park & Ride facilities, electric charging points	LTP3: AQ7		
	Set up and operational			

	costs of enforcing scheme, verifying offenders and permitted vehicles			
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Action: Workplace parking charging schemes

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	KR3, RR10, RR11, WR13, WR14, DD4, DD12, LRH1, LRH9, HF3, WG2	Yes	1 - 3	Impact depends on voluntary take up and unlikely to be as popular as other initiatives

5.3.6 Action: Improve cycling and walking routes in local areas.

Establish comprehensive walking and cycling networks complementing existing routes focused on main urban centres and main transport corridors and integrate with local public transport hubs. Includes new footpaths, cycle paths and crossings. Some initiatives are outlined in LTP3. Available routes could be promoted through production of walking and cycling maps of local areas. This should also be a consideration and applied to any new substantial developments and business travel plans within the planning regime.

This measure makes changing travel behaviour and mode of transport more attractive. In addition to reducing the number of car journeys and therefore emissions, this initiative also provides health benefits to individuals who participate in a permanent change and meets the requirements of Local Authority health policies. This also supports the local economy through the purchases of bikes and accessories. Maximum benefit would be achievable through combining with associated actions such as introducing more secure cycle stores in local destinations, promotion of cycling and walking initiatives and uptake of employer 'bike to work' schemes..

Action: Improve cycling and walking routes in local areas

Pros	Cons	Key Stakeholders	Cost	Time
Successful implementation encourages uptake of sustainable travel Reduce congestion Health benefits and fuel cost savings for individuals	Potentially benefits wider area but limited effect within AQMAs Limited capacity to input in narrow streets Could be expensive and long term before completed Potential lack of facilities at workplaces for employees Also requires provision of secure parking for bikes	WCC, LPA, Health promoters Linked Policy LTP3: A1, A3, A4, AQ3, AQ5-7, C1-6, C8, DC1, DC9, DC11, SMT6, TCC4, W1-2, W5, W10	NQ	S - VL

Action: Improve cycling and walking routes in local areas

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	KR3,	Possible routes within AQMA	0 - 1	Majority of traffic through AQMA is trans boundary improving local routes may have limited effect on AQMA. New ADR development will include cycling and walking enhancements to gyratory but not due completion until 2022.
Lickey End	None	Yes	1 - 3	Forecast benefits are dependent on amount of take-up and implementation as part of combined strategy with other associated actions. Increasing beneficial effect where there is a number of AQMAs in close proximity and economies of scales can be achieved through implementation e.g. Bromsgrove
Redditch Road	RR10, RR11,	Yes		
Worcester Road	WR13, WR14,	No – street canyon		
Dolday	DD4, DD12,	Need WCC study	1 - 3	Forecast benefits are dependent on amount of take-up and implementation as part of combined strategy with other associated actions. Increasing beneficial effect where there is a number of AQMAs in close proximity and economies of scales can be achieved through implementation e.g. Worcester City
Lowesmoor	LRH1, LRH9,	No – street canyon		
Port Street	None	No – street canyon	0 - 2	Narrow carriageway excludes significant improvements to cycling and walking route through AQMA unless a one way system or pedestrianisation action is adopted in combination. Potential benefit if adopted in wider Evesham area
Horsefair	HF3,	No – street canyon	0 - 1	Narrow carriageway excludes significant improvements to cycling and walking route through AQMA unless a one way system or pedestrianisation action is adopted in combination.
Welch Gate	WG2	No – street canyon	0 - 1	Narrow carriageway excludes significant improvements to cycling and walking route through AQMA unless a one way system or pedestrianisation action is adopted in combination. Potential benefit if adopted in wider Bewdley area

5.3.7 Action: Install secure cycle parking shelters

Providing secure cycle parking stores in local destinations makes changing travel behaviour and mode of transport more attractive. In addition to reducing the number of car journeys and therefore emissions, this initiative also provides health benefits to individuals who participate in a permanent change. Some initiatives are outlined in LTP3 such as installing secure cycling stores at railway stations but more benefit could be achieved by expanding to other destinations such as car parks around town centres, local employment, education and leisure facilities and any new large residential developments. The maximum benefit would be

achievable through combining this with associated actions such as improving the cycle network into those locations and the promotion of cycling initiatives.

'Recent surveys have shown that demand to cycle in Worcestershire is constrained by a lack of secure cycle parking. Worcestershire County Council has set out its policy for cycle parking in the LTP3 Cycle Policy.' (WCC,2011m)

Action: Install secure cycle parking shelters

Pros	Cons	Key Stakeholders	Cost	Time
Successful implementation results in uptake of sustainable travel Reduce congestion Health benefits and fuel cost savings for individuals	Potentially benefits wider area but limited effect within AQMAs	WCC, LPA	NQ	S - VL
	Could be expensive depending on number required in final design	Linked Policy		
	Space required for installation Concern for safety of cyclists without additional network improvements	LTP3: A1, AQ3, AQ5-7, C7, DC1, DC5, SMT6, TCC4		

Action: Install secure cycle parking shelters

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	KR3,	No - Not a specific destination	0 - 1	Majority of traffic through AQMA is trans boundary installing in town centre likely will have limited effect on AQMA.
Lickey End	None	No - Not a specific destination	1 - 3	Forecast benefits are dependent on amount of take-up and implementation as part of combined strategy with other associated actions. Increasing beneficial effect where there is a number of AQMAs in close proximity and economies of scales can be achieved through implementation e.g. Bromsgrove
Redditch Road	RR10, RR11,	No - Not a specific destination		
Worcester Road	WR13, WR14,	Yes – Market St car park		
Dolday	DD4, DD12,	Yes within Newport St car park	1 - 3	Forecast benefits are dependent on amount of installations and implementation as part of combined strategy with other associated actions. Increasing beneficial effect where there is a number of AQMAs in close proximity and economies of scales can be achieved through implementation e.g. Worcester City
Lowesmoor	LRH1, LRH9,	Within St Martins Gate		
Port Street	None	No – street canyon	0 - 2	Narrow carriageway excludes installation in AQMA unless a one way system or pedestrianisation action is adopted in combination. Potential benefit if installed in Evesham town centre depending on number of installations

Horsefair	HF3,	No – street canyon	0 - 1	Narrow carriageway excludes installation in AQMA unless a one way system or pedestrianisation action is adopted in combination. Potential benefit if installed in Kidderminster town centre depending on number of installations
Welch Gate	WG2	No – street canyon	1 - 2	Narrow carriageway excludes installation in AQMA unless a one way system or pedestrianisation action is adopted in combination. Potential benefit if installed in Bewdley town centre depending on number of installations

5.3.8 Action: Promote and support walking and cycling initiatives in Worcestershire

There are many national and local initiatives encouraging the health benefits of cycling and walking that clearly also have a potential benefit for local air quality such as:

National Bike Week, Choose How You Move Halfords cycle race, Walk to school week, employee loan schemes for bike purchases, company cycle usage mileage schemes.

Such initiatives should be supported and encouraged through local advertising, production of cycle and walking maps, providing details or links on WRS air quality webpages, Worcestershire Works Well organisation, Choose How You Move initiatives and working with local businesses to include as part of employer travel plans.

'Worcestershire Cycle Loan Scheme - was established in 2008, which enables any resident in Worcestershire (over the age of 18 years) to borrow a bike for a period of 6 months. A fleet of bicycles and tandems were purchased and fitted with cycle computers to monitor mileage. All bicycles have been security coded by the Police. The key aim of this scheme was to encourage residents to try cycling for key journeys, such as to work. To date nearly 400 loans to new customers have taken place and there are currently 171 bikes on loan (89 to men, and 82 to women).' (WCC, 2011i)

Additionally, new businesses moving into area could be encouraged to take up initiatives as part of Employer Travel Plans via planning process.

More benefit gained by integrating option with others as part strategy to develop cycling into a realistic choice as a method of transport and Worcestershire as a cycle friendly destination.

Action: Promote and support walking and cycling initiatives in Worcestershire

Pros	Cons	Key Stakeholders	Cost	Time
Encourages uptake of sustainable travel	Potentially benefits wider area but limited effect within AQMAs	WCC, LPA. Health promoters	L	S - VL
Reduce congestion	Concern for safety of cyclists and walkers without additional network improvements	Linked Policy LTP3: A4, AQ3, AQ5-7, C1-14, DC1, DC5, SMT3,		
Health benefits and fuel cost savings for individuals	Resource implications in			

	supporting and promoting a range of initiatives.	SMT6, TCC2, W1, W4-5		
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Action: Promote and support walking and cycling initiatives in Worcestershire

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	KR3, RR10, RR11, WR13, WR14, DD4, DD12, LRH1, LRH9, HF3, WG2	Yes	0 - 2	Forecast benefits are dependent on amount of take-up and implementation as part of combined strategy with other associated actions. Increasing beneficial effect where there are a number of AQMAs in close proximity . key local employers could be encouraged to take up 'Bike to Work schemes' where have an effect on AQMA

5.3.9 Action: Smarter Choices – ‘Choose how you move - Worcestershire’

‘The term "Smarter Choices", put simply, refers to the use of marketing and information measures which seek to encourage and enable the use of sustainable travel modes, and typically include workplace, school, residential, community and personal travel planning, car sharing initiatives, car clubs, improved information provision, and innovative marketing, media and awareness-raising campaigns.’ (WCC, 2011i)

The aim is to encourage ‘modal shift’ from car based trips to more sustainable travel such as walking, cycling and public transport through a combination of tailored travel advice, information and incentives. The process and delivery of travel planning is central to the delivery of Smarter Choices (WCC, 2011i).

WCC identify this action within LTP3 and currently support ‘Choose how you move - Redditch’, a three-year programme which encourages people in the borough to travel more sustainably. With the help of funding by the Department for Transport, the Choose team produce a range of events, information material and personal travel plans as a means of engaging as many people as possible, increasing their knowledge and appreciation of the benefits of sustainable travel.

The programme includes an Individual Travel Marketing campaign, periodic reprinting of walking/cycling and passenger transport maps and a programme of Travel Plan development for Employers and Organisations. ITM is a technique using personal telephone contact with households to identify those willing to make changes, before providing them with tailor made information on alternatives and incentives.

It follows on from success of the previous Worcester Choose How You Move Project which is recognised nationally as representing smarter choices best practice.

It is proposed that WRS will facilitate the Steering Group in providing support and promotion of Smarter Choices particularly in districts with AQMAs.

Action: Smarter Choices – ‘Choose how you move - Worcestershire’

Pros	Cons	Key Stakeholders	Cost	Time
Reduces emissions via reducing amount of car journeys. Promotes healthier alternatives Supports charities work such as Sustrans	Use of telemarketing may deter people from participating. Relies on individuals making behavioural change. Needs to be used in conjunction with other action e.g. improvements to cycle and pedestrian facilities	WCC, WRS	NQ	M - VL
		Linked Policy		
		LA Climate Change; LTP3: A1, A3-5, C1, C11, DC1, DC5, ITP2-13, ITP15, ITS8, SCP1-6, SCP10-11, SCP20-21, SMT5, SMT7, TCC2, TCC4		

Action: Smarter Choices – ‘Choose how you move - Worcestershire’

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	More info required	0	WCC LTP3 currently concentrating on Redditch where no AQMAs, Worcester City programme complete. Increased impact depends on funding availability

5.3.10 Action: Car Clubs

Car clubs offer an alternative to private car ownership. A car club provides its members with quick and easy access to a car for short term hire. Members can make use of car club vehicles as and when they need them, for as little as half-an-hour at a time. A car can usually be booked by telephone or internet, up to an hour before it's needed. Unlike conventional car hire companies, car club cars are not parked at one central location but are usually located singly in designated bays in urban and suburban streets – near to where the users need them. Car clubs can also be a workplace or a residential development club. Car clubs can achieve a significant reduction in the number of car miles driven, through changes in travel behaviour and in the number of cars on the road. In the UK, former car owners increase their use of non-car transport modes by 40% after joining a car club (LaCors, 2008).

While car clubs are designed to be self-financing, they may need start up funding in the initial period. Local Authorities (including WCC) may be required to provide funding which can give a project credibility and release funding from other sources.

Currently the only car club WRS have identified in Worcestershire is in Malvern with another club in nearby Colwall, Herefordshire. It is proposed that WRS will facilitate the Steering Group working with Local Authorities and WCC to promote and establish car clubs in conjunction with local communities and groups in areas where opportunities or a desire to form a club is identified. This action could form part of a wider Low Emissions Strategy and or be promoted via WRS and WCC websites.

Advice on setting up car clubs can be found at Carplus, a Non Government Organisation (NGO) supporting the development of affordable accessible and low-carbon shared mobility. Carplus have produced a number Best Practice Guidance documents which can be found and downloaded from www.carplus.org.uk.

Action: Car Clubs

Pros	Cons	Key Stakeholders	Cost	Time
<p>Reduces emissions via reduced congestion.</p> <p>Encourages modal shift to other sustainable transport and less reliance on car ownership.</p> <p>Substantial savings for members on reduction in Vehicle Licence, MOT and services</p> <p>Can reduce parking requirements in cities due to reduction in cars</p>	<p>Relies on private enterprise to organise and continually run</p>	<p>LA, WCC, WRS</p> <p>Linked Policy</p> <p>LA Climate Change; LTP3: A5, AQ3, AQ5-6, DC1, DC10, SCP6, SCP11-12, SCP16, SCP21, TCC1-2, TCC4</p>	L	S - M

Action: Car Clubs

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Yes	0 - 2	Impact depends on take up. Identify any particular community with a significant impact on an AQMA.

5.4 Education & Information Actions

These are a broad range of actions designed to inform the general public on local air quality issues and/or encourage individuals to effect behavioural changes that could benefit local air quality.

Actions discussed in this section are as follows:

- Smarter driving tips (5.4.1)
- Provide link to real time air quality information (5.4.2)
- Establish an Air Quality Alert System (5.4.3)
- Make air quality information more available and accessible (5.4.4)
- Raise the profile and increase awareness of air quality within the region (5.4.5)

5.4.1 Action: Smarter Driving Tips

Smarter driving (or eco-driving) is the adoption of environmentally conscious driving techniques and optimal vehicle operation. Factors to consider include driving behaviour, tyre type and pressure, and speed management. (LACORS 2008)

Many motorists waste money because of the way they drive or the way they use and maintain their car. Simply offering advice to motorists could help them change the way they behave and reduce their motoring costs whilst also reducing emissions of air pollutants. Smarter Driving Tips and information on local providers could be added to WRS Air Quality webpages.

Local Authorities can take the lead by providing eco-driving courses for employees. Employers can be encouraged to include courses as part of their Travel Plans via planning regime and targeting car fleet managers, professional drivers from local businesses.

Action: Smarter Driving Tips

Pros	Cons	Key Stakeholders	Cost	Time
Lower emissions of air pollutants and greenhouse gases. Lower motoring costs for drivers.	Relies on individuals making behavioural change.	WCC, LAs, WRS Linked Policy LTP3: AQ7, C12, F8, TCC1	L	S

Action: Smarter Driving Tips

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Yes	1	Does not actually reduce car journeys made

5.4.2 Action: Provide link to real time air quality information

There are some websites that have information on air quality updated on a daily basis. This provides free information about air pollution and related health advice to those with medical conditions that are proved or believed to be exacerbated by poor air quality such as asthma, emphysema, bronchitis, heart disease or angina.

Following some research into most appropriate website(s) available a link could be provided on Air Quality pages of WRS website, and potentially also accessible via social networking sites. This would be a relatively quick and simple solution to action. However, accessibility would depend on persons having access to computers and internet.

The possibility of displaying via other public displays, such as in street Variable Messaging Systems or at Doctors surgeries, could be explored but will involve additional partnership working and be considerably more expensive and a longer timeframe before delivered. Similarly care home providers could be advised of AQMA's and encourage placement of vulnerable individuals (i.e. with respiratory illness or disability) away from poor air quality areas e.g. John Gwyn House in Dolday AQMA.

Action: Provide link to real time air quality information

Pros	Cons	Key Stakeholders	Cost	Time
Empowers people most affected by poor air quality to change their behaviour and reduce impact of pollution on their health.	Has no impact on reducing pollutant levels	WRS, Public Health bodies, WCC, LA	L	S
	Relies on individuals making behavioural change.	Linked Policy		
Raises profile of air quality issues and encourages change in travel choices.	Requires internet access	LTP3: ITS4, ITS8		

Action: Provide link to real time air quality information

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Yes	0	Has no effect on pollution levels

5.4.3 Action: Establish an Air Quality Alert System

Air quality alerts provide free information about air pollution and related health advice to those individuals with medical conditions that are proved or believed to be exacerbated by poor air quality such as asthma, emphysema, bronchitis, heart disease or angina. These alert systems are not intended to help mitigate existing air quality effects but helps raise profile of air quality and reduce hospital admissions and NHS costs.

Subscribers receive a text message to their mobile phone, a recorded voice message to their home phone or an email the evening before or the morning of an expected air pollution episode.

Costs of establishing system depend on a number of variables including:

- Availability and format of an emissions inventory
- Size of area to be covered
- Number of local authorities involved
- Whether low or high resolution forecasts are required
- Whether the SMS, voicemail and email alert system is required

Costs are indicated as £5 – 20k to set up and operate 1st yr. and £3 to £10k per year thereafter from other experiences in UK (LACORS 2008).

Action: Establish an Air Quality Alert System

Pros	Cons	Key Stakeholders	Cost	Time
Empowers people most affected by poor air quality to change their behaviour and reduce impact of pollution on their health.	Has no impact on reducing pollutant levels Relies on individuals making behavioural change.	WRS, WCC, LAs, Politicians	M - VH	NQ
		Linked Policy		
		LTP3: AQ2, AQ5, AQ7		

Action: Establish an Air Quality Alert System

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Review required	0	Has no impact on reducing pollutant levels. Feasibility may depend on available funding

5.4.4 Action: Make air quality information more available and accessible

WRS are committed to ensuring all relevant air quality documents are accessible to the general public as they become available. WRS website went live in September 2012. Currently the air quality pages on the website provide general information on the pollutants of concern, air quality objectives and access to the last three annual reports provided to Defra for each local authority.

Following adoption of the AQAP it will be available from the website and future versions will be made available to download. Additionally all annual reports on Air Quality will be uploaded upon completion. Reports can be provided for review in paper format, upon request by members of public.

Documents relating to individual proposed developments that may be the subject of air quality concerns are available from the relevant Local Planning Authority where submitted in support of any application.

Action: Make air quality information more available and accessible

Pros	Cons	Key Stakeholders	Cost	Time
Provides information for people on air quality in their local area.	Has no impact on reducing pollutant levels	WRS	L	S
		Linked Policy		
		None		

Action: Make air quality information more available and accessible

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Yes	0	Has no effect on pollution levels

5.4.5 Action: Raise the profile and increase awareness of air quality within the region

The choices that people and organisations make in terms of travel and general behaviour can have a significant impact on local air quality. It is important that members of the public and organisations are informed about local air quality issues, as their support is important to the success of the AQAP. It is also important that local air quality is linked with other programmes being progressed within the Local Authorities such as Climate Change

Strategies, Local Development and Transport Plans. Raising the profile and awareness of local air quality issues will be achieved by the range of activities outlined in this document:

- The AQAP consultation process
- Formation of Steering Group and engagement with partners
- Publication of material and promotion of alternatives on website and potentially other operational centres
- Implementation of shortlisted actions
- Working with local communities to produce travel plans and other relevant actions

Action: Raise the profile and increase awareness of air quality within the region

Pros	Cons	Key Stakeholders	Cost	Time
Raising awareness of issues encourages people to switch to alternative modes of transport	Relies on individuals changing behaviour	All	NQ	NQ
		Linked Policy		
		LTP3: AQ3, AQ7		

Action: Raise the profile and increase awareness of air quality within the region

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Yes	0 - 5	Impact depends on success of all of the above

5.5 Planning Initiative Actions

Planning and development control play an important role in minimising the potential detrimental impacts that new developments may have on local air quality. Air Quality is already considered during the development planning process and the Local Planning Authorities consult WRS where considered appropriate.

It is important that all small or large-scale major developments are considered in terms of their potential impact on local air quality which is particularly relevant where proposed developments may exert an impact on an existing AQMA, and that all practicable mitigation measures are implemented. Development proposals should aim to be 'air quality neutral' and not lead to further deterioration of existing poor air quality and increased exposure to existing poor air quality should be minimised.

The Herefordshire and Worcestershire Air Quality Planning Protocol was adopted by all Worcestershire district councils and Herefordshire Unitary Authority in 2009. The protocol sets out the general requirements for Air Quality Assessments for new developments.

There are a number of additional actions identified below that could be applied to a range of situations within the planning regime to improve local air quality.

Actions discussed in this section are as follows:

- Produce Supplementary Planning Document in respect of Air Quality (5.5.1)
- Formula for s106 (or CIL) contributions towards air quality mitigation measures and programmes (5.5.2)
- Encourage the uptake of Employer and Residential Travel Plans for major employers and new developments to the area (5.5.3)
- Encourage developers to provide sustainable transport facilities and links serving new developments (5.5.4)
- Compulsory Purchase Schemes (5.5.5)

5.5.1 Action: Produce Air Quality Supplementary Planning Document

Supplementary Planning Documents (SPDs) represent guidance formally adopted by local authorities in England. They provide additional information in relation to specific policy areas within the Local Development Framework. Many local authorities have now published SPDs on air quality. They generally set out when an air quality assessment is required and what it should include. Some also include criteria for assessing the significance of the impact of a proposed development. These documents are a very useful tool for providing transparent and consistent advice to both development control departments and to developers. They can also provide a benchmark to assess the adequacy of an air quality assessment (EPUK, 2010)

It is proposed that on behalf of the LPA's WRS will produce an up to date SPD to serve as technical guidance on Air Quality for all partner local planning authorities, including the County Council, and developers to replace the existing Herefordshire and Worcestershire Planning Protocol (2008).

The SPD will clarify and specify requirements for air quality assessments for developments in line with current national guidance from DEFRA and in line with the National Planning Policy Framework and EPUK Planning Guidance 2010 (due to be updated in 2013) e.g.

- Identify when Air Quality Assessments for developments are required i.e. size and type of development;
- What should be considered and provided within an assessment e.g. cumulative impact of committed developments locally, input data;
- Which air quality models are acceptable use within for assessments;
- Outline acceptable monitoring data to be used within models and presentation;
- Provide guidance on types of sustainable measures developers should consider incorporating within development plans to provide air quality neutral and beneficial developments in line with this AQAP and LA Sustainable Development Policies;
- Provide matrices for developers to calculate proportion of sustainable measures required for developments e.g. number of EV points per car parking spaces or financial contributions towards Low Emission Strategies via Community Infrastructure Levy (CIL);
- Outline when mitigation measures will be required of developers based on principle of 'air quality neutral' developments;
- May outline requirements for financial contributions (e.g. CIL's) from developers of small scale and large scale developments towards air quality targets;

Production of the SPD will be future work undertaken by the Steering Group. The guidance will be inserted into the Air Quality Action Plan as an appendix and provided on the air quality pages of the WRS website.

Action: Produce Air Quality Supplementary Planning Document

Pros	Cons	Key Stakeholders	Cost	Time
Specifies requirements for air quality assessments for developers and LPAs. Provides up to date guidance in line with recent national and local policy changes and frameworks.	Up dated EPUK guidance not yet available	WRS, LPAs, WCC planning authority	L	S
		Linked Policy		
		NPPF; LTP3:DC6		

Action: Produce Air Quality Supplementary Planning Document

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Yes	NQ	Depends on proximity, size and impact of new developments to AQMAs and schemes to be implemented

5.5.2 Action: Formula for s106 (or CIL) contributions towards air quality mitigation measures and programmes.

Planning obligations also known as Section 106 (of the Town and Country Planning Act 1990) agreements are legally binding agreements negotiated, usually in context of a planning application between local planning authorities and developers. They provide a means of ensuring that developers contribute towards any infrastructure and services that the Council believes are necessary to facilitate proposed developments. Contributions may be either in cash or in kind; for example, by providing funds for traffic calming measures, cycle paths, air quality monitoring, changes to junctions, traffic signals etc. (LACORS, 2008).

The Community Infrastructure Levy (CIL) is a new levy designed to replace s106 agreements that local authorities can choose to charge on new developments in their area.

In authorities where a CIL is in force, land owners and developers must pay the levy set by the local council based on the size and type of the new development.

The community infrastructure levy:

- gives local authorities the freedom to set their own priorities for what the money should be spent on
- gives local authorities a predictable funding stream that allows them to plan ahead more effectively
- gives developers much more certainty from the start about how much money they will be expected to contribute
- makes the system more transparent for local people, as local authorities have to report what they have spent the levy on each year

Some LAs in Worcestershire are already considering or in process of switching from section 106 agreements to the new CIL type of levy. It is proposed that WRS will work with Local Planning Authorities to ensure that a proportion of CILs is utilised for air quality projects or section 106 agreements are obtained where appropriate.

Action: Formula for s106 (or CIL) contributions towards air quality mitigation measures and programmes.

Pros	Cons	Key Stakeholders	Cost	Time
Developer Funding can be used for a range of air quality issues specific to AQMA.	Competing with other LPA requirements in Local development plans.	WRS, LPA, LA, Politicians	L	S - M
Air quality impacts can be mitigated.	May deter developments and associated infrastructure improvements which could benefit LAQM	Linked Policy LTP3: AQ4, AQ6-7, C4, DC8		
Places restrictions on developments				

Action: Formula for s106 (or CIL) contributions towards air quality mitigation measures and programmes.

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Yes	NQ	Impact depends proportion of CIL funding obtained and individual scheme s106

5.5.3 Action: Encourage the uptake of Employer and Residential Travel Plans for major employers and new developments to the area.

WRS will work with Local Planning Authorities to ensure these are given appropriate levels of consideration within the planning regime for new developments and form part of Local Development Strategies.

More details on Travel Plans are outlined in Lowering Emissions actions above.

Action: Encourage the uptake of Employer and Residential Travel Plans for major employers and new developments to the area.

Pros	Cons	Key Stakeholders	Cost	Time
Encourages uptake of sustainable modes of transport Reduces congestion and emissions	Relies on individuals to change travel behaviour	LPAs, WCC, WRS Linked Policy NPPF; LTP3:AQ4, AQ6-7, DC10, ITP6, ITP9, SCP11-17	L	On-going

Action: Encourage the uptake of Employer and Residential Travel Plans for major employers and new developments to the area.

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	KR3, RR10, RR11, WR13, WR14, DD4, DD12, LRH1, LRH9, HF3, WG2	Yes	NQ	Depends on proximity, size and impact of new developments and schemes to be implemented

5.5.4 Action: Encourage developers to provide sustainable transport facilities and links serving new developments

WRS will work with Local Planning Authorities and developers to ensure sustainable development initiatives (for example secure cycle storage, bus stops, electric charging points) are given appropriate levels of consideration within the planning regime for new developments and form part of Local Development Strategies now and in the future.

More details on sustainable travel initiatives are outlined in Promotion of Alternatives section above.

Action: Encourage developers to provide sustainable transport facilities and links serving new developments

Pros	Cons	Key Stakeholders	Cost	Time
Encourages uptake of sustainable modes of transport Reduces congestion and emissions	Relies on individuals to change travel behaviour	LPA, WCC, WRS Linked Policy NPPF; LTP3: A3-4, AQ4, AQ6-7, C2, C4, DC1-2, DC-5, DC7-8, ITS10, SMT6, TCC4	L	On-going

Action: Encourage developers to provide sustainable transport facilities and links serving new developments

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Yes	NQ	Depends on proximity and impact of new

				developments and schemes to be implemented
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5.5.5 Action: Compulsory Purchase Schemes

A compulsory purchase order (CPO) is a legal function in the United Kingdom that allows certain bodies which need to obtain land or property to do so without the consent of the owner. In the United Kingdom, most Orders are made as subordinate legislation under powers given to Local Authorities in existing legislation (e.g. an Order for road works is made under the Highways Act 1980). Whilst the powers exist the Authority must demonstrate that the taking of the land is necessary and there is a compelling case in the public interest. Owners or occupiers can challenge this, and their objection will be heard by an independent Inspector.

In some areas of the UK where an AQMA has been declared based on a single or small number of receptors it has sometimes been possible to effectively remove the residential exposure via compulsory purchase of the property(s) (DMBC, 2011).

Costs involved will be very high due to compensation rights for the owners which usually include the value of the property, costs of acquiring and moving to a new property, and sometimes additional payments. Then there are costs involved in demolishing the properties to remove street canyon and construction of replacement open space.

Clearly this would be an unpopular and very expensive option to action and therefore only desirable as a last resort. However potentially it will be the most effective approach to removal of the reduced dispersion of emissions factor where short street canyons exist.

Action: Compulsory Purchase Schemes

Pros	Cons	Key Stakeholders	Cost	Time
Removing street canyon increases airflow and dispersion of emissions	Requires acquirement of residential properties or business premises Very expensive for purchase of properties, compensation, demolishing and rebuild	LAs LPAs	VH	M - VL
		Linked Policy		
		None		

Action: Compulsory Purchase Schemes

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	None	No	0	No street canyon
Lickey End	None	No	0	No street canyon
Redditch Road	RR5	Review required	4 - 5	There are a couple of short street canyons comprising 3 to 4 houses. Removing properties would potentially allow for complete revocation of AQMA.
Worcester Road	WR12	Review Required	4 - 5	There are a couple of street canyons comprising a number of residential dwellings and businesses. Removing business premises on western side of Hanover Street/Worcester Road bend would effectively remove canyon and potentially allow for complete revocation of AQMA. Black Cross PH may be listed

				reducing impact
Dolday	DD6	No	0	All Saints Road and Bridge Street are street canyons. Not feasible to action due to number of properties involved.
Lowesmoor	LRH4	No	0	Great lengths of the AQMA are street canyons and therefore not feasible due to the number of properties required
Port Street	PS2	No	0	The whole length of the AQMA is a street canyon and therefore not feasible due to the number of properties required
Horsefair	HR4	No	0	Not feasible because of listed buildings
Welch Gate	WG3	No	0	Not feasible because of listed buildings

5.6 Policy & Guidance Actions

These are a mixture of actions involving partnership working to ensure other local authority strategies are in harmony with air quality issues. Several are broad actions where influence or participation in directly may not be possible as they go beyond local issues and any achievement will rely on direction at central government level.

Actions discussed in this section are as follows:

- Air Quality policies in Local Development Frameworks (5.6.1)
- Influence Climate Change Strategy actions (5.6.2)
- Air Quality networks (5.6.3)
- Lobby and support government to subsidise public transport (5.6.4)
- Lobby and support government to ensure the manufacture and use of cleaner vehicles and fuels (5.6.5)
- Lobby and support government to adopt policies to carry out nationally targeted green transport initiatives (5.6.6)
- Removal of receptors from Air Quality Management Areas (5.6.7)
- Forge closer links with local health agencies (5.6.8)
- Development of a Low Emission Strategy for Worcestershire (5.6.9)

5.6.1 Action: Air Quality policies in Local Development Plans.

Local development plans and frameworks outline the policy for sustainable development within Local Authority areas. Many LAs are redrawing their Local Development Plans at this time to reflect recent central government changes through the introduction of the National Planning Policy Framework. WRS will work with LAs and LPAs to ensure air quality considerations have appropriate profile and strategy within local policies.

Pros	Cons	Key Stakeholders	Cost	Time
Increase general awareness of air quality issues in LA	Some Local Plans may already have been completed and adopted	LPA's, WRS	L	S
Encourage strategies for improving local air quality and minimising negative impacts from development		Linked Policy NPPF, LDP, LDF		

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Yes	3 - 5	Appropriate policy provides checks and restrictions on new developments

5.6.2 Action: Influence Climate Change Strategy actions

Climate change strategies are primarily concerned with reducing carbon dioxide (CO₂) but it is clear from review of local policy (see section 4) that many of the strategies adopted to improve carbon emissions are similar to actions proposed in this document. However it is recognised that some climate change improvements can have a negative effect on local air quality, for example:

- Biomass boilers – boilers that use biomass fuels (wood, straw, poultry litter) are increasingly used as renewable energy sources. However they emit pollutants including nitrogen oxides and particulate matter. It is predicted that NO_x emissions due to biomass boilers will rise from 8.7 kilotonnes in 2015 to 20.86kt in 2020 in UK (Air Quality News, February 2013)
- Vehicles with lower CO₂ emissions - some diesel vehicles may have lower CO₂ emissions but higher air pollutant emissions.
- Tree planting within AQMA could have a detrimental effect. Refer to Lowering Emissions section above.

A close working partnership with climate change groups is required to ensure activities are in harmony with other strategies and do not cause detrimental effects.

Action: Influence Climate Change Strategy actions

Pros	Cons	Key Stakeholders	Cost	Time
Increase general awareness of air quality issues in LA Encourage strategies for improving both local air quality and climate change and minimising negative impacts on either	Some actions may already have been completed	Climate Change groups, WRS Linked Policy LA Climate Change; LTP3: TCC1, TCC5, TCC12	L	On-going

Action: Influence Climate Change Strategy actions

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Yes	NQ	Impact depends on future planned schemes

5.6.3 Action: Air quality networks

An air quality network is a group of councils working in partnership to address air quality issues in their area. Networks enable councils to pool data together and gain an overall perspective of air quality in their area. (LACORS, 2008)

There are a number of advantages:

- Sharing information provides a more comprehensive and detailed picture of air quality across a region.
- Sharing experiences to avoid duplication of effort.
- Networks make it easier for councils to work together on developing joint actions across the area.
- Pooling financial resources can allow the purchase of expensive monitoring equipment, which could be prohibitively costly for one council alone.
- Joint funding of a network co-ordinator can provide dedicated expertise to all councils involved. (LACORS, 2008)

An air quality network exists between the neighbouring local authorities north of the Worcestershire border. The West Midlands authorities of Birmingham, Solihull, Coventry,

Walsall, Dudley, Sandwell and Wolverhampton have formed a partnership to tackle air quality in the region via the West Midlands Low Emission Towns and Cities Programme (LETCP).

WRS already have some links with the West Midlands authorities through association with the Midland Joint Advisory Committee (MJAC). However closer links could be forged with the coordinators of the programme to learn from their experience of implementing a Low Emission Strategy, LEZ feasibility study and best practises and potentially undertake joint exercises or actions where applicable.

Action: Air quality networks

Pros	Cons	Key Stakeholders	Cost	Time
Share information and experience and supplier contacts	Other authorities local circumstances and mitigation strategy may not be relevant to Worcs	WRS, MJAC, LETCP	L	S - L
Joint beneficial exercises or actions		Linked Policy		
Economies of scale through joint implementation of actions		None		

Action: Air quality networks

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Yes	0	Has no direct impact on reducing emissions

5.6.4 Action: Lobby and support government to subsidise public transport

Above inflation railway ticket price increases are often reported in the news. Buses in AQMAs were observed to often be barely half full even at peak time traffic. In a recent survey of Redditch borough inhabitants by the 'Choose how you move team', 77% of those surveyed stated 'nothing' would persuade them to switch to bus travel for their work journeys. These demonstrate the enormity of the challenge of successfully encouraging the public to switch to alternative modes of transport. An integrated, reliable, cleaner public transport service is unlikely to provide sufficient impact on reducing emissions without an accompanying attractive and affordable pricing structure.

Action: Lobby and support government to subsidise public transport

Pros	Cons	Key Stakeholders	Cost	Time
Successful lobbying could result in reduced ticket prices on public transport providing economical alternative to car	Requires additional government funding in austere economic climate	Politicians	L	M - VL
		Linked Policy		
		LTP3: AQ7, ITP2, ITP10		

Action: Lobby and support government to subsidise public transport

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Unknown	NQ	Potentially something LA's could

				investigate
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5.6.5 Action: Lobby and support government to ensure the manufacture and use of cleaner vehicles and fuels

Technological advancements in engines and emissions can have an enormous impact on local air quality as older more polluting vehicles are replaced. Engine advancements in conjunction with other policies such as the recent car scrappage scheme, initiatives to encourage take up of low emission vehicles and disincentivising use of most polluting diesel vehicles can dramatically speed up the process of reducing emissions on our roads

Action: Lobby and support government to ensure the manufacture and use of cleaner vehicles and fuels

Pros	Cons	Key Stakeholders	Cost	Time
Successful lobbying should result in increase in lower emission efficient engines and fuels	Requires government pressure effecting changes in international companies and influencing public choice of vehicle	Politicians	NQ	L - VL
		Linked Policy		
		LTP3: AQ7		

Action: Lobby and support government to ensure the manufacture and use of cleaner vehicles and fuels

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Unknown	NQ	Potentially something LA's could investigate

5.6.6 Action: Lobby and support government to adopt policies to carry out nationally targeted green transport initiatives

These could be 'leave your car at home day', green transport week, car sharing initiatives, incentives to employers to provide travel plans, increase cycling initiatives, free bus travel for a day. If coordinated with the worst air quality months annually i.e. December and January these could have a significant impact on local levels.

Action: Lobby and support government to adopt policies to carry out nationally targeted green transport initiatives

Pros	Cons	Key Stakeholders	Cost	Time
Successful lobbying results in uptake of sustainable travel Increase profile of air quality issues, alternative transport	Requires government pressure and new incentives effecting changes in public behaviour	Politicians	NQ	L - VL
		Linked Policy		
		LTP3: AQ7		

Action: Lobby and support government to adopt policies to carry out nationally targeted green transport initiatives

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Unknown	NQ	Potentially LA's could investigate potential lobbying options

5.6.7 Action: Removal of Receptors from Air Quality Management Areas

Similar to compulsory purchase of properties discussed in the previous section, where an AQMA has been declared based on a single or small number of receptors it may be possible to effectively remove exposure to the effect of air quality pollutants via permanent removal of all receptors at risk.

However, as this action is likely involve the Local Authority using available powers to forcibly remove residents from their homes and incur associated compensation costs of doing so, in reality it is unlikely to be a desirable option for the Local Authority.

Clearly this would be an unpopular and very expensive option to action and therefore only desirable as a last resort. However, potentially it could be a very effective approach to removing effect of poor air quality.

Action: Removal of Receptors from Air Quality Management Areas

Pros	Cons	Key Stakeholders	Cost	Time
Removes receptors at risk	Does not improve air quality emissions	LAs	VH	M - VL
	Very expensive for repatriation of residents, compensation.			
	Leaves buildings empty and unused unless demolished which incurs additional cost	Linked Policy		
	Potentially further receptors at risk if buildings reoccupied	None		

Action: Removal of Receptors from Air Quality Management Areas

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
Hagley	KR6	Yes	3 - 4	Only 3 receptor properties identified in FA. Removing receptors would potentially allow for complete revocation of AQMA.
Lickey End	None	Review required	NQ	Number of receptors at risk not quantified at this time. Potentially one empty residential property that could be converted to commercial use.
Redditch Road	RR5	Yes	3 - 4	There are a couple of short street canyons comprising 3 to 4 houses. Removing receptors would potentially allow for complete revocation of AQMA.

Worcester Road	None	No	0	Too many receptors
Dolday	None	No	0	Too many receptors
Lowesmoor	None	No	0	Too many receptors
Port Street	PS10	Yes	3 - 4	Only 1 receptor property identified in FA. Removing receptors would potentially allow for complete revocation of AQMA.
Horsefair	None	Review required	NQ	Number of receptors at risk not quantified at this time
Welch Gate	None	Review required	NQ	Number of receptors at risk not quantified at this time

5.6.8 Action: Forge closer links with Local Health Agencies

Whilst most solutions and potential actions within air quality action plans aim to reduce or remove emissions of air pollutants from sources such as traffic, the requirement for these actions is fundamentally driven by the concern for public health for the reasons outlined in Chapter 1 of this document. The lead for Local Air Quality Management (LAQM) comes from the national strategies, standards and objectives set by the UK government, adopted from EU policies, and are informed by international health studies. As the targets to protect health are well established there is no specific requirement, currently, within the LAQM regime for coordination between local authorities and the local health service agencies.

However it may be beneficial to forge a partnership with local health agencies such as Public Health England and local Primary Care Trusts in conjunction with other partners to improve knowledge and understanding of local air quality and associated health issues.

A similar partnership is proposed within the neighbouring West Midlands authorities as part of the Lower Emissions Towns and Cities Programme. 'The LETCP has identified organisations in the West Midlands that are recognised nationally for their work on air pollution and health, including Birmingham University, Sandwell Primary Care Trust (PCT) and Birmingham NHS Health Impact Assessment Unit, with the purpose of developing a West Midlands steering group on health and air quality. In line with the new Public Health Framework, the steering group will review existing and emerging evidence regarding the local health impacts of air quality, including the Low Emission Zone Feasibility Study: Health Impact Assessment with a view to informing local policy development and implementation.' (WMLETCP, 2013)

WRS propose to undertake an initial review of relevant local health agencies in Worcestershire prior to invitations to representatives of those organisations to form a similar working partnership to that described above.

Action: Forge closer links with Local Health Agencies

Pros	Cons	Key Stakeholders	Cost	Time
<p>Improve knowledge and understanding of health issues</p> <p>Raises profile and increases awareness of air quality issues within the region</p> <p>Help to inform local policy development</p>	<p>Does not reduce or improve air quality emissions</p>	<p>WRS, Local Health Agencies e.g. PHE, PCT</p> <p>Linked Policy</p> <p>None</p>	L	S

Action: Forge closer links with Local Health Agencies

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Review required	0	Has no effect on pollution levels

5.6.9 Action: Development of a Low Emission Strategy for Worcestershire

Refer to section 4.1.3 for detailed explanation and review of low emission strategies.

Action: Development of a Low Emission Strategy for Worcestershire

Pros	Cons	Key Stakeholders	Cost	Time
<p>Combines preferred solutions into a coordinated strategy across the entire county.</p> <p>Focusses limited resources and have benefits for all areas.</p> <p>Supports sustainable development policies in Local and National Policies.</p> <p>Supports local climate change plans and policies.</p> <p>Support and integrate Local Transport Plan & Highways initiatives</p>	<p>Reaching agreement amongst all seven partner authorities on strategy measures to be included may be difficult.</p>	<p>WRS, LA's LPA,s, WCC</p> <p>Linked Policy</p> <p>NPPF, LA Climate Change; LTP3: A3, A8, AQ2, AQ4, C1-C14, DC2, F1, F3-5, F7-F10, ITP1-13, ITP15-16, ITP18, SCP1-6, SCP10-17, SCP20-21, SMT1-3, SMT5-7, TCC1-2, TCC4, TMP1-4, W1, W5-7, W10,</p>	L - M	S - M

Action: Development of a Low Emission Strategy for Worcestershire

AQMA	Specific Issues Addressed	Feasibility Check	Impact Score	Rationale
All	None	Review required	4 - 5	Impact depends on range of actions incorporated into strategy but anticipated to include preferred efficient emission reducing solutions identified in AQAP

6 Worcestershire Air Quality Action Plan – AQMA Specific Actions

AQMA specific actions are listed in the order and identified by key code as follows:

AQMA	District	Key Issue ID
Kidderminster Road, Hagley	Bromsgrove DC	KR
Lickey End	Bromsgrove DC	LE
Redditch Road	Bromsgrove DC	RR
Worcester Road	Bromsgrove DC	WS
Dolday/Bridge Street	Worcester City Council	DD
Lowesmoor/Rainbow Hill	Worcester City Council	LRH
Port Street, Evesham	Wychavon DC	PS
Horsefair/Coventry Street	Wyre Forest DC	HF
Welch Gate, Bewdley	Wyre Forest DC	WG

Table 6-1 Worcestershire AQMA specific issues and actions as appropriate

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
KR1	Conjunction of busy A456 and A491 roads	Not feasible to change	n/a	n/a	n/a	n/a	n/a	n/a
KR2	Current boundary of AQMA requires amendment to conform with best practice guidance	Amend boundary following future dispersion modelling if revocation not appropriate	Focus resources on reducing emission actions instead of performing administrative requirements	Current boundary outline remains in place until future monitoring implies AQMA revocation is possible and modelling is undertaken	WRS, LA	0	L	M - L
KR3	Large proportion of single occupancy vehicles	Generic actions e.g. Travel Plans, HOV lanes, Car sharing, Smarter Choices Measures Package	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions		
KR4	Older private bus fleet destined for local schools	Generic actions e.g. School Travel Plans, Bus Quality Partners. WCC advise June 2013): 'The Public Service Vehicle Accessibility Regulations (PSVAR) 2000 will result in widespread renewal of bus fleets to more accessible models. In all cases, this will also result in more efficient, lower emissions vehicles.'	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions		
KR5	Significant queuing traffic observed in both directions on A456	Propose WCC undertake junction review to ascertain	Appropriate expertise addressing problem junction. Impact	Not included within current LTP3 runs until 2026 so timescales	WCC	NQ	NQ	M - L

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
	heading for A491 Stourbridge Road	improvements to current and future predicted flows	depends on resulting scheme	could be long.				
KR6	AQO only exceeded at a few properties	Mitigation measures should be proportionate. Generic actions e.g. all	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions		
KR7	HGVs largest source	Generic actions e.g. FQPs, utilising existing VMS	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions		
KR8	Long Term Local Trend data indicates only three exceedences have been recorded in last 7 years	Targeted monitoring of existing and new locations and analysis to continue	Increased data improves quality of long term trend analysis and indication of effect local and national actions	Resources required to analyses data	WRS	n/a	L	On - going
LE1	Current boundary of AQMA requires amendment to conform with best practice guidance	Amend boundary following future dispersion modelling if revocation not appropriate	Focus resources on reducing emission actions instead of performing administrative requirements	Current boundary outline remains in place until future monitoring implies AQMA revocation is possible and modelling is undertaken	WRS, LA	0	L	M - L
LE2	A38 south from gyratory is very busy route, comes under extra pressure during motorway incidents	Reduction in traffic and congestion through shortlisted Generic actions. Request WCC & HA review alternative routes for traffic during incidents	Refer to Generic Actions. Appropriate expertise addressing incident congestion. Impact depends on alternative routes available	Refer to Generic Actions. Review not included within current LTP3 runs until 2026 so timescales could be long.	Refer to Generic Actions	Refer to Generic Actions		
						NQ	NQ	M - L
LE3	A38 south pedestrian crossing causes pause in flow	Replace with footbridge if feasible	Improves flow and increases pedestrian safety for nursery	Requires sufficient space for bridge footwall and pavement either side of carriageway	WCC	2	NQ	NQ
LE4	Narrowing of two lanes into one causes bottleneck at top of A38	Propose WCC undertake junction (including gyratory)	WCC advised June 2013: 'Included in the LTP3 as Scheme BR2 –	No details of scheme or timeline available at this time.	WCC	NQ	NQ	M - L

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
	south	review to ascertain improvements to current and future predicted flows	Bromsgrove Transport Package – Bromsgrove Eastern Bypass Junction Improvements.'					
LE5	School Lane is busy junction just south of AQMA	Review Lickey End First School Travel Plan. Encourage alternative modes of transport and routes	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions		
LE6	Traffic exiting Barnsley Hall Rd right	No turning right restriction except for emergency vehicles	Reduce congestion and improve flow	Vehicles will have to journey round gyratory to come back to chosen direction of travel but few vehicles affected. Effect on nursery business	WCC	1 - 2	NQ	S - M
LE7	Turning right into Harvester PH from A38 south	No turning right restriction	Reduce congestion and improve flow and encourage vehicles to access from Alcester Road	Vehicles will have to journey round gyratory to come back to chosen direction of travel but few vehicles affected. Effect on business	WCC	2	NQ	S - M
LE8	Exiting right from Esso garage towards gyratory	No turning right restriction	Reduce congestion and improve flow	Vehicles will have to reach gyratory via turning left onto School Lane and Alcester Road but few vehicles affected.	WCC	1 - 2	NQ	S - M
LE9	Lane markings on gyratory approach to B4096 north and M42 appear to confuse drivers	Request WCC review junction to ascertain any improvements can be made	Avoids potential incidents which could cause congestion. WCC advised June 2013: 'programmed for delivery as part of LTP3 BR2 –Bromsgrove	No details of scheme or timeline available at this time.	WCC	0 - 1	NQ	M - L

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
			Eastern Bypass Enhancements Scheme.'					
LE 10	In carriageway bus stop A38 south	Move bus stop further south or create pull-in stop where space available	Reduces amount of traffic arriving all in AQMA at one time and queuing at gyratory traffic lights	Not many spatial opportunities to create pull in stop. Also limited use of bus stop	WCC, Bus company	1	NQ	S – M
LE 11	No visible restrictions on gyratory with exception of box markings which are sometimes ignored	Increase restrictions and repaint double yellows on the gyratory and on approaches where appropriate. Emplace cameras and penalties for vehicles ignoring markings	Reduce vehicles blocking flow. WCC advised June 2013: 'Included in the LTP3 as Scheme BR2 – Bromsgrove Transport Package – Bromsgrove Eastern Bypass Junction Improvements.'	No details of scheme or timeline available at this time.	WCC	1	NQ	M – L
LE 12	Long term trend data analysis indicates higher pollution levels associated with A38 instead of M42	Targeted monitoring of existing and new locations and analysis to continue	Increased data improves quality of long term trend analysis and indication of effect of local and national actions	Resources required to collect and analyse data	WRS	0	L	S – M
LE 13	Further assessment out of date	Undertake up to date detailed dispersion modelling using latest tools, data	Provide more accurate source apportionment scenario and pollutant dispersion model to inform AQAP actions	Full calendar years' worth of data required for any new location to inform modelling in 2015. Cost of modelling and reporting	WRS	0	L	S – M
LE 14	Additional monitoring points required to capture data from different points	Locate and emplace new monitoring points depending on access	Increased data improves quality of analysis	Resources required to collect and analyse data	WRS	0	L	S – M
LE 15	Options identified in previous AQAP focus	Undertake up to date detailed dispersion	Provide more accurate source apportionment	Full calendar years' worth of data required	WRS	0	L	S – M

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
	on M42 improvements mostly not implementable	modelling using latest tools, data	scenario and pollutant dispersion model to inform AQAP actions	for any new location to inform modelling in 2015. Cost of modelling and reporting				
RR1	A38 Redditch Road is major through route between two junctions	Not feasible to change	n/a	n/a	n/a	n/a	n/a	n/a
RR2	Redditch Road is occasionally impacted by large volumes of congested traffic during motorway incidents	Request WCC & HA review alternative routes for traffic during incidents	Appropriate expertise addressing incident congestion. Impact depends on alternative routes available. WCC advised June 2013: 'Included in LTP3 as Scheme BR2 – Bromsgrove Eastern Bypass Junction Improvements.'	No details of scheme or timeline available at this time.	WCC, HA	NQ	NQ	M - L
RR3	Current boundary of AQMA requires amendment to conform with best practice guidance	Amend boundary following future dispersion modelling if revocation not appropriate	Focus resources on reducing emission actions instead of performing administrative requirements	Current boundary outline remains in place until future monitoring implies AQMA revocation is possible and modelling is undertaken	WRS, LA	0	L	M - L
RR4	Topography at either end is a contributing factor to emissions	Not feasible to change	n/a	n/a	n/a	n/a	n/a	n/a
RR5	Properties close to roadside create street canyon	Not feasible to change without CPO and removal of properties – refer to generic actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions		
RR6	High proportion of HGVs and LGVs noted due to several proximal	Generic actions e.g. Greening Fleets, FQP	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions		

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
	Industrial Estates							
RR7	Two in road bus stops on carriageway either side of central street canyon	Move to further along road with more desirable pull in stops	Improves traffic flow and reduces idling vehicles at top of Buntsford Hill, reducing emissions	Review of siting locations for stops may be required	WCC, bus companies	2	NQ	S - M
RR8	Access to the Bromsgrove Prep school potentially impacts Hanbury Turn junction	Generic action e.g. School Travel Plans	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions		
RR9	Difficult access to Engineering co potentially cause issues at Hanbury Turn junction	Work with business re loading and unloading in non-peak traffic times, assess if access can be improved	Ensure no obstructions causing congestion	Alternative access may not be available	WCC, LPA	1	NQ	S - M
RR 10	Cars and HGVs are biggest source of roadside emissions	Generic actions e.g. FQPs, greening fleets, Travel Plans, promotion of alternative transport	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions		
RR 11	Max. exceedence is 6.2 µg/m ³ and total vehicle emissions need to reduce by 25%	Generic actions e.g. FQPs, greening fleets, Travel Plans, promotion of alternative transport	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions		
WR1	Close to Town Centre and busy junction	Not feasible to change	n/a	n/a	n/a	n/a	n/a	n/a
WR2	Current boundary of AQMA requires amendment and extension	Amend boundary following setting up of steering group	Focus resources on implementing reducing emission actions instead of performing administrative requirements	Current boundary outline remains in place for time being	WRS, LA	0	L	S
WR3	Zebra crossing at Hanover St/ Worcester Rd causes congestion	Replace with footbridge if feasible	Improves flow and increases pedestrian safety for schools	Requires sufficient space for bridge foot well and pavement either side of	WCC	3	NQ	NQ

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
				carriageway				
WR4	Two street canyons	Canyons may effectively be removed through CPO – see generic action.	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
WR5	Eight school and nursery campuses within or adjacent to AQMA	Generic action e.g. School Travel Plans	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions		
WR6	Reduced two way traffic flow due to residential parking near Turks Head PH	Introduce parking restrictions and provide space for residential parking with permits elsewhere in Worcester Road. Potentially as part of future redevelopment of Sanders Road Industrial Estate or parking area created by demolishing of street canyon following CPO	Reduces congestion caused by parked vehicles restricting two way flow	Lack of available alternative parking space identified presently without additional substantial action e.g. development or demolishing properties to open up canyon	LPA, WCC	2	NQ	NQ
WR7	Bulbous traffic calming measure at Shrubbery Road junction	Generic action e.g. Remove all build out	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions		
WR8	Not enough parking spaces for One stop convenience store	Promote use of PH car park through arrangement between businesses	Avoids parking in Shrubbery Road on double yellow lines causing congestion in turning	Requires agreement between businesses	LPA	1	L	S
WR9	Local and school traffic causes congestion exiting Shrubbery Road junction	Generic action e.g. School Travel plan. Propose WCC undertake junction review to ascertain	WCC advised June 2013: 'Included in LTP3 as BR2 –Bromsgrove Eastern Bypass Enhancements	No details of scheme or timeline available at this time.	WCC	2	NQ	NQ

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
		improvements to current and future predicted flows	Scheme.' Impact depends on resulting scheme					
WR 10	Sanders Road Industrial Estate and Market Site car park are redevelopment targets	Work closely with LPA and LA to ensure air quality in AQMA is not further compromised. Generic actions e.g. S106, CIL funding for improvements	Could provide benefits for local air quality	Timeline likely to long	LPA, LA	NQ	NQ	M - VL
WR 11	Old bus fleet	Generic actions e.g. BQP, and PSVAR (2000) will also assist in this area (WCC June 2013)	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
WR 12	Modelling indicates exceedences only at properties within street canyons	Generic actions e.g. CPO, parking restrictions, BQP, FQP	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
WR 13	Cars are biggest source of roadside pollutants	Generic actions e.g. Travel plans, promotion of alternatives, electric charging points, parking restrictions	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
WR 14	25 to 50% Total vehicle emissions required	Generic actions e.g. Travel plans, Smarter Choices Measures, electric charging points, parking restrictions, Park & Ride	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
DD1	The A44 Dolday one way system is the only route for all traffic crossing the River Severn	Not feasible to change without addition of another river crossing for vehicles in City. However WCC advise	Dualling of the Southern Link Road will significantly increase the capacity of this alternative route. Could	Unable to quantify likely reduction in City Centre traffic volumes and therefore impact at present.	WCC, LA	NQ	VH	TBC

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
		(June 2013): 'Dualling of the Southern Link Road will draw through traffic away from City Centre'.	ease traffic congestion travelling into and out of city.					
DD2	Current boundary of AQMA requires amendment to additional residential buildings on east boundary and exclude open areas	Amend boundary following setting up of steering group	Focus resources on implementing reducing emission actions instead of performing administrative requirements	Current boundary outline remains in place for time being	WRS, LA	0	L	S
DD3	Three sets of traffic lights within AQMA cause pause in traffic	Refer to Generic e.g. Alteration to traffic lights	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
DD4	Some congestion in AQMA linked to congestion further afield in city	Propose WCC undertake modelling of how flows can be improved along key routes across city.	WCC advise June 2013: 'Included as part of The Worcester Transport Strategy bid, a comprehensive package of measures to improve the efficiency of Worcester's transportation networks.'	No details of specific scheme or timeline available at this time.	WCC, LA	NQ	NQ	NQ
DD5	High proportion of buses due to proximity of bus station	Generic actions e.g. BQP, PSVAR 2000, potential to relocate bus station to east of City Centre.	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
DD6	Two street canyons within the AQMA	Generic actions e.g. CPOs	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
DD7	Box markings are sometimes ignored during periods of	Emplace cameras and penalties for vehicles ignoring markings	Reduce vehicles blocking flow	Not WCC policy unless safety issue is identified (June 2013).	WCC	1 - 2	NQ	NQ

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
	congestion							
DD8	Number of proximal car parks	To rationalise car parking provision in City Centre and improve signage (including VMS), implement park and ride.	Part of Worcester Transport Strategy	Details of specific scheme and timeline unknown at this time.	WCC, LA	1 - 2	NQ	NQ
DD9	Nearby college of technology	Generic action e.g. School Travel Plan	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
DD 10	Existing monitoring positions are placed outside street canyons	Redesigned monitoring positions have been emplaced in early 2013	Will improve data quality and definition of AQMA boundary.	Will have to wait full calendar year for results	WRS	0	L	S
DD 11	Source apportionment indicates HDVs are biggest source of road emissions	Generic actions e.g. BQPs, FQPs	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
DD 12	Further assessment indicates reducing vehicle emissions by 50% will be an effective measure	Generic actions e.g. all	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
DD 13	Recorded data needs working back to facades of properties	Use available background maps and calculator tool to recalculate data	Provides accurate analysis for use in final AQAP and future progress reports	Resource required.	WRS	0	L	S
DD 14	Traffic queues back along the street canyon in Bridge Street from the exit onto North Parade due to a lack of traffic signals. Congestion is exacerbated by queues caused by pedestrian crossing in North	Recommend as part of Worcester Transport Strategy WCC place traffic lights at exit from bridge onto North Parade and move pedestrian crossing closer to Newport Street turning.	Pauses traffic on wide open space of bridge where emissions not an issue and allows easier exit from Bridge Street canyon. Increases length of road for cars in open North Parade being paused at	May have a knock on effect to traffic congestion other side of bridge so requires alignment of traffic light phasing further afield	WCC	3	NQ	S - M

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
	Parade.		crossing and allows for traffic to exit Newport Street more easily					
LRH 1	The B4550 is used by commuters to avoid other congested routes to get into city	Generic actions e.g. Travel plans, car sharing.	Refer to generic actions.	Refer to generic actions	Refer to generic actions	Refer to generic actions		
		WCC advise June 2013: 'Key corridor programme within the Worcester Transport Strategy.'	Key corridor programme will see enhancements to bus stops (including VMS signs) and pedestrian crossings.	Unlikely to lead to significant reductions in volumes of traffic	WCC	0 - 1	NQ	M - L
LRH 2	Current boundary of AQMA requires amendment to conform with best practice guidance and extension to include properties recommended in FA	Amend boundary following setting up of steering group	Focus resources on implementing reducing emission actions instead of performing administrative requirements	Current boundary outline remains in place for time being	WRS	0	L	S
LRH 3	Number of schools in area	Generic actions e.g. School Travel Plans	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
LRH 4	Street canyon effects in most parts	Not feasible to change due to number of properties involved	n/a	n/a	n/a	n/a	n/a	n/a
LRH 5	Delivery vehicles often observed obstructing traffic flow	Generic actions e.g. Make one way, pedestrianisation, limited loading and parking	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
LRH 6	Number of bus routes and non pull-in stops in AQMA	Generic actions e.g. Make one way, BQPs including rationalisation of bus stops	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
LRH	Traffic lights onto	Generic actions e.g.	WCC advise June 2013:	No WRS consultation	WCC	2-3	NQ	S

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
7	Lowesmoor Terrace cause congestion	Phasing of traffic lights, one way system	Currently being delivered as part of Worcester Transport Strategy (Phase 1)	on programme content as predates WRS				
LRH 8	Source apportionment indicates emissions for HDVs are greatest contributors in Lowesmoor and LDVs in Rainbow Hill	Generic actions e.g. FQPs and BQPs in Lowesmoor, car sharing, car parking provision, VMS, cycling initiatives in Rainbow Hill	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
LRH 9	Further assessment indicates reducing vehicle emissions by 50% will be an effective measure	Generic actions e.g. all	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
LRH 10	Recorded data needs working back to facades of properties	Use available background maps and calculator tool to recalculate data	Provides accurate analysis for use in final AQAP and future progress reports	Resource required.	WRS	0	L	S
PS1	Current boundary of AQMA requires amendment to conform with best practice guidance	Amend boundary following future dispersion modelling if revocation not appropriate	Focus resources on reducing emission actions instead of performing administrative requirements	Current boundary outline remains in place until future monitoring implies AQMA revocation is possible and modelling is undertaken	WRS, LA	0	L	S - M
PS2	Street canyon on incline	Not feasible to change	n/a	n/a	n/a	n/a	n/a	n/a
PS3	HGV >7.5t currently unable to utilise alternative bridge	Will be lifted in 2014 following bridge replacement. Generic action e.g. signage improvement	Refer to Generic actions	Refer to Generic actions	Refer to Generic actions	Refer to Generic actions		
PS4	Traffic queuing at Waterside junction	Generic action e.g. alteration to traffic	Refer to Generic actions	Refer to Generic actions	Refer to Generic	Refer to Generic actions		

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
		phasing lights already planned as part of bridge replacement			actions			
PS5	Two sets of pedestrian lights cause temp traffic queues	Generic action e.g. alteration to traffic phasing lights already identified within LTP3	Refer to Generic actions	Refer to Generic actions	Refer to Generic actions	Refer to Generic actions		
PS6	Single in carriageway bus stop causes congestion in AQMA	Move bus stop further along Port Street towards Lidl	Reduces congestion	May effect businesses and passengers by moving further away	WCC, bus companies	2 - 3	L	S - M
PS7	Incidents of cars and vans unloading causing congestion	Generic action e.g. convert to one way system, loading and unloading restrictions	Refer to Generic actions	Refer to Generic actions	Refer to Generic actions	Refer to Generic actions		
PS8	Busy side roads with poor visibility for drivers exiting can cause congestion	Could be improved by convert to one way system - refer to generic action	Refer to Generic actions	Refer to Generic actions	Refer to Generic actions	Refer to Generic actions		
PS9	Poorly utilised car park in Burford Road	Generic action e.g. Review of parking provision and pricing. Improve signposting	Refer to Generic actions	Refer to Generic actions	Refer to Generic actions	Refer to Generic actions		
PS 10	AQO only exceeded at a few properties	Mitigation measures should be proportionate. Generic actions e.g. all	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions	Refer to Generic Actions		
PS 11	Initial review of data indicates less exceedences than previously indicated	More detailed review and cleansing of data required for final version of report	Improved qualification of data will enable identification of level of mitigation required	Resource required to undertake detailed quality review	WRS	0	L	S
PS 12	No automatic monitoring has previously been undertaken	Undertake 6 month AM as part of potential revocation and detailed assessment in future	Provides improved quality data	Expensive. Timeline will depend on observed downward trend in monitoring results following implementation of	WRS	0	M	M - L

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
				planned and generic actions				
HF1	Additional monitoring locations and detailed modelling required as part of Further Assessment	Undertake detailed modelling and further assessment following min. of 1 calendar year monitoring at additional locations to be identified	Meet recommendations of Detailed Assessment to determine extent of AQMA	Will not be able to undertake Further Assessment because of monitoring requirements until 2015	WRS, LA	0	L - M	S - M
HF2	Current boundary of AQMA requires amendment to conform with best practice guidance	Amend boundary following additional monitoring, dispersion modelling and Further Assessment if revocation not appropriate	Focus resources on reducing emission actions instead of performing administrative requirements	Current boundary outline remains in place until HF1 is completed	WRS, LA	0	L	S - M
HF3	Main issue is volume of traffic entering and exiting ring road	Generic actions e.g. Travel plans, car sharing, Park & Ride, promotion of alternatives, electric charging points etc.	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
		WCC advise June 2013: 'LTP3 Kidderminster Transport Package Major Scheme including Hoobrook Link Road (between the A449 Worcester Road and A451 Stourport Road).'	WCC advise June 2013: 'A proposed Hoobrook Link Road is planned which will act to reduce traffic queuing on the Kidderminster Ring Road.' This would provide an alternative diversion from the ring road for traffic between Stourport and Hagley/ Stourbridge destinations via A449 Chester Road'	Link road is 2 km south of the AQMA. Reductions in traffic likely limited to Stourport-Hagley/Stourport bound traffic. Traffic will have to travel through additional traffic signals thus faster Ring Road may be preferred route. Given levels in Horsefair limited impact anticipated.	WCC	1	£5m	S-M

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
HF4	Blackwell street canyon	Some of the buildings are part of the conservation area and cannot be altered. Not feasible to change	n/a	n/a	n/a	n/a	n/a	n/a
HF5	Two way traffic flow results in congestion due to narrow carriageway	Generic actions e.g. convert to one way only	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
HF6	There are two local schools in vicinity	Generic actions e.g. School Travel Plans	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
WG1	More than 8 years since detailed modelling and Automatic monitoring undertaken	Undertake detailed modelling	Would provide up to date source apportionment, required emission reduction and confirm if existing boundary requires amendment	Automatic monitoring would better inform modelling but is costly.	WRS, LA	0	L - M	S - M
WG2	Main issue is volume of traffic proceeding to two bridges	Generic actions e.g. Travel plans, car sharing, Park & Ride, promotion of alternatives, electric charging points etc.	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
WG3	Street canyon	Some of the buildings are part of the conservation area and cannot be altered. Not feasible to change	n/a	n/a	n/a	n/a	n/a	n/a
WG4	Normal length buses block road in narrow bends	Generic action e.g. Bus Quality Partnership	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
WG5	No waiting box markings are ignored	Yellow box needs repainting and signing.	Reduce vehicles blocking flow	Not included within current LTP3 runs until	WCC	1	NQ	M - L

Key Issue ID	Description	Proposed action	Pros	Cons	Stakeholders/ Associated Policy	Impact Score	Cost	Time scale
		Emplace cameras and penalties for vehicles ignoring markings		2026 so timescales could be long.				
WG6	Pedestrian traffic light at PH in Dog Lane causes congestion at junction of Welch Gate	Generic action e.g. Alteration to phasing of traffic lights	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
WG7	HGVs traverse Welch Gate even though bridge has weight limit	Generic actions e.g. Weight restriction, FQP, Improve signage away from AQMA	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
WG8	Two way traffic flow results in congestion due to narrow carriageway	Generic actions e.g. convert to one way only	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		
WG9	There are three local schools in vicinity	Generic actions e.g. School Travel Plans, Improve signage away from AQMA	Refer to generic actions	Refer to generic actions	Refer to generic actions	Refer to generic actions		

7 Next steps

Stage	Timeline	Description	Detail
Stage 1	April to June 2013	Public Consultation on Action Plan document	<p>Document will be made available to view/download from website and in local government buildings including libraries in paper format.</p> <p>Local residents within AQMA will be informed of consultation via hand delivered letter.</p> <p>Consultees will be invited to express comments on plans and suggestions via electronic or paper format.</p> <p>List of proposed consultees:</p> <ul style="list-style-type: none"> Air Quality Task Group BDC Better Environment Theme Group BDC Defra Hagley Residents Association Health Protection Agency Highways Agency Local Councillors and Portfolio Holders Local Planning Authorities Neighbouring authorities e.g. Dudley MBC Parish Councils PCT Residents of AQMA's Worcestershire County Council – Highways & Planning departments
Stage 2	July to October 2013	Review of Public Consultation outcomes & Councillor Consultation	<p>All responses received by end of June will be reviewed and considered for inclusion within AQAP.</p> <p>Action Plan will be updated with appropriate amendments and additional solutions identified from the consultation.</p> <p>A summary of consultee comments not included for further consideration within AQAP and reasoning will be posted on website and included as appendix within updated AQAP.</p>
Stage 3	October & November 2013	Formal Adoption of AQAP	Updated Action Plan will be presented to all six Worcestershire Local Authorities for adoption
Stage 4	November 2013 to January 2014	Formation of Worcestershire Air Quality Steering Group	Invitations to partake in Steering Group will be forwarded by early October to organisations and individuals identified from the consultation process whom can help deliver actions within plan.

Stage	Timeline	Description	Detail
			<p>The Steering Group will be set up and initial meetings arranged.</p> <p>The Steering Group will assign initial actions, prioritise options, determine timeframe for delivery and devise measurements of impact of actions.</p> <p>AQAP will be updated with details of Steering Group, prioritisation of actions, timeframe and measurements and funding options.</p>
	January 2014 onwards	Modelling of shortlist options	<p>If the situation arises that the benefit of shortlisted options is unclear, or the preferred scenario is difficult to determine, detailed modelling will be undertaken where possible, and where costs, time and resources permit, to determine potential reduction in pollution and ascertain best options.</p> <p>AQAP will be updated with results of any such modelling.</p>
Stage 5	2014 onwards	Worcestershire Air Quality Steering Group	The Steering Group will meet on regular basis to ensure preferred options are progressed actions.
	2014 and onwards	Annual Air Quality Action Plan Update	<p>Updates on the action plan will be included as part of the annual progress report for each district required by Defra. These will be posted onto WRS Air Quality webpages and available to download.</p> <p>Yearly updates can be included as appendices in AQAP.</p>

8 Glossary and Abbreviations

AADT	Annual Average Daily Traffic (Vehicles per day)
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
ADMS Roads	Atmospheric Dispersion Modelling System for Roads.
Air Quality Neutral	Air Quality Neutral concept requires new developments to have lower or equivalent emissions of air pollution than those emitted from a site prior to its redevelopment.
Ambient	Ambient air quality refers to the quality of outdoor air in our surrounding environment.
ATC	Automatic Traffic Counter
AURN	Automatic Urban and Rural (air quality monitoring) Network
Background Levels/ Concentrations	This is the component of the total pollutant concentration that does not originate from local sources.
BDC	Bromsgrove District Council
COMEAP	Committee on the Medical Effects of Air Pollutants
DA	Detailed Assessment
DCLG	Department for Communities & Local Government
Defra	Department for Environment Food and Rural Affairs
DMBC	Dudley Metropolitan Borough Council
DMRB	Design Manual for Roads and Bridges Screening Model
Euro Standards	Euro standards describe the emissions criteria that vehicle manufacturers must type approve their vehicles to in order to supply for general sale in the EU. Euro I vehicles began to be produced for an EC-specific type approval standard that came into force in 1993, with pre-Euro vehicles generally being those registered before this date.
Exceedence	A period of time where the concentration of a pollutant is greater than the appropriate air quality objective.
FA	Further Assessment
HDV	Heavy Duty Vehicle
HGV	Heavy Goods Vehicle

Kerbside	A site sampling within 1 m of the kerb of a busy road
LA	Local Authority
LAQM	Local Air Quality Management
LDF	Local Development Framework
LDV	Light Duty Vehicle
LGV	Light Goods Vehicle
LTP3	Worcestershire County Council's Local Transport Plan 3
MHDC	Malvern Hills District Council
NO	Nitrogen oxide
NO_x	Nitrogen oxides
NO₂	Nitrogen dioxide
NPPF	National Planning Policy Framework
NQ	Not quantified
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date, taking into account costs, benefits, feasibility and practicality. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides.
PCT	Primary Care Trust
PM₁₀	Particulate Matter with a (equivalent aerodynamic) diameter of ten microns (10 µm) or less
PPS	Planning Policy Statement
PSV	Public Service Vehicles (buses)
RBC	Redditch Borough Council
Roadside	A site sampling between 1 m of the kerbside of a busy road and the back of the pavement. Typically this will be within 5 m of the road, but could be up to 15 m (Defra, 2009).
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal.
Street Canyon	A relatively narrow street with buildings on both sides, where the height of the buildings is generally greater than the width of the road.

Trans-boundary traffic	Traffic emanating from beyond local area and travelling to destinations outside the local area
µg/m³	Micrograms per cubic metre.
USA	Updated Screening Assessment
WC	Worcester City Council
WCC	Worcestershire County Council
WDC	Wychavon District Council
WFDC	Wyre Forest District Council
WRS	Worcestershire Regulatory Services

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WCC (2011e) Worcestershire Local Transport Plan 3: Development Control (Transport) Policy

WCC (2011f) Worcestershire Local Transport Plan 3: Multimodal Freight Policy

WCC (2011g) Worcestershire Local Transport Plan 3: Integrated Passenger Transport Policy

WCC (2011h) Worcestershire Local Transport Plan 3: Intelligent Transport Systems Policy

WCC (2011i) Worcestershire Local Transport Plan 3: Smarter Choices Policy

WCC (2011j) Worcestershire Local Transport Plan 3: Sustainable Modes of Travel to School Strategy

WCC (2011k) Worcestershire Local Transport Plan 3: Transport and Climate Change Policy

WCC (2011m) Worcestershire Local Transport Plan 3: Traffic and Parking Management Policy

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10 Appendices

10.1 Appendix 1 - Lickey End AQAP update 2010

(A) Progress on Direct Action Plan measures

Action	Description	Organisation responsible	Original Timescale	Progress with measures	Outcome to date	Comments
Option 1	Speed Restriction to 50mph (80kph)	DfT/Highway Agency/ Police	Yet to be agreed (short/ medium term)	Liaison is continuing with the Highways Agency to discuss potential direct options for the M42 Junction 1. The Highways Agency attends the Air Quality Steering Group and met with BDC in June 2009 to review the Action Plan.	There are currently no proposals to introduce speed restrictions on the M42	Unlikely to be progressed before EU Limit target date of 2010.
Option 2	Reduction in traffic flows on the M42	Central Government/ Highways Agency	Not agreed. Need to identify measures that would enable it to be achieved.	Following a successful trial of Active Traffic Management (ATM) on the M42 (between J3a and J7), a feasibility study identified strategic locations to expand the use of this technology. Several schemes are currently in construction or design in the West Midlands based on locations that experience the greatest traffic volumes and congestion. The Highways Agency currently has no proposals to introduce this technology in the immediate vicinity of M42 J1.	No outcome to date	Unlikely to be progressed before EU Limit target date of 2010.
Option 3	Reduction in %LGV flows on the M42	Central Government/ Highways Agency	Not agreed. Need to identify measures that would enable it to be achieved.	Ramp Metering is in operation on some slip roads primarily to manage vehicular access onto the Motorway by improving traffic flows and thereby reducing congestion. The effect of Ramp Metering on local air quality was monitored at M5 J1 from September 2006 to January 2008. The results of this monitoring exercise were insufficiently conclusive and would not support the Highways Agency offering ramp metering as a proven means of contributing to the improvement of local air quality. Should further studies subsequently prove that ramp metering can be effective in contributing to the improvement of local air quality, Bromsgrove District Council will be pushing for the active consideration by the Highways Agency of the installing of ramp metering at M42 Junction 1.	There is insufficient evidence at present to justify the installation of Ramp metering at M42 J1 solely on the basis of improvements to local air quality.	Unlikely to be progressed before EU Limit target date of 2010. M42 Junction 1 does not meet the criteria for Ramp Metering.

Option 4	Reduction in overall background levels	Central Government/WCC/BDC	Ongoing	Being progressed through General Borough-wide measures. Refer to Table B, which follows.	Refer to Table B, which follows.	
Option 5	Introduction of tolls	Central Government/Highways Agency	Central government, HA or BDC have no plans to introduce tolls in this area.	Liaison is continuing with the Highways Agency to agree potential direct options for the M42 Junction 1. Update provided by Highways Agency is shown above.	No outcome to date	Unlikely to be progressed before EU Limit target date of 2010. Central government or the HA do not currently have a policy to introduce tolls or road user charging on the SRN.
Option 6	Improvements to Junction 1 of the M42	Highways Agency	The HA is proposing to put in box markings at junction 1 to reduce congestion due to gridlock and hence reduce emissions at the junction. Yet to be agreed (short/ medium term)	Observations indicate these markings are having a positive effect when traffic queues onto the junction by making a break in the queue so traffic can circulate to the M42 northbound. This helps to keep the traffic moving around the junction, reduces the likelihood of gridlock occurring and contributes to a reduction in emissions at the junction.	Completed in 2008	
Option 7	Removal of the M42 Junction 1 slip roads	Highways Agency/WCC/BDC	The HA do not intend to do this as it would lead to increased flows on local roads with increased accidents and congestion.		No further action is proposed by the Highways Agency	Unlikely to be progressed before EU Limit target date of 2010.
Option 8	Improved layout and signing on the M42 J1 westbound – M5 J4A to reduce collisions (and resulting congestion) and driver confusion resulting in them taking the wrong road and having to double back	Highways Agency	Scheme implemented in July 2007	This scheme will be subject to a Road Safety Audit Stage 4 report to review incident data in relation to the scheme. Data has recently been made available and the report is expected for autumn 2009. A subsequent safety study of the link roads from the M42 to the M5 has I some further improvements that will be implemented as a scheme in 2009/10. These improvements will further reduce the risk of incidents and resulting congestion, and have a positive effect in reducing associated emissions.	RSA4 expected for autumn 2009	

(B): Progress on General Action Plan measures

Proposed measure	Description	Organisation responsible	Original timescale	Progress measures with	Outcome to date	Comments
Measure 1	BDC will ensure that the Action Plan measures are co-ordinated with relevant Local Transport Plan (LTP) measures and provide WCC with annual progress reports on air quality.	BDC/ WCC	Ongoing	BDC has been working in partnership with WCC on air quality input into the LTP2. and forthcoming LTP 3	A38/M42 Lickey End AQMA and relevant action plan measures incorporated within the LTP3 under shared priorities Air Quality and Congestion	LTP3 includes strategies to reduce the impact of traffic on air quality. LTP3 aims to reduce congestion on the A38 through Bromsgrove through encouraging modal shift to the parallel rail corridor, and traffic management measures to reduce congestion at M42 Junction 1
Measure 2	BDC will work together with WCC to improve public transport facilities within Bromsgrove and develop Quality Partnerships ¹ (BQP) with transport providers to promote greater uptake of public transport.	BDC/ WCC	Ongoing	Bromsgrove Railway Station rebuilding programme are being progressed in 2011. The station is to be completely relocated south of existing location	No observed increase in public transport uptake to date.	. Capacity at Bromsgrove identified as constraint in LTP2. Improvements proposed include platform lengthening to allow longer trains to stop, and additional parking and facilities for cycling. A detailed plan for the new station has been completed and funding is now being sought.
Measure 3	BDC will work with WCC to develop and implement a Council Travel Plan in accordance with the LTP Objectives	BDC/ WCC	2004/5 This was delayed.	Work on this was suspended, a scheme to discourage usage of vehicles has been devised whereby car mileage allowances have been cut and bicycle mileage allowances have been promoted.	Evolving progress	Radical Changes to Structure of Council with Shared Services project with Redditch BC and formation of Worcestershire Regulatory Services, have driven these changes.
Measure 4	BDC will continue to work together with WCC to encourage the uptake of Employer and School Travel Plans within Bromsgrove.	BDC/ WCC	Ongoing	The LTP delivery report 2001-6 reported Employer and School Travel Plans to be above target.	In 2007 92% of the County's schools have implemented Safe Routes to Schools and 50% of schools have developed travel plans.	Proposals in LTP2 to have 100% schools with travel plans and to meet the Government target by 2010.

¹ Informal partnership involving dialogue with local authorities, public transport providers and other relevant stakeholders to improve public transport facilities

Proposed measure	Description	Organisation responsible	Original timescale	Progress measures with	Outcome to date	Comments
Measure 5	BDC will work together with WCC to improve the facilities for cycling and walking within Bromsgrove and encourage greater uptake. For new development, developers will be encouraged to provide secure parking facilities and cycle paths where appropriate.	BDC/WCC	Ongoing	BDC continues to work in partnership with WCC to deliver the cycling and walking strategies.	The decline in levels of cycling seen prior to LTP1 has been reversed and Worcestershire has evidence of increased levels (14% increase between 2001 and 2006) of cycling from the 15 permanent cycle monitoring sites established throughout the County and through the monitoring of School and Employer Travel Plans with an average increase in cycling to school and work after the implementation of a Travel Plan of 33% and 37% respectively	During 2005/06 around 2,000 children received on road pedestrian training and 3,500 cycle training.
Measure 6	BDC will work together with WCC to develop Freight Quality Partnerships ² and encourage wider uptake of freight by rail.	BDC/WCC	Ongoing	BDC continues to work in partnership with WCC	Countywide Freight Quality Partnership has been developed, which includes a Lorry Route Map	
Measure 7	BDC Environmental Health Services will continue to work closely with the Planning Department to ensure that air quality is taken into account in the planning process when located in or close to the AQMA or in areas marginally below air quality Objectives.	BDC	Ongoing	Worcestershire Regulatory Services continues to work closely with Planning Department	Ongoing process which takes place as part of the application process Countywide Air Quality Planning protocol adopted by all District Councils in Spring 2009	
Measure 8	BDC will continue to work together with developers to improve sustainable transport links serving new developments.	BDC	Ongoing	BDC continues to work together with developers	Ongoing process which take place as part of the application process	
Measure 9	BDC will develop supplementary planning guidance to assist with air quality assessments of development proposals	BDC	2004/5	Countywide Air Quality Planning protocol adopted by all District Councils in Spring 2009 this enabled AQ impact assessments to be demanded where criteria require it .	as a result of the Planning protocol being adopted separate document not needed. Reference within that is made to to the EPUK guidance where appropriate.	

² Informal partnership involving dialogue with local authorities, the freight industry and other relevant stakeholders to improve freight operation in the area and minimise its impact

10.2 Appendix 2 - Horsefair & Welch Gate AQAP update

Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to target emissions reductions
Implement Air Quality Strategy	Improve ability to manage air quality across the district	District Council	2005	2006	Adoption of Strategy	N/A	Strategy was adopted in 2006	N/A	N/A	N/A
Implement Hereford & Worcestershire County Air Quality Strategy	Improve ability to manage air quality across the region	District Councils	2008	2009	Adoption of Strategy	N/A	Strategy was adopted in 2009	On going	On going	N/A
Reduce NO ₂ emissions within Welch Gate AQMA	Improve traffic management & reduce unit emissions of NO ₂	Worcestershire County Council & Halcrow	2009	2010-2011	National Objectives for NO ₂	Yes	County Council Considering options	Feasibility Study Completed by Halcrow (See additional information below)	On going	Reduction of NO ₂ to a level that is managed below 40 µg/m ³
Reduce NO ₂ emissions within Horsefair/Radford Avenue AQMA	Improve traffic management & reduce unit emissions of NO ₂	ReWyre Prospectus, County Council/Wyre Forest District Council	2009	2009-	National Objectives for NO ₂	Yes	None to date	Publication of ReWyre Prospectus & Promotion (See additional information below)	On going	Reduction of NO ₂ to a level that is managed below 40 µg/m ³

10.3 Appendix 3 - LTP3 summary

LTP3 ID	Scheme Name	Description of Improvements	AQMA benefitting	Improvement Type - Direct/Adjacent/Indirect or General	Current Status/Timeline for completion from WCC Highways Feb 2013
BR1	Bromsgrove New Station Scheme	Will allow longer trains to call at station, increased public transport capacity, increase to 350 car parking spaces	Mostly Redditch Rd, Worcester Rd	Indirect. General improvement to public transport	Public consultation underway. Programme date for opening 17th May 2015.
BR2	Bromsgrove Eastern Bypass Enhancement Scheme (including AQMA remediation)	A package of enhancement measures, including major junction improvements and measures to improve accessibility to the railway. Integrated with other schemes in Bromsgrove	Redditch Rd, Lickey End	Directly linked to AQMA	One of options for Bromsgrove Transport Package. No decision on what package will entail.
BR4	Bromsgrove Traffic and Parking Management Study	Study would identify where to focus investment to improve the operation of the local transport network.	Redditch Rd, Worcester Rd, Lickey End	Indirect. Could lead to more focus on alleviating AQMAs	One of options for Bromsgrove Transport Package. No decision on what package will entail.
BR5	Bromsgrove Minor Transport Improvements Scheme	Minor complimentary transport improvements to enhance safety, accessibility, information and travel choice.	Redditch Rd, Worcester Rd, Lickey End	Indirect. General improvements across area	One of options for Bromsgrove Transport Package. No decision on what package will entail.
NE5	Hagley Station Enhancement	Improvements to passenger facilities	Hagley	Indirect. General improvement to public transport	No proposals at this time.
W1	Worcester Foregate Street Enhancement	Significant improvement to passenger facilities including quality of interchange with other transport modes	All Worcester AQMAs	Indirect. General improvement to public transport	Awaiting funding clearance from Department for Transport. Programmed date for completion is September 2013.
W2	Worcester Shrub Hill Station Enhancement	Improvements to infrastructure and facilities	All Worcester AQMAs potentially	Indirect. General improvement to public transport	No proposals at this time.

LTP3 ID	Scheme Name	Description of Improvements	AQMA benefitting	Improvement Type - Direct/Adjacent/Indirect or General	Current Status/Timeline for completion from WCC Highways Feb 2013
W7	Worcester Shrub Hill and Lowesmoor Area Maintenance & Improvement	A comprehensive programme of junction and traffic signals enhancements, street furniture decluttering, replacement and enhancement, and improved information systems	Lowesmoor – Rainbow Hill	Adjacent. Improvements to connecting route	At planning stage.
W9	Worcester City Walls Rd/ Cathedral Sq/ Deansway corridor maintenance & improvement	A comprehensive programme of junction and traffic signals enhancements, street furniture decluttering, replacement and enhancement, and improved walk and cycle infrastructure, and passenger transport infrastructure and information	Bridge St/ Dolday	Adjacent. Improvements to connecting route	At planning stage.
W11	Worcester – City Secure Cycle parking	Provision of indoor cycle parking facilities in City Centre to make cycling more attractive	All Worcester AQMAs potentially	Indirect. General improvement to other transport facilities	No proposals at this time.
W14	Worcester – Crown East (West of Worcester) Park & Ride	Provide a Park and ride alternative to access for residents of the rural areas to the west of Worcester as well as residents of any new developments approved in the area.	St Johns, Bridge St/ Dolday, Foregate St	Indirect. General improvement to public transport	No proposals at this time.
W17	Worcester – Rail capacity Improvement	Upgrading rail signalling and junctions, removal of single track operations, enhance capacity and improve reliability	All Worcester AQMAs	Indirect. General improvement to public transport	Not in current Network Rail work scheme. Likely to be 2021-2025.
SW6	Evesham B4035 Port St/Waterside Junction Enhancement (AQMA remediation scheme)	Maintenance and upgrading of this busy junction including MOVA intelligent traffic signal control system.	Port St, Evesham	Direct	Related to replacement of Abbey Bridge.

LTP3 ID	Scheme Name	Description of Improvements	AQMA benefitting	Improvement Type - Direct/Adjacent/Indirect or General	Current Status/Timeline for completion from WCC Highways Feb 2013
SW13	Worcester to Evesham Rail line Dualling Scheme	Reinstate dual track increase capacity on Cotswold Line	Port St, Evesham, all Worcester AQMAs	Indirect. General improvement to public transport	No proposals at this time.
SW19	Evesham River Avon Walk Cycle Bridge (north of walkmans bridge)	Development of a walk cycle bridge from new Offenham Rd Estate to High St/Railway station in Evesham providing link to key facilities and Evesham Town Centre	Port St, Evesham	Indirect. General improvement to other transport facilities	No proposals at this time.
K2	Kidderminster – Ring Road Junction and Public Realm Improvement Scheme	Enhancement/redevelopment of the ring road to improve efficiency, functionality and appearance, in particular to mitigate the AQMA	Horsefair, Kidderminster	Direct	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.
K3	Kidderminster – Station Enhancement	Upgrading railway station to more attractive and appropriate transport gateway to town and integrated with Severn Valley Railways.	Horsefair, Kidderminster	Indirect. General improvement to public transport	On hold pending identification of funding.
K5	Kidderminster – Traffic & Parking Study	Study would identify where to focus investment to improve the operation of the local transport network.	Horsefair, Kidderminster	Indirect. Could lead to more focus on alleviating AQMAs	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.
K6	Kidderminster – Minor Transport Improvements Scheme	Minor complimentary transport improvements to enhance safety, accessibility, information & travel choice integrated with other schemes	Horsefair, Kidderminster	Indirect. General improvements across area	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.
K7	Kidderminster – Secure Cycle Parking Scheme	Provision of indoor cycle parking facilities in Town Centre to make cycling more attractive	Horsefair, Kidderminster	Indirect. General improvement to other transport facilities	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.

LTP3 ID	Scheme Name	Description of Improvements	AQMA benefitting	Improvement Type - Direct/Adjacent/Indirect or General	Current Status/Timeline for completion from WCC Highways Feb 2013
BE1	Bewdley (Welch Gate) AQMA Remediation	Involve changing traffic flows through Bewdley Town Centre using a variety of measures, to manage traffic flows through Town Centre to manage traffic flow and mitigate AQMA at Welch Gate	Welch Gate, Bewdley	Direct	Trials have been held. Next step to commission design based on trial outcomes.
BE3	Bewdley – Traffic & Parking Study	Study would identify where to focus investment to improve the operation of the local transport network.	Welch Gate, Bewdley	Indirect. Could lead to more focus on alleviating AQMAs	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.
BE4	Bewdley – Minor Transport Improvements Scheme	Minor complimentary transport improvements to enhance safety, accessibility, information & travel choice integrated with other schemes	Welch Gate, Bewdley	Indirect. General improvements across area	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.
BE5	Bewdley – Walk/Cycle Bridge Scheme	Development of a walk/cycle bridge over River Severn south of Bewdley bridge	Welch Gate, Bewdley	Indirect. General improvement to other transport facilities	Would form part of Wyre Forest Transport Package. Programmed for later in Local Transport Plan.
WF1	A456 Kidderminster – M5 (J3 and J4) Inter urban corridor maintenance and improvement	A comprehensive corridor length programme of improvements including junction enhancements, street furniture decluttering, replacement and enhancement	Horsefair, Kidderminster	Adjacent. Improvements to connecting route	No proposals at this time.
WF2	A448 Kidderminster – Bromsgrove Inter urban corridor maintenance and improvement	A comprehensive corridor length programme of improvements including junction enhancements, street furniture decluttering, replacement and enhancement	Horsefair, Kidderminster, Worcester Road, Bromsgrove	Adjacent. Improvements to connecting route	See comments relating to Bromsgrove and Wyre Forest Transport Packages.

LTP3 ID	Scheme Name	Description of Improvements	AQMA benefitting	Improvement Type - Direct/Adjacent/Indirect or General	Current Status/Timeline for completion from WCC Highways Feb 2013
WF3	A449 Kidderminster – Worcester Inter urban corridor maintenance and improvement	A comprehensive corridor length programme of improvements including junction enhancements, street furniture decluttering, replacement and enhancement	Horsefair, Kidderminster	Adjacent. Improvements to connecting route	No proposals at this time.

10.4 Appendix 4 - LTP3 Topic Specific Policies and objectives relevant to Air Quality

Transport Accessibility Policy

Objectives of Accessibility Policy in context of air quality:

LTP3 Objective	Worcestershire Sustainable Community Strategy Objective	How policy delivers against these objectives
To reduce Worcestershire's transport-related emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change.	A better environment for today and tomorrow	Developing an accessible transport network increases travel choice and encourages sustainable travel behaviour. Increasing travel choice and making travel by sustainable modes more attractive will contribute towards achieving modal shift and less use of carbon-intensive modes of transport. In the long-term this will contribute to reduced surface transport emissions.
To contribute towards better safety, security, health and longer life expectancy in Worcestershire, by reducing the risk of death, injury or illness arising from transport and promoting healthy modes of travel.	Communities that are safe and feel safe	Developing accessible transport networks will encourage travel on foot and by cycle, which is part of a healthy lifestyle, promote public health and encourage responsible car use. Providing options for people to travel by sustainable modes, which encourage public participation and social cohesion, and can act to enhance actual and perceived safety in public spaces.
To enhance the quality of life for Worcestershire's residents, and to protect and promote a healthy, natural environment.	Improving health and well being	An accessible transport network contributes to improved quality of life and a healthy natural environment by promoting a mobile and economically active society, making travel by sustainable modes an attractive alternative to the private car, enabling the use of less carbon intensive forms of transport and maximising the efficiency of the existing network. Over the LTP3 period this will contribute to a reduction in noise pollution and an improvement in air quality.

Policy A1 – Accessibility Methodology

Worcestershire County Council will employ a variety of methods of assessing accessibility, dependent upon the purpose of the analysis. The methodologies will include:

- **Threshold Measures:** High-level and simple measurements providing limited indication of accessibility (e.g. existing indicator NI176), not suitable for specific transport planning purposes;
- **Access Measures:** takes into account the frequency of passenger transport services, the location of passenger transport infrastructure and accessibility for specific demographic groups and the individuals' different abilities to access passenger transport services by walking and cycling;
- **Continuous Measures:** These take account of the relative "importance" of destinations to be accessed and provide a realistic and meaningful measure of accessibility. This is particularly useful when having to prioritise transport schemes in terms of the benefits that they will deliver to Worcestershire residents.
- **Comparative Measures:** These enable comparison between, for example, geographic areas and can highlight the transport-related disparities in accessibility which lead to problems in terms of economic performance, social deprivation, vehicle emissions and air quality, for example.

Policy A3 – Multi-modal Accessibility Analysis

The County Council will undertake accessibility analysis for a range of purposes, and will adopt an appropriate methodological approach depending on the requirements of the assessment, including:

- The assessment of existing and forecast accessibility to key services and facilities in Worcestershire and beyond;
- Identification of where poor accessibility to key services and facilities threatens to undermine economic activity and social wellbeing;
- Development and appraisal of measures targeted at improving accessibility in support of funding bids (where the methodology may be prescribed by the funding body);
- Assessment of the existing and future accessibility (by all modes of transport) of land use development proposals; and
- Regular monitoring and reporting of accessibility to key health, employment, leisure, education, retail and transport interchanges (HELERT) for residents in Worcestershire.

Policy A4 – Assessing Access to Key Services and Facilities in Worcestershire

Worcestershire County Council will undertake technically robust accessibility analysis to:

- Accurately assess levels of accessibility across all modes of transport;
- Identify and quantify accessibility problems so that interventions can be targeted appropriately;

- Quantify the benefits of proposed interventions (both infrastructure and services enhancements); and
- Prioritise accessibility improvements so that they provide value for money.

The analysis will be undertaken using the Worcestershire County Council Accession model, Geographic Information Systems (GIS) and other bespoke models as may be necessary.

The analysis will take account of:

- Demographic characteristics;
- Journey times (by all transport modes) to key destinations;
- The relative importance of destinations and services, particularly in terms of the number of opportunities provided, e.g. employment places;
- The need to provide a fair comparison between different parts of the county; and
- The competitiveness of walk, cycle and passenger transport modes in comparison with the car.

Policy A5 – Identifying Where Poor Accessibility Impacts on Achievement of Defined Objectives

Worcestershire County Council will:

- Identify areas where accessibility is poor;
- Highlight where this is inhibiting the achievement of economic, environmental, health and quality of life objectives;
- Identify possible solutions, including those which could require the involvement of other organisations;
- Design, test and assess multi-modal transport or other measures which could resolve the accessibility issue;
- Quantify the benefits and effects of interventions; and
- Prioritise development and delivery of the interventions to maximise efficient use of resources.

Policy A8 – Accessibility and Land-use Planning

Worcestershire County Council will oversee and inform the accessibility assessments of land use developments for strategic and site-specific purposes in order to ensure that:

- Transport infrastructure and service provision is adequate and the appropriate mix, range and level of land uses, services and facilities are provided on site;
- Where intervention is required the development proposals result in accessible developments which maximise the use of sustainable transport modes;
- Proposed developments are fully compliant with local and national transport and planning policies; and
- Transport Assessments submitted by developers in support of planning applications follow in full the accessibility assessment guidelines set out in the Worcestershire County Council Requirements for Transport Assessments.

Transport and Air Quality Policy

Objectives of policy in context of air quality:

LTP3 Objective	Worcestershire Sustainable Community Strategy Objective	How policy delivers against these objectives
<p>To reduce the impacts of transport in Worcestershire on the local environment, by reducing noise and transport related emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change and reducing the impacts of transport on public health.</p> <p>The Environment Objective</p>	<p>A better environment for today and tomorrow</p>	<p>With transport emissions cited as the lead cause of Air Quality Management Area designation in Worcestershire, transport-related air quality management measures are well placed to deliver against these objectives by reducing emissions.</p>
<p>To contribute towards better safety, security, health and longer life expectancy in Worcestershire, by reducing the risk of death, injury or illness arising from transport and promoting healthy modes of travel.</p> <p>The Health and Safety Objective</p>	<p>Communities that are safe and feel safe</p>	<p>Where transport-related air quality management measures are considered, these are normally developed to reduce motorised traffic levels (and emissions) in designated Air Quality Management Areas. These measures often involve enhancements to infrastructure to support the use of more sustainable, healthy modes such as walking and cycling. As such, where traffic is reduced and sustainable modes are promoted, this can act to directly deliver against these objectives, by creating safer public spaces and healthier travel choices.</p>
<p>To enhance the quality of life for Worcestershire's residents by promoting a healthy, natural environment, conserving our historic built environment and preserving our heritage assets.</p> <p>The Quality of Life Objective</p>	<p>Improving health and well being</p>	<p>Transport-related air quality management measures can help protect the natural environment and the historic fabric of our towns and cities, by reducing the adverse effects of otherwise unsustainable traffic growth and promoting responsible and efficient travel choice. This can act to enhance overall quality of place, and therefore quality of life in Worcestershire.</p>

Policy AQ1 – Measuring and Monitoring Air Quality

Worcestershire County Council will continue to work with the authorities responsible for measuring and monitoring air quality to:

- Identify at an early stage potential air quality deterioration;
- Understand the transport related causes of designated Air Quality Management

Policy AQ2 – Partnership Working

Worcestershire County Council will continue to work its partners, including the Herefordshire & Worcestershire Pollution Group, the Worcestershire Borough, City and District Councils transport operators and infrastructure providers and the Worcestershire Partnership to:

- Inform, influence and respond to the development of Air Quality Management Area Action Plans;
- Provide information on traffic flows and other transport developments as required;
- Make informed decisions on planning documents as required;
- Develop transport schemes to mitigate (or ideally resolve) localised poor air quality caused by transport emissions.

Policy AQ3 – Approach to Air Quality Management in Worcestershire

Worcestershire County Council will adopt an approach to the management of transport related air quality issues which is consistent with the goals of:

- Minimising the impact of transport on air quality and the wider environment
- Supporting the performance of the Worcestershire economy
- Increasing transport choice and encouraging modal shift, particularly in congested urban areas and along key inter-urban corridors
- Promotion of Air Quality issues to wider public

Policy AQ4 – Identifying and Assessing the Air Quality Impacts of New Land Use Developments and Unconstrained Traffic Growth

Worcestershire County Council will work with partners, including public and private sector developers, the Worcestershire Borough, City and District Councils and transport infrastructure providers and operators to:

- Forecast the impact on air quality of new land use development proposals, transport schemes and traffic growth
- Identify the potential impact of these on Existing Designated Air Quality Management Areas
- Identify the potential air quality impact on other parts of the network, including those areas/corridors/locations at a high risk of being designated as Air Quality Management Areas

This work will help to determine Worcestershire County Council's response to changes in land uses and major new developments in terms of the mitigating measures, new infrastructure and services, travel plans etc. required to minimise the impact on air quality.

Policy AQ5 – Targeting Existing Air Quality Management Areas caused by Transport Emissions

Worcestershire County Council will:

- Target interventions on existing designated Air Quality Management Areas
- Help to develop schemes needed to reduce or remove the air quality effects of transport
- Set out the interventions required, those responsible for their funding and delivery and the implementation timescale

Policy AQ6 – Managing Impact on Air Quality of Land Use Developments

Worcestershire County Council will work with land use planners, transport operators and infrastructure providers to:

- Minimise the need to travel by motorised transport, for example through provision of essential facilities such as health, retail and education, close to or within new developments.
- Integrate pedestrian, cycle and passenger transport infrastructure and service requirements with new land use developments from the outset of the planning process
- Ensure that promoters of new developments contribute towards the costs of providing pedestrian, cycle and passenger transport infrastructure and services (including on-going revenue support where this is required to deliver an adequate level of service and accessibility)
- Ensure that the Transport Assessment provided in support of planning applications for new developments take account of the impact on air quality of traffic generated by new developments, including in non-adjacent areas

Policy AQ7 – Developing Measures to Deal with Potential Future Air Quality Management Areas

Worcestershire County Council will work with partners to:

- Develop and appraise the measures (individual and in combination) to deal with potential future Air Quality Management Areas
- Develop business cases and (where required) funding bids to access the funds needed to implement the measures
- Deliver (subject to funding) agreed measures to enhance local air quality
- Monitor the performance of implemented measures
- Support measures that have the potential to improve air quality across Worcestershire
- Support measures that protect and enhance the natural environment of the County

Cycling Policy

Objectives of policy in context of air quality:

LTP3 Objective	Worcestershire Sustainable Community Strategy Objective	How policy delivers against these objectives
To enhance the quality of life for Worcestershire's residents by promoting a healthy, natural environment, conserving our historic built environment and preserving our heritage assets. The Quality of Life Objective	Improving health and well being	Increased levels of cycling helps to counter the adverse effects of traffic growth, such as congestion and air and noise pollution. This can act to enhance overall quality of place, and therefore quality of life in Worcestershire. Cyclists can improve a person's wellbeing and the cycling network includes pleasant traffic-free routes through the county's green spaces.

Policy C1 – Partnership Working to Deliver Cycling Measures

The cycle network in Worcestershire comprises the majority of public highways, some categories of public rights of way and a range of other off-road routes, in public or private ownership. Worcestershire County Council will work in partnership with the City, Borough and District Councils and other organisations, including voluntary interest groups and fora, to continue to develop a comprehensive cycling network. The County Council will seek to create a network which is convenient and comfortable to use, enhances accessibility to key destinations, is safe and attractive. Worcestershire County Council will in particular look to:

- Tackle road safety hazards which discourage people from cycling;
- Identify features which act as barriers to cycling and formulate a long-term programme to overcome these.

Policy C2 – Cycle Network Infrastructure & Other Measures for Cyclists

The County Council recognises that different groups of cyclists have different needs. It will choose appropriate cycling measures – including off-road routes and reallocating roadspace - to create a cycling network which meets the five core principles of convenience, accessibility, safety, comfort and attractiveness. Links in the cycle network will be designed according to the following criteria:

- The position of cycling in the modal hierarchy (see LTP3 Traffic Management & Parking Policy) for the road in question;
- The volume and speed of motorised traffic and proportion of HGVs;
- The volume of pedestrians which may have to share the route
- The types of cyclist being catered for;
- The number of side roads or frontage accesses;

- The presence of on-street parking; and
- The availability of suitable off-road routes.

The needs of cyclists will inform the design and redesign of junctions. In particular consideration will be given to:

- Advanced stop lines at all signal junctions; and
- Constructing new or converting existing roundabouts with continental-style geometry which slow entry traffic speeds and make cyclists more visible.

In considering appropriate infrastructure for cyclists, Worcestershire County Council will take into account the above criteria and best practice guidance documents to design routes of an appropriate width, gradient and horizontal alignment.

The County Council will continue to work with the Borough, City and District Councils to identify and protect the alignment of suitable off-road routes in Local Development Framework documents.

Policy C3 – Maintenance

With regard to highway maintenance, Worcestershire County Council will ensure that its programme takes account of the needs of cyclists, including issues such as pothole repairs, dealing with uneven road surfaces, addressing up-stands at dropped kerb locations and sunken manhole covers.

The County Council will work in partnership with the Worcestershire Borough, City and District Councils to ensure on-and off-road routes receive a suitable cleansing and sweeping regime.

The County Council recognises that certain maintenance issues and maintenance on certain routes are more critical than others. It will prepare a priority list to ensure that when the authority becomes aware of maintenance defects which could significantly endanger cyclist safety these are tackled promptly.

Policy C4 – Spatial Planning and Developer Contributions for Cycling

Worcestershire County Council will continue to work closely with the Worcestershire Borough, City and District Councils to ensure that new developments:

- Are located to maximise cyclist accessibility to local facilities
- Are designed to maximise cycle permeability and legibility, and minimise delays to journeys by cycle;
- Are designed to maximise natural surveillance on cycle routes;
- Are designed to incorporate cycle parking and other suitable facilities, on-site or within buildings as appropriate; and
- Make suitable financial contributions towards improvements to the cycling network, including those proposed in the LTP3 Delivery Plan or Local Development Framework documents.

Policy C5 – Lighting Off Road Cycle Routes

The County Council will consider lighting off-road cycle routes on their individual merits, taking into account the number of users, the security benefits, environmental considerations, the potential for new types of lighting, installation and maintenance costs.

Policy C6 – Enhancements to Traffic Regulation Orders

Worcestershire County Council will investigate the enhancing Traffic Regulation Orders to promote increased cycling. In particular:

- Consideration will be given to trialling enhancements to enable an assessment of the appropriateness of the enhancement;
- Where full cyclist access to existing or proposed pedestrianised areas is not appropriate, consideration will be given to limiting the cycle restriction to the busiest pedestrian hours only;
- Where physical measures are used to enforce the TRO and prevent use by motor vehicles, suitable routes through the physical measures which are free from obstructions will be provided to enable cyclists to safely use these routes;

The County Council will also consider altering TROs where the overall benefits, particularly to cyclists, would on balance outweigh any dis-benefits to particular road users, frontagers or environmental conditions

Policy C7 – Parking for Bicycles

Worcestershire County Council will work in partnership with the City, Borough, District and Parish Councils along with other organisations, including landowners, to provide appropriate levels of cycle parking at key destinations. In considering suitable locations, the County Council will wish to be satisfied that they:

- Do not cause a hazard or obstruction to pedestrian movement;
- Do not place cyclists in danger from road traffic;
- Benefit from suitable levels of 'natural surveillance'; and
- Are placed as close as practicable to the entrances to key destinations (within 20 metres is recommended).

Cycle parking must be of the most appropriate type and style for the surroundings and space available. Sheffield Stands are the County Council's preferred design for short stay cycle parking, although other styles in some cases may be preferable, such as in Conservation Areas or where space is limited. The County Council will also have regard for the potential dual uses of cycle stands (e.g. acting as bollards). The County Council will in general oppose the use of 'butterfly' stands.

Particular attention will be paid to security and shelter of long-stay cycle parking.

Worcestershire County Council will work with the Worcestershire Borough, City and District Councils to ensure that cycle parking standards for new developments reflect best practice in terms of their quantity, quality and location and will update these as required.

Policy C8 – Cycle Network Direction Signing

Worcestershire County Council will provide clear and concise direction signing for cyclists. The signing should promote cycling and leave cyclists in no doubt that they are on the correct route.

Worcestershire County Council will seek to minimise the quantity of signs and other street furniture on the cycle network, consistent with the need for safety and suitable information provision. In particular, 'End of route' and 'cyclists dismount' signs will, as a rule, not be used. Directional signs with times and distances will be provided where beneficial to do so.

Policy C9 – Cycle Hire

Worcestershire County Council will continue to promote cycle hire locations in its leisure cycling promotional material. The County Council is not currently considering implementing a comprehensive cycle hire scheme but will keep this under review.

Policy C10 – Cycle Training

Worcestershire County Council will continue to work in partnership with other organisations, including Sustrans, to provide a structured cycle training programme to young people and adults. Cycle training courses to the Bikeability National Standard will be offered to all school children in the county who wish to receive it. Where appropriate, road safety campaigns will promote and highlight safe and courteous cycling techniques.

Policy C11 – Cycle Promotion and Information

Worcestershire County Council will continue to work in partnership to promote cycling and its wider benefits (e.g. health) and provide suitable information on a range of relevant subjects, including routes, benefits of cycling and road safety messages.

Policy C12 – Driver Education

Worcestershire County Council will work with its partners to improve driver education provision and road safety campaigns to educate drivers of what intimidates cyclists (e.g. the lack of space given) especially where the speed differential is an issue or where overall road space is limited.

Policy C13 – Cycle Security

Alongside secure cycle parking, Worcestershire County Council will work in partnership with West Mercia Police and the British Transport Police to identify and undertake other measures to combat cycle crime including increased police action and enforcement, crime prevention advice and postcode marking of cycles.

Policy C14 – Cycle Measures at the Workplace

Worcestershire County Council will continue to work with employers to promote measures which can improve conditions for commuter cyclists and break down barriers to cycle commuting. The County Council will encourage employers to take up measures such as:

- Good quality changing facilities and lockers;

- The cycle to work scheme for cycle and cycle equipment purchase;
- Pool bikes and repair kit; and
- Providing cycle mileage allowances for work journeys undertaken by bike

Development Control (Transport) Policy

Objectives of policy in context of air quality:

LTP3 Objective	Worcestershire Sustainable Community Strategy Objective	How policy delivers against these objectives
<p>To reduce the impacts of transport in Worcestershire on the local environment, by reducing noise and transport related emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change and reducing the impacts of transport on public health.</p> <p>The Environment Objective.</p>	<p>A better environment for today and tomorrow</p>	<p>Provision of the transport infrastructure and services from the outset of the delivery of new developments can act to significantly enhance the efficiency of constrained transport networks. In particular by encouraging responsible car use and promotion of sustainable modes. This acts to reduce the impact of transport on climate change.</p>
<p>To contribute towards better safety, security, health and longer life expectancy in Worcestershire, by reducing the risk of death, injury or illness arising from transport and promoting healthy modes of travel.</p> <p>The Health and Safety Objective</p>	<p>Communities that are safe and feel safe</p>	<p>The effective planning of transport infrastructure and services for new developments can assist in the delivery of these objectives by enhancing the efficiency of transport networks, providing clear information which can encourage more, responsible, safe use of Worcestershire's transport networks. Furthermore, the promotion of sustainable modes and responsible car use through effective Travel Plans can promote active lifestyles and enhanced public health.</p>
<p>To enhance the quality of life for Worcestershire's residents by promoting a healthy, natural environment, conserving our historic built environment and preserving our heritage assets.</p> <p>The Quality of Life Objective</p>	<p>Improving health and well being</p>	<p>Working with key stakeholders in the effective planning of transport infrastructure and services for new developments through the master-planning process can help to protect the natural environment and historic fabric of our towns and cities by reducing the adverse effect of unsustainable traffic growth and promoting responsible and efficient travel choice.</p>

Policy DC1 – Planning Sustainable Development

Worcestershire County Council will work in partnership with the Worcestershire Borough, City and District Councils and developers across Worcestershire to ensure that all new developments in the county are designed to be sustainable and are consistent and comply with relevant emerging and adopted strategies and policies, including Core Strategies and Local Development Frameworks.

In planning new developments and providing supporting Transport Assessments and Statements, the promoters must:

- Explore all feasible methods of encouraging sustainable transport behaviour (i.e. increased use of walk, cycle and passenger transport)
- Not focus on road building or highway capacity enhancements as the sole means of catering for the transport demand generated by development
- Reduce the need to travel, including through by promoting more sustainable patterns of development
- Seek to reduce the length of trips, in particular for single occupancy car trips
- Promote multi-purpose or linked trips, including through reducing the physical separation of key land uses
- Actively address the environmental impact of travel improving sustainable transport choices
- Maximise accessibility by walk, cycle and passenger transport modes
- Have proactive and appropriately funded Travel Plans which assist in influencing travel behaviour
- Make best possible use of existing transport infrastructure
- Manage access to the highway network
- Mitigate the residual effects on the road network of traffic generated by the new development
- Demonstrate effective connections to the strategic road network and by passenger transport to key locations
- Assessment of the traffic impacts during the construction phase and mitigation proposals.

Policy DC2 – Planning Environmentally Sustainable Development

Worcestershire County Council will work in partnership with the Worcestershire Borough, City and District Councils and developers across Worcestershire to ensure that all new developments in the county are designed to be sustainable, in that their impacts on the environment are minimised.

To ensure this in the planning of new developments, Transport Assessments and Statements must pay due regard to assessing:-

- Impact of development generated travel demand on transport emissions
- Impact of development generated travel demand on any existing or proposed Air Quality Management Areas (AQMAs)

Policy DC4 – Maximising use of Existing Transport Infrastructure and Services

Worcestershire County Council expect that in planning new developments promoters will maximise use of existing transport infrastructure and services in accommodating demand generated by new/changed land uses. Methods of achieving this include:

- Locating developments on existing walk, cycle and passenger transport routes and services
- Maximising use of non-car modes, such that the impact on congested sections of the network are minimised
- Investing in passenger transport infrastructure to enhance service efficiency enabling new developments to be served without incurring additional revenue costs

Where demand generated by a new development exceeds the capacity of the network (including each mode of transport), the promoter of the development will be expected to contribute towards the capital and on-going revenue costs of new infrastructure and services.

Policy DC5 – Delivering Accessible Developments

Worcestershire County Council requires that in planning new developments promoters will:

From the outset seek to maximise accessibility by sustainable transport modes (walk, cycle and passenger transport)

Plan to deliver high levels of accessibility for the development to/from key services and facilities, including: health, employment, education, retail, leisure and transport interchanges (for onward longer distance journeys)

Provide evidence of the proposed level of accessibility as set out in Worcestershire County Council's "Requirements for Transport Assessments and Transport Statements", which requires assessment of:

- Pedestrian and cycle access to/from/within the development
- Passenger transport, and private car accessibility to health, employment, education, retail, leisure and transport interchange destinations for weekday AM peak, weekday inter-peak, weekday PM peak, weekday evening, Saturday daytime, Saturday evening and Sunday daytime periods
- The population which can access passenger transport services within an acceptable walking distance (approximately 250m)
- The effects of traffic congestion on passenger transport and car journey times
- Accessibility during the "opening year" scenario and forecast year scenarios (taking account of the phasing of the development)
- The infrastructure and service improvements that are required to deliver accessibility to key services and facilities

Policy DC6 – Evidence Base Needed to Support Planning and delivery of Sustainable Development

Worcestershire County Council requires that in identifying the infrastructure and services required to deliver sustainable development, promoters will:

- Provide an evidence based assessment of the likely trip generation by the development
- Show the proportion of trips with origins and destinations external to the development, including an assessment for freight. Evidence should be presented to demonstrate how the predicted external trip generation will be secured, delivered, monitored and maintained
- Provide an evidence based assessment of the anticipated origin and destination of external trips
- Provide an evidence based assessment of the mode share for external trips, including for freight. Evidence should be presented to demonstrate how this will be secured, delivered, monitored and maintained
- Provide the evidence base for mode share forecasts. This should include a detailed assessment of the accessibility of the development across all transport modes, taking into account proposed additional transport infrastructure and services
- Provide an evidence based assessment of the impact on the Worcestershire transport network (across all modes) of the travel demand generated by the proposed development. This must take account of the background growth in travel demand on the network and travel demand associated with committed developments, as agreed with WCC
- Set out details of the proposed transport infrastructure mitigation measures for all modes of transport with sufficient assessment of the proposed measures to demonstrate their deliverability and cost
- Set out details of the proposed measures to cater for trips internal to the development.
- Make appropriate use of the Transport, Traffic and Accessibility Models developed by Worcestershire County Council to support the transport assessments as set out in the WCC Guidance on Transport Assessments and Statements.

Policy DC7 – Transport Infrastructure and Services needed to deliver Sustainable Development

Worcestershire County Council requires that in identifying the transport infrastructure and services required to deliver sustainable development, promoters will:

- Provide an evidence based assessment of the forecast mode share for internal and external trips (see Policy DC6 and WCC Requirements for Transport Assessments and Transport Statements)
- Set out details of the infrastructure needed to deliver these forecast mode shares
- Produce a 20 year business case for the passenger transport services required to deliver the forecast mode shares. This will demonstrate, over the 20 year period, the anticipated:

- Demand
- Revenue
- Operating costs
- Revenue support profile
- Identify the proposed source of funding for that revenue support.
- Demonstrate how provision of sustainable transport services will be promoted from the start of occupation of the development and proposals for securing and phasing of sustainable transport services.

Policy DC8 – Developer Contributions for Transport Infrastructure and Services

Worcestershire County Council, as the strategic transport authority, will work in partnership with the Worcestershire Borough, City and District Councils across the County to:

- Ensure that there is a co-ordinated approach to delivering new land use developments that are sustainable and policy compliant
- Ensure that the appropriate levels of financial contributions toward the cost of transport infrastructure and services are obtained from developers.

This policy will be used as part of the development control process to inform planning decisions. Future infrastructure requirements will be identified and developed through the emerging LTP3 strategies and associated LTP3 Five Year Delivery Plans alongside District Council Core Strategy documents. This will take full account of the role of Community Infrastructure. Levy and associated mechanisms to help deliver the strategic transport infrastructure needed for sustainable growth.

These requirements will take account of the planned growth across the County and the need to ensure that new developments are, in terms of transport, sustainable environmentally, economically, and financially.

Policy DC9 – On-going Revenue Support for Transport Infrastructure and Services

Worcestershire County Council will work in partnership with Worcestershire Borough, City and District Councils across the County to ensure that contributions from developers toward the on-going cost of:

- Maintaining walk, cycle, passenger transport and highway infrastructure and services required to deliver developments that are sustainable and policy compliant

This policy will be used as part of the transport-related development control process to inform planning decisions.

Policy DC10 – Travel Plans

Worcestershire County Council will work with developers to ensure that effective, adequately funded, resourced and monitored Travel Plans are developed in support of all planning applications and develop a process for the improvement, monitoring and review of Travel Plan measures and agreed outcomes to ensure that all development is delivered sustainably (as set out in the LTP3 Smarter Choices Policy).

Policy DC11 – Transport Related Development Control Processes

Worcestershire County Council's transport-related development control process:

- Planning of Development through the Transport Assessment/Transport Statement Process
- Identification and optimisation of the use of existing infrastructure
- Maximising accessibility by passenger transport, walking, cycling and private car of new developments
- Identification and delivery of transport infrastructure required to mitigate the impact of new developments
- Identification and delivery of transport services required to mitigate the impact of new developments
- Funding of transport infrastructure and services (Section 106, 38, 278 agreements and LTP3 funding)
- Linking development related infrastructure and service requirements into with LTP3 5 Year Delivery Plan
- Monitoring of Developments (Travel Plans)

Multimodal Freight Policy

Objectives of policy in context of air quality:

LTP3 Objective	Worcestershire Sustainable Community Strategy Objective	How policy delivers against these objectives
<p>To reduce the impacts of transport in Worcestershire on the local environment, by reducing noise and transport related emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change and reducing the impacts of transport on public health.</p> <p>The Environment Objective</p>	<p>A better environment for today and tomorrow</p>	<p>Measures to enhance the efficient operation of freight, and the encouragement of more sustainable modes of transit (such as rail freight and water freight) can help to protect the natural environment and the historic fabric of our towns and cities, by reducing the adverse effects of unsustainable growth in road-based traffic.</p> <p>Measures to enhance the efficiency of freight movements and encouragement of more sustainable modes of transit for freight movements can help to reduce carbon dioxide emissions by reducing the wasted mileage of freight vehicles that become lost or are looking for suitable unloading areas.</p>
<p>To enhance the quality of life for Worcestershire's residents, by promoting a healthy, natural</p>	<p>Improving health and well being</p>	<p>Measures to encourage the efficient movement of freight, and encourage the use of more</p>

<p>environment, conserving our historic built environment and preserving our heritage assets. The Quality of Life Objective</p>		<p>sustainable modes of transit can act to reduce carbon emissions, air and noise pollution (particularly in urban areas) and damage from vibrations which will assist in the protection of Worcestershire's natural environment and the historic fabric of our towns and cities, and can reduce the adverse effects of otherwise unsustainable traffic growth, by efficiently transporting the goods people need to the places where they live. This can act to enhance overall quality of place, and therefore quality of life in Worcestershire.</p>
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Policy F1 – The Worcestershire Freight Quality Partnership

Worcestershire County Council will continue to facilitate the meeting of the Worcestershire Freight Quality Partnership and expand its remit to cover the former Vale of Evesham Freight Quality Partnership's work within the boundaries of Worcestershire. The partnership will act to shape and progress the delivery of multimodal freight measures in and across Worcestershire and will work with neighbouring partnerships to deliver against common aims and objectives.

Policy F2 – Monitoring Freight Movements in Worcestershire

Where knowledge gaps exist and it is relevant to do so, Worcestershire County Council will collect data on multimodal freight movements within and across the County to inform the work of the County Council and the Worcestershire Freight Quality Partnership.

This data will be used to support bids for funding to enhance infrastructure and services across the county, and measures to enhance the efficient operation of freight movements countywide.

Policy F3 – Rail Freight in Worcestershire

Worcestershire County Council will work with the Worcestershire Freight Quality Partnership, partners in the rail industry as well as the Borough, City and District Councils and landowners to identify and develop opportunities to develop rail freight infrastructure and services in Worcestershire, and to promote the use of rail freight for long-distance freight movements emanating from Worcestershire.

Policy F4 – Water Freight in Worcestershire

Worcestershire County Council will work with the Worcestershire Freight Quality Partnership and partners such as British Waterways and the Worcestershire Borough, City and District Councils to identify and develop opportunities to develop water freight infrastructure and

services in Worcestershire, and to promote the use of water freight for freight movements emanating from Worcestershire.

Policy F5 – HGV Parking

Worcestershire County Council will conduct a review of the current provision of HGV parking in the County, to identify whether suitable short stay and long-stay capacity is being appropriately provided locally.

Short-Medium Stay Parking (0-5 hours)

Worcestershire County Council will continue to invest in the maintenance of lay-bys on the principal road network in the county, and will support their use for short to medium stay HGV parking.

The County Council does not support the use of lay-bys for long-stay (overnight) parking, as these sites do not have suitable facilities to accommodate this type of use. Where on-going misuse of lay-bys occurs, Worcestershire County Council will seek to legally prohibit the use of such sites for long-stay parking by use of enforceable Traffic Regulation Orders.

Long Stay / Overnight Parking (5+ hours)

Worcestershire County Council, working with the Worcestershire Freight Quality Partnership and existing and future stopover providers will seek to promote a minimum standard for Long Stay / Overnight HGV parking sites in Worcestershire:

- Flushing toilets, showers, and washing facilities;
- Satisfactory surfaced parking for HGVs;
- Security features including fencing, CCTV and 24 hour staffing;
- A heated and lit rest area with seating*;
- Refreshment facilities which serve hot food and drinks from 07:00 to 21:00*;
- A filling station within 5 km of the site.
- Ability to plug fridges into mains sockets to reduce noise and emissions from diesel engines+

Only those facilities that meet the standards set out above will be promoted by Worcestershire County Council.

Worcestershire County Council will not seek to fund the provision of long-stay HGV parking in Worcestershire from the public purse, but will work with the Worcestershire Freight Quality Partnership and Borough, City & District Councils to identify suitable sites and promote private-sector investment in such facilities if demand can be identified. It will also investigate any potential opportunities to widen the use of certain existing sites (such as bus-based Park and Ride sites, or some urban car parks) in a multi-functional way, including for long-stay HGV parking. This makes more efficient use of such facilities (which may have low demand or are not required overnight).

In circumstances where purpose-built existing HGV parking in urban centres represent an inefficient use of limited space, Worcestershire County Council will seek to relocate it or make alternative arrangements to provide parking away from urban centres.

* denotes a facility which need not necessarily be provided on-site, but must be accessible within a short walking distance (less than 500 metres) of the site.

+ denotes a facility which is desirable but not essential.

Policy F6 – Enhancing Highway Network Infrastructure to Support Efficient Freight Operations

Worcestershire County Council is committed to maintaining and enhancing the quality of a core highway network for goods vehicles, including HGVs, comprising the county's principal road network and other routes which are of strategic importance for goods access. Where problems in terms of route width, alignment or road safety are identified, Worcestershire County Council will work in partnership to develop appropriate solutions to ensure that goods vehicles and other road users can use this core network safely and efficiently.

Policy F7 – Traffic Regulation Orders (TRO) and Signing for Freight Vehicles

Worcestershire County Council will aim to ensure that HGVs use the most appropriate routes available and will implement TROs to restrict such vehicles from using inappropriate routes. The County Council will work with West Mercia Police to ensure these are enforced. Worcestershire County Council and partners will periodically review the impact of Traffic Regulation Orders in terms of:

- whether the original aims of the TRO are being achieved;
- the degree to which there is a disproportionate impact on achieving effective goods access; and
- The cost and effectiveness of associated signage.

Where appropriate, changes to the TROs will be made to ensure these functions continue to be met.

In line with its general signing policy, the County Council will provide an appropriate level of signing and which is consistent and legible and aids goods driver navigation and safety, particularly to town centre delivery zones and in rural areas where there are known freight issues. The County Council will continue to identify and remove or consolidate redundant and unnecessary signage and restrictions to ensure the street environment is clutter-free.

The County Council will continue to favour pictograms over text on signs where this improves legibility and overall driver navigation. It will continue to consider zoning to improve goods driver understanding of access routes, particularly to town centres and Industrial Estates and will use these on direction signs where appropriate.

It will also review the provision of lorry information boards and electronic display information (including journey planning at lorry parking facilities) to ensure these aid safety and are proactive to needs, rather than reactive to problems.

Policy F8 Satellite Navigation Systems

Worcestershire County Council will continue to work with satellite navigation system providers to ensure that systems are updated with highway changes in a timely manner. Additionally, the council will seek to provide height, weight and width restriction information

for its road networks in electronic format, to enable easy transfer to satellite navigation system base maps.

Policy F9 – Freight Consolidation Centres

Worcestershire County Council will seek to develop and review technically robust business cases to enable the delivery of Freight Consolidation Centres, subject to the support of the relevant Borough, City or District Council and suitable commitment from the private sector to use such a facility.

Policy F10 – Provision of Information

Worcestershire County Council will continue to produce Lorry Advisory Route Maps for Worcestershire and disseminate these using a variety of media. In addition, Worcestershire County Council will maintain information to support the efficient operation of freight on its website at www.worcestershire.gov.uk/transport.

Integrated Passenger Transport Policy

Objectives of policy in context of air quality:

LTP3 Objective	Worcestershire Sustainable Community Strategy Objective	How policy delivers against these objectives
<p>To reduce the impacts of transport in Worcestershire on the local environment, by reducing noise and transport related emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change and reducing the impacts of transport on public health.</p> <p>The Environment Objective</p>	<p>A better environment for today and tomorrow</p>	<p>IPT measures will help protect the natural environment and reduce transport related emissions by</p> <ul style="list-style-type: none"> • Encouraging modal switching, particularly for journeys into/through environmentally sensitive areas. • Encouraging sustainable travel choices
<p>To contribute towards better safety, security, health and longer life expectancy in Worcestershire, by reducing the risk of death, injury or illness arising from transport and promoting healthy modes of travel.</p> <p>The Health and Safety Objective</p>	<p>Communities that are safe and feel safe</p>	<p>IPT measures will:</p> <ul style="list-style-type: none"> • Encourage greater use of passenger transport modes • Reduced car dependency with consequent reduction in accidents and increased safety • Increase transport choice • Actively discourage inefficient use of the network • Improve access to health care facilities and services for all • Help promote active lifestyles/public health

Policy IPT1 – Identifying an Integrated Passenger Transport Network

Worcestershire County Council will work with partners to define an integrated passenger transport network for the county, following a robust and iterative approach. This process will make full use of available data and transport models, the LTP3 Scheme Appraisal Framework and will be fully integrated with the LTP3 consultation process, including working with private and public sector partners.

Policy IPT2 – Targeting Investment in Passenger Transport Toward Schemes which Support the Economy

Worcestershire County Council will prioritise investment toward passenger transport schemes which:

- Are aligned with travel demand
- Support the performance of the economy
- Offer the greatest return on investment
- Enhance the overall commercial viability of the network (and hence reduce the need for public subsidy)

This is likely to involve prioritising investment:

- In congested urban areas
- Along key inter-urban corridors

Policy IPT3 – Delivering an Accessible Passenger Transport Network

Worcestershire County Council will take full account of the accessibility delivered by the passenger transport network. In particular, it will seek, subject to funding availability, to ensure that all key employment, health, education, retail and leisure services and destinations in Worcestershire are provided with a level of accessibility by passenger transport which:

- Ensures that those without access to a car are not disadvantaged in terms of ability to access these key services, facilities and employment and training opportunities
- Ensures that passenger transport is a realistic alternative to the car (in terms of actual and perceived journey times and costs), particularly for journeys in to/from/within urban areas and along key inter-urban corridors
- Supports the achievement of the public transport mode shares which underpin existing and proposed Travel Plans
- Where mobility impairments prevent residents from using conventional passenger transport services, alternative transport options are made available (such as community transport, ambulances or taxis) or the services are delivered to residents through innovative solutions

Accessibility assessments will be undertaken to an appropriate level of detail as part of all assessments of justification of changes to the passenger transport network (infrastructure and services).

Policy IPT4 - Delivering a Safe Passenger Transport Network

Worcestershire County Council will work with passenger transport operators and infrastructure providers to provide a network of infrastructure and services that meet relevant safety and Disability Discrimination Act requirements and increases user confidence.

We will seek in partnership with the private and voluntary sectors (and subject to funding availability) to deliver the quality of infrastructure and vehicles which:

- Meet the appropriate infrastructure quality standards set out in the Bus Infrastructure Design Guide
- Meet the appropriate vehicle quality standards set out in this document (IPT Policy)
- Provide value for money
- Take account of the needs of more vulnerable sections of our community, such the young, elderly and mobility impaired
- Ensures that those without access to a car are not disadvantaged in terms of actual or perceived safety when seeking to access key services and facilities
- Is in line with seeking to ensure that passenger transport is a realistic alternative to the car), particularly for journeys to/from/within urban areas and along key inter-urban corridors

Policy IPT5 – Delivering a Reliable Passenger Transport Network

Worcestershire County Council will work with passenger transport operators and infrastructure partners to obtain the funding required provide the infrastructure and other measures required to deliver a network of reliable passenger transport services with consistently quick and competitive journey times, particularly for journeys:

- In congested urban areas
- Along key inter-urban corridors

For rail, this will involve working with rail industry partners and key funding bodies such as the Department for Transport to identify and resolve capacity pinch points, line speed problems and rolling stock capacity restrictions.

For bus, this will involve working with partners to develop meaningful quality partnerships which:

- Establish evidence based reliability and journey time targets
- Deliver infrastructure, operational management measures and Traffic Regulation Orders which will deliver against these targets
- Ensure that measures are properly enforced
- Monitor performance (including enforcement)

For community transport, this will involve working with operators to identify existing reliability constraints on the network, and seeking to mitigate these issues to enhance the efficiency of these operations (such as drop off points at key trip attractors such as hospitals)

For taxis, this will involve working with operators to ensure that provision and use of infrastructure is optimised to ensure that this mode integrates properly with other modes of transport.

Policy IPT6 – Delivering an Integrated Passenger Transport Network

Worcestershire County Council will work with passenger transport operators, infrastructure providers and land use planners to:

- Integrate passenger transport with new land use developments from the outset of the development planning process
- Ensure integration within and between passenger transport modes, particularly in terms of information & marketing, fares and ticketing, infrastructure provision, timetables and rolling stock/vehicles
- Better integrate passenger and private transport modes, particularly in terms of the provision of large and small scale multi-modal interchanges where these encourage greater use of passenger transport in congested urban areas and along key inter-urban corridors
- Work with partners to ensure that key multi-modal interchanges such as rail stations and Park & Ride are provided with adequate and appropriately priced car parking which encourage use of passenger transport

Policy IPT7 – Delivering an Equitable and Inclusive Passenger Transport Network

Worcestershire County Council will work with partners to deliver a passenger transport network which provides Worcestershire residents and businesses with access to key services. In particular, it will seek to ensure that all key employment, health, education, retail and leisure services and destinations in Worcestershire are provided with a level of accessibility by passenger transport which ensures that those without access to a car are not disadvantaged in terms of ability to access these key services, facilities and employment and training opportunities.

Policy IPT8 – Delivering a Passenger Transport Network That is Easy to Understand and Use

Worcestershire County Council will work with passenger transport users and operators and other partners to:

- Develop a clearly defined and understood "brand" for the Worcestershire passenger transport network, used consistently on Worcestershire's infrastructure and services
- Ensure that information on passenger transport meets recognised best practice guidelines in terms of design, content and distribution
- Co-ordinate and limit to a minimum the number of timetable changes
- Improve the quality of map based passenger transport network information
- Provide a consistent quality of electronic (website), interchange, rail & bus station and roadside information
- Deliver real time information on high demand sections of the network where a strong business case can be developed
- Include within all Quality Partnerships (see also IPTP 15) specific reference information standards, branding and associated maintenance requirements

Subject to the availability of funding and resources, Worcestershire County Council will consider taking on responsibility for the provision of road side information if this will ensure consistency and quality.

Policy IPT9 – Delivering a Passenger Transport Network that is Reflective of Modern Lifestyles

Worcestershire County Council will work with passenger transport operators, infrastructure providers, land use planners and private sector businesses and developers to:

- Ensure that new developments consider from the outset the need to provide access to passenger transport services that are convenient and attractive to use.
- Improve the convenience of the existing network, particularly in congested urban areas and along key inter-urban corridors

Policy IPT10 – Delivering an Affordable and Value for Money Passenger Transport Network

Worcestershire County Council will work with passenger transport operators, infrastructure providers, funding bodies and private sector businesses and developers to:

- Maximise the value for money of capital and revenue investment in the passenger transport infrastructure and services.
- Identify the "pinch points" which reduce the efficiency and quality of services
- Develop robust bids for capital and revenue funding investment in Worcestershire's passenger transport infrastructure and services to address identified problems and opportunities
- Establish meaningful partnership arrangements whereby efficiency savings are passed back to Worcestershire residents and businesses in the form of reduced fares and/or improved levels of service agreed between the partners as being most appropriate

Policy IPT11 – Deliver an Integrated Passenger Transport Network Utilising the Most Appropriate Passenger Transport Technologies

Worcestershire County Council will work with passenger transport operators, infrastructure providers, land use planners and private sector businesses and developers to embrace technological advances in the arena of passenger transport. Where investment is proposed, the council will:

- Ensure that robust business cases are developed to support investment (capital and revenue) required to deliver the appropriate quality of service
- Sift out passenger transport technologies and schemes which would otherwise undermine the case for investment in Worcestershire's passenger transport network

Policy IPT12 – Establish a Three Tier Integrated Passenger Transport Network with Level of Service Aligned with Demand

Worcestershire County Council will work with passenger transport operators, infrastructure providers, land use planners and private sector businesses and developers to:

- Align supply to demand and the needs of the travel markets, recognising that these will vary and that funding may be constrained
- Develop and deliver a three-tier integrated passenger transport network
- Ensure that the network is integrated, maximising accessibility, choice and journey opportunities (including greater integration of Community Transport)

Policy IPT13 – Deliver a ‘Worcestershire Standard’ for Passenger Transport Infrastructure

Worcestershire County Council will work with passenger transport operators, infrastructure providers, land use planners and private sector businesses and developers to improve facilities for existing and potential passenger transport users, increase travel choice and encourage modal switching to sustainable modes, particularly within congested urban areas and along key interurban corridors.

Policy IPT16 – Passenger Transport Vehicles and Rolling Stock Aligned with Market Needs

Worcestershire County Council will work with passenger transport operators and infrastructure providers, vehicle and rolling stock manufacturers and funding bodies to improve the quality and accessibility of passenger transport vehicles and rolling stock.

Policy IPT18 – Working in Partnership to Deliver an Integrated Passenger Transport Network

Where performance of the passenger transport network causes major concern across a specified area, such as a central urban area and along key inter-urban corridors, Worcestershire County Council will work closely with key partners, including rail, bus and coach operators & infrastructure providers, regulatory and funding bodies, other local authorities and traffic & parking regulation enforcement agencies to address identified problems

Intelligent Transport System Policy

Objectives of policy in context of air quality:

LTP3 Objective	Worcestershire Sustainable Community Strategy Objective	How policy delivers against these objectives
To reduce the impacts of transport in Worcestershire on the local environment, by reducing noise and transport related emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change and	A better environment for today and tomorrow	ITS measures such as UTMC can help protect the natural environment and the historic fabric of our towns and cities, by reducing the adverse effects of otherwise unsustainable traffic growth. ITS measures can help reduce

<p>reducing the impacts of transport on public health. The Environment Objective</p>		<p>carbon dioxide emissions by encouraging sustainable travel choices through real time information on all modes and by reducing the wasted mileage of motorists lost or looking for parking. New technologies provide more energy efficient traffic control systems for e.g. LED traffic signal lamps, solar and wind powered traffic monitoring etc.</p>
<p>To contribute towards better safety, security, health and longer life expectancy in Worcestershire, by reducing the risk of death, injury or illness arising from transport and promoting healthy modes of travel. The Health and Safety Objective</p>	<p>Communities that are safe and feel safe</p>	<p>ITS Measures can enhance the efficiency of transport networks, by providing information to users which actively discourages inefficient use of the network, for example, by providing timely information of congestion, users can choose sustainable alternatives such as walking, cycling and passenger transport to avoid congestion, whilst promoting active lifestyles/ public health. ITS measures can provide advanced warning of incidents that may have compromised the safety of the highway network thus reducing the number of people travelling to the vicinity of the incident and improving public safety and security.</p>
<p>To enhance the quality of life for Worcestershire's residents, by promoting a healthy, natural environment, conserving our historic built environment and preserving our heritage assets. The Quality of Life Objective</p>	<p>Improving health and well being</p>	<p>ITS measures can help protect the natural environment and the historic fabric of our towns and cities, by reducing the adverse effects of otherwise unsustainable traffic growth. This can act to enhance overall quality of place, and therefore quality of life in Worcestershire. ITS improves quality of life by providing real time public information on travel options, parking facilities, costs and journey times. This enables people to plan journeys door to door with increased confidence and maximises their travel choice.</p>

Policy ITS3 – Urban Traffic Management Control (UTMC) Optimisation and Connectivity

Worcestershire County Council will seek to integrate all existing and new investments in ITS measures into the Worcestershire UTMC system. This will ensure that benefits are optimised and maximum value for money is achieved on the County Council's investment in this technological approach.

Policy ITS4 – UTMC Strategy Manager

Worcestershire County Council will seek to make full use of the UTMC Strategy Manager software tool, by developing a range of techniques to enable more automated (costeffective) management of incidents and accidents on Worcestershire's transport networks.

Policy ITS5 – Intelligent Traffic Signals

Worcestershire County Council will seek to make full use of the Urban Traffic Control (UTC) system SCOOT MC3 and subsequent versions of this software to optimise traffic signal control over a area wide network, in particular:

- The capability of the system to deliver bus priority will be used extensively wherever the potential exists. As part of this, gating will be investigated to relocate queues, in conjunction with bus priority measures.
- The development of alternative SCOOT strategies to manage major incidents (such as closure of the M5) including traffic gating to control the inflow of traffic into sensitive areas such as Air Quality Management Areas, where it is particularly important to prevent serious congestion.

The implementation of SCOOT and MOVA in locations across Worcestershire will be considered where a favourable business case can be developed to support investment.

Worcestershire County Council will ensure that where investments are made in SCOOT and MOVA systems, regular system validation takes place to ensure that optimum system efficiency is maintained, particularly when new signals, bus priority measures and/or new developments are introduced into existing networks.

New signalised crossings and junctions will only be considered where a robust business case can be developed which identifies that the level of benefits (in terms of safety, journey times (delay), environmental benefits etc) are greater than the costs of implementing and maintaining the scheme over a defined period of time.

Policy ITS6 – Use of Camera Technology

Worcestershire County Council will seek to make full use of camera-based technologies where a business case can be developed which supports their use. In particular, the Council will consider camera-based technologies for the following applications:

- Enhanced enforcement of speeds, red light over-running and Traffic Regulation Orders such as bus lanes and double yellow lines.
- Monitoring of traffic flows in congested urban areas

Policy ITS7 – Communications

Worcestershire County Council will review all communications used for ITS to make the best use of new technologies to minimise communications costs and increase the resilience and cost effectiveness of enhancing the UTMC system and associated data collection and information systems.

Policy ITS8 – Use of Real Time Information Systems

Worcestershire County Council will seek to make use of Real Time Information (RTI) systems where a business case can be developed which supports their use. In particular, the Council will consider RTI systems for the following applications:

- Real Time Passenger Information (RTPI) at bus and rail stops and interchanges, to inform users on levels of service and likely issues.
- Variable Messaging Signs at strategic locations, to influence travel behaviour and promote responsible use of transport networks.
- Car Park Management Systems will be developed in the City of Worcester and elsewhere in the County subject to a robust business case being made.
- The Urban Traffic Management and Control (UTMC) Travel Portal will be developed to provide comprehensive travel information across Worcestershire, including outputs to digital television, SMS, mobile communication devices, mp3 downloads, in-vehicle satellite navigation systems, public kiosks and display boards.

Policy ITS9 – Incident Management

Worcestershire County Council will make use of its investment in the Worcestershire Urban Traffic Management and Control (UTMC) common database to manage incidents more effectively, by communicating with neighbouring agencies, informing users and key organisations, and providing priority to emergency service vehicles. This will enable Worcestershire County Council and partners to dynamically respond to the management of incidents as they arise.

Policy ITS10 – ITS Associated with New Developments and Highway Improvement Schemes

Worcestershire County Council, in line with its Development Control (Transport) Policy, will seek contributions to enhance its UTMC capabilities wherever appropriate, as and when new developments are proposed. The Council will require:

- Any new development that impacts on an existing signalised junction or pelican crossing will need to contribute to the upgrade of that junction including the installation of SCOOT or MOVA and new technologies for communications, sustainability and energy efficiency. Unless it is agreed by the Traffic Manager that it is not a requirement.
- All new signals to utilise new technologies for control (e.g. SCOOT/MOVA), communications, sustainability and energy efficiency unless it is specifically agreed by WCC's Traffic Manager that this is not required
- Provide wireless CCTV cameras linked back to WCC for monitoring traffic conditions if identified by WCC's Traffic Manager

- In the case of significant developments, provide on-street journey time monitoring equipment linked to the Worcestershire UTMC Common Database
- Any new public car parks or alterations to existing car parks to be provided with equipment to enable real-time occupancy data, which must be fitted with a functioning communications link to the Worcestershire UTMC common database.
- Where RTPI is currently in place or planned, developers will be required to fund enhancements to these systems such that the benefits of these systems can be optimised to include new technological advances.

Smarter Choices Policy

Objectives of policy in context of air quality:

LTP3 Objective	Worcestershire Sustainable Community Strategy Objective	How policy delivers against these objectives
<p>To reduce the impacts of transport in Worcestershire on the local environment, by reducing noise and transport related emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change and reducing the impacts of transport on public health.</p> <p>The Environment Objective</p>	<p>A better environment for today and tomorrow</p>	<p>Smarter Choices measures, when rolled out as part of a coordinated package of investment in multi-modal transport infrastructure and services can act to significantly enhance the efficiency of constrained transport networks, by encouraging responsible car use and promoting sustainable modes. This acts to reduce the impact of travel demand on climate change.</p>
<p>To contribute towards better safety, security, health and longer life expectancy in Worcestershire, by reducing the risk of death, injury or illness arising from transport and promoting healthy modes of travel.</p> <p>The Health and Safety Objective</p>	<p>Communities that are safe and feel safe</p>	<p>Smarter Choices measures, when rolled out as part of a coordinated package of investment in multimodal transport infrastructure and services can act to enhance the efficiency of constrained transport networks, influencing mode choice and encouraging use of sustainable modes and responsible car use, which can promote active lifestyles and enhanced public health. Sustainable modes encourage public participation and social cohesion, which can act to enhance actual and perceived safety in public spaces.</p>
<p>To enhance the quality of life for Worcestershire's residents, by promoting a healthy, natural environment, conserving our</p>	<p>Improving health and well being</p>	<p>Smarter Choices measures, when rolled out as part of a coordinated package of investment in multi-modal</p>

<p>historic built environment and preserving our heritage assets. The Quality of Life Objective</p>		<p>transport infrastructure and services can improve local health and environment by decreasing the amount of journeys made and promote more sustainable methods of transport such as cycling and walking, both of which strongly contribute to a healthier environment.</p>
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Policy SCP1 – Smarter Choices Partnership Working

Worcestershire County Council will work closely with internal and external partners to ensure that Smarter Choices Measures are always consistently delivered as part of a packaged approach to the delivery of transport infrastructure and services to ensure that optimum benefits are achieved from investments.

Policy SCP3 – Printed Passenger Transport Timetable Information

Worcestershire County Council will continue to provide printed timetables wherever display cases are available at bus stops and bus stations, in partnership with bus operators and infrastructure providers. Worcestershire will seek to increase the number of bus stops at which display cases and associated printed timetables are provided as funding permits. Stops for new display cases will be identified and prioritised according to the anticipated number of passengers who will benefit from the information.

The County Council will work with the rail industry and voluntary sectors to enhance provision and availability of printed timetable information for other transport modes.

Worcestershire County Council will not produce printed timetable leaflets for specific passenger transport services in the County, except in exceptional circumstances such as diversionary routes and new services. However, the County Council will continue to provide photocopies of timetables through the Worcestershire Hub to those who request them.

Policy SCP4 – Printed Maps and Guides for Passenger Transport, Walking and Cycling

Worcestershire County Council, in partnership with Local Planning Authorities and passenger transport operators, will continue to provide printed passenger transport, walking and cycling information maps and guides to promote sustainable travel choices, and will seek to develop additional maps for the remaining urban areas in Worcestershire where such publications do not yet exist.

Policy SCP5 – The Local Media

Worcestershire County Council will continue to use a range of local media to communicate both dynamic travel information and marketing campaigns to the public, to encourage smarter travel choices including more responsible car use.

Policy SCP6 – Worcestershire County Council Website

Worcestershire County Council will continue to provide the transport pages of its website: www.worcestershire.gov.uk/transport to deliver multimodal travel information (including timetables, maps and infrastructure/service information) for the wide range of services and facilities provided by Worcestershire County Council and others.

As part of this service, the County Council will ensure that pages are reviewed and updated both dynamically and periodically to ensure that they remain current, and will seek to enhance the provision of information to ensure ease of use and to encourage and promote delivery against both the wider and more specific objectives of the County Council's LTP3.

Policy SCP10 – Smarter Choices Marketing Campaigns

Worcestershire County Council will develop and deliver smarter choices marketing campaigns annually throughout the Third Worcestershire Local Transport Plan period. These campaigns will promote the use of sustainable modes and responsible car use, and will use a variety of media including:

- Billboards/Posters/Branding;
- Web-based Information;
- Events;
- The Local Press;
- Printed Information; and
- Merchandise

Policy SCP11 – Individual Travel Marketing

Worcestershire County Council will develop Individual Travel Marketing programmes as part of any future phased approaches to transport planning and delivery in the larger urban areas. ITM measures could include offering the following personalised services to residents in target areas:

- Local passenger transport timetables
- Personalised journey plan for trips made on a regular basis
- Local walking, cycling and passenger transport maps
- Bicycle loan

Policy SCP12 – Travel Plan Bonds (mandatory Travel Plans)

Worcestershire County Council will commit to using bonds to enforce the delivery of effective travel plans for residential, commercial and industrial development sites. This will require the development of a preferred approach early in the LTP3 plan period, with defined thresholds, which will be agreed jointly by Worcestershire County Council as the Local Transport Authority and the six Local Planning Authorities. It is proposed that this will be modelled on the TRICS Standardised Assessment Methodology for Travel Plans. Thereafter, the use of bonds for travel plans will be required for all developments throughout the LTP3 plan period, with the criteria set out in a revised LTP3 Development Control (Transport) Policy.

The County Council will work with its partners to ensure that the requirements and the outcomes of Travel Plans are enforced, to the benefit of new and existing Worcestershire residents.

Policy SCP13 – Station Travel Plans

Worcestershire County Council will work with Train Operating Companies, the relevant local planning authority and bus operators and other key stakeholders to develop Station Travel Plans for stations in Worcestershire where demand for car parking is outstripping supply or leading to inappropriate overspill parking in nearby streets, to encourage the use of sustainable alternatives to access rail services.

Policy SCP14 – Workplace Travel Plans

Worcestershire County Council will continue to encourage employers to develop Workplace Travel Plans for their sites offering suitable incentives to engage businesses if needed.

Policy SCP15 – Reducing Grey Fleet Miles

Worcestershire County Council will, via the workplace travel plan process, encourage reductions in grey fleet (employees own vehicles) mileage and promote measures to provide alternative means of travel and/or ways to reduce the need to travel altogether.

Policy SCP16 – Residential Travel Plans

Worcestershire County Council, through its development control function, will seek to ensure the identification and delivery of Residential Travel Plans through Section 106 planning agreements, as identified in the Worcestershire LTP3 Development Control (Transport) Policy. These agreements will in each case clearly specify:

- The scope and extent of the proposed Residential Travel Plan area;
- The range of measures that should be explored within the Residential Travel Plan (including highway measures such as path widening and provision of crossings);
- The way in which the plan should be delivered; and
- Responsibilities for monitoring and enforcement.

Policy SCP17 – School Travel Plans

Worcestershire County Council will work to ensure that all schools in Worcestershire have appropriate and regularly updated School Travel Plans in place to encourage sustainable travel choices to access education facilities, as set out in the Worcestershire Sustainable Modes of Travel to School Strategy.

The County Council will, in line with its statutory requirements, prepare and make available an annual update to its Sustainable Modes of Travel to School Strategy, which will set out the detail actions the authority intends to take to promote and make available sustainable travel modes.

Policy SCP20 – S.T.A.R. Accreditation Scheme

Worcestershire County Council will continue to promote the S.T.A.R. Accreditation Scheme to encourage long-term commitment of schools and employers towards sustainable travel planning and incentivise or reward those schools and businesses which demonstrate a proactive approach to travel planning. The scheme recognises the standard of travel plans and the commitment of the organisation to encouraging sustainable travel

Policy SCP21 – Smarter Choices Initiatives

Worcestershire County Council will continue to develop and offer a range of initiatives to enhance and promote its smarter choices programmes. These include:

- Continuing to develop the online Workplace Travel Plan builder to include all travel plan types. It is the long-term aim of the County Council that all Workplace Travel Plans will be uploaded and maintained via the online Travel Plan Builder.
- Developing consultancy services, subject to available resources, for travel planning in Worcestershire to interested developers and their consultants.
- Encouraging employers in Worcestershire to offer their employees the opportunity to purchase bicycles tax-free by adopting the government's Cycle to Work scheme.
- Continuing to operate its cycle loan scheme for Worcestershire residents, to encourage the use of cycling in the County, particularly for work trips. The County Council will also seek to promote this scheme as an integral part of the travel plan development process, to encourage modal shift to cycling by demonstrating its suitability to people who had not previously considered it.
- Continuing to promote car sharing as a travel option, including its use in existing and future travel plans. Worcestershire County Council will ensure appropriate methods are used to maintain and enhance its car/ lift share database.

Sustainable Modes of Travel to School Strategy

Objectives of policy in context of air quality:

LTP3 Objective	Worcestershire Sustainable Community Strategy Objective	How policy delivers against these objectives
To contribute towards better safety, security, health and longer life expectancy in Worcestershire, by reducing the risk of death, injury or illness arising from transport and promoting healthy modes of travel. The Health and Safety Objective	Communities that are safe and feel safe	Encouraging the use of sustainable travel promotes healthy lifestyles and enhanced public health. Sustainable modes encourage public participation and social cohesion, which can act to enhance actual and perceived safety.
To enhance the quality of life for Worcestershire's residents, by promoting a healthy, natural environment, conserving our	Improving health and well being	Increased levels of sustainable travel help to counter the adverse effects of traffic growth, such as congestion and air and

historic built environment and preserving our heritage assets. The Quality of Life Objective		noise pollution. This can act to enhance overall quality of place, and therefore quality of life in Worcestershire.
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Policy SMT1 – Partnership Working

Worcestershire County Council will work closely with internal and external partners to ensure that Sustainable Travel Measures are always consistently delivered as part of a packaged approach to the delivery of transport infrastructure and services to ensure that optimum benefits are achieved from investments.

Policy SMT2 – School Travel Planning

Worcestershire County Council will work to ensure that all schools in Worcestershire have appropriate and regularly updated School Travel Plans in place to encourage sustainable travel choices to access education facilities.

Policy SMT3 – Promotion of Walking and Cycling Initiatives

Worcestershire County Council will continue to work with schools to promote walking and cycling to school and develop more robust measuring tools.

Policy SMT5 – Passenger Transport

Worcestershire County Council will continue to implement its Home to School Transport Policy and promote public transport to all pupils.

Policy SMT6 – Infrastructure Measures

Worcestershire County Council will continue to review pedestrian and cycle routes and facilities and implement a planned programme of improvements.

Policy SMT7 – Publicising Sustainable Transport

Worcestershire County Council will continue to publicise sustainable transport via a variety of methods as set out in the Smarter Choices Policy.

Transport and Climate Change Policy

Objectives of policy in context of air quality:

LTP3 Objective	Worcestershire Sustainable Community Strategy Objective	How policy delivers against these objectives
To enhance the quality of life for Worcestershire's residents, by promoting a healthy, natural environment, conserving our historic built environment and preserving our heritage assets. The Quality of Life Objective	Improving health and well being	The delivery of the Worcestershire Transport and Climate Change Policy will reduce the pressure of Worcestershire's Transport Asset by minimising road travel. The policy does this by encouraging sustainable transport modes such as cycling, walking, car sharing and a move to public transport. By reducing journeys made and need for journeys made, maintenance and costs to Worcestershire's Transport Asset will also come down. Less maintenance work to assets will also positively affect communities with less disruption to the local society and environment.

Policy TCC1 – Reducing Harmful Emissions from Vehicles

Worcestershire County Council will work closely with internal and external partners to ensure that Transport and Climate Change mitigation measures are delivered consistently as part of a packaged approach to the delivery of transport infrastructure and services, and that optimum benefits are achieved from investments.

Policy TCC2 – Encouraging and Enabling Smarter and More Sustainable Travel Choices

Worcestershire County Council has developed a range of complementary policies to encourage smarter and more sustainable travel choice in Worcestershire. The County Council will continue to focus on the implementation of these policies during the LTP3 period. The LTP3 Smarter Choices Policy sets out the approach to the associated communication and information strategy.

Policy TCC4 – Reducing the Need to Travel

Worcestershire County Council will through partnership working with the Borough, City & District Councils encourage new developments which seek to reduce the need for Worcestershire's residents and visitors to travel to access key services and facilities through its transport policies and strategies, and to ensure that a suitable network of services and facilities are appropriately located within the county's settlements.

Traffic and Parking Management Policy

Objectives of policy in context of air quality:

LTP3 Objective	Worcestershire Sustainable Community Strategy Objective	How policy delivers against these objectives
<p>To reduce the impacts of transport in Worcestershire on the local environment, by reducing noise and transport related emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change and reducing the impacts of transport on public health.</p> <p>The Environment Objective</p>	<p>A better environment for today and tomorrow</p>	<p>Traffic and Parking Management Measures, when applied strategically using an area-based approach, can act to significantly enhance the efficiency of constrained transport networks, by encouraging responsible car use and promotion of sustainable modes. The measures can reduce traffic congestion and have a positive impact on pollution and air quality. This acts to reduce the impact of transportation on climate change.</p>
<p>To contribute towards better safety, security, health and longer life expectancy in Worcestershire, by reducing the risk of death, injury or illness arising from transport and promoting healthy modes of travel. The Health and Safety Objective</p>	<p>Communities that are safe and feel safe</p>	<p>Traffic and Parking Management measures, when applied using a strategic area-based approach, can assist in the delivery of these objectives by enhancing the efficiency of transport networks, providing clear information which can encourage more responsible, safe use of Worcestershire's transport networks. Traffic and Parking Management measures can be used to encourage use of sustainable modes and responsible car use, which can promote active lifestyles and enhanced public health.</p>
<p>To enhance the quality of life for Worcestershire's residents, by promoting a healthy, natural environment, conserving our historic built environment and preserving our heritage assets. The Quality of Life Objective</p>	<p>Improving health and well being</p>	<p>Traffic and Parking Management measures can help protect the natural environment and the historic fabric of our towns and cities, by reducing the adverse effects of otherwise unsustainable traffic growth and promoting responsible and efficient travel choice. This can act to enhance overall quality of place, and therefore quality of life in Worcestershire.</p>

Policy TMP1 – Partnership Working to Deliver Strategic Urban Traffic Management and Parking Plans

Worcestershire County Council will work with both public and private sector partners to develop strategic urban traffic management and parking plans in those areas of the county where traffic management and parking issues have been identified as a major concern.

Each traffic management and parking plan will be developed to be bespoke to the local needs of each urban area, and will include:

- A Capacity Review
- A Pricing Review
- A Network Review
- An Infrastructure Review

These plans, aligned with available funding, will determine the subsequent works in the key areas of concern and will feed into transport asset management planning.

Policy TMP2 – Transport Modal (User) Hierarchies

Worcestershire County Council will use transport modal (user) hierarchies to inform its approach to the treatment of main transport routes and the networks in urban and rural areas in an efficient manner such that they support the delivery of the objectives of the Sustainable Community Strategy, Worcestershire LTP3 and other relevant plans, including the Network Management Plan

Policy TMP3 – Enforcement

Worcestershire County Council will work with partners to achieve effective enforcement of traffic and parking management measures across the county through the complete adoption of Civil Parking Enforcement (CPE) by all Borough, City and District Councils in Worcestershire.

Policy TMP4 – Park and Ride

Worcestershire County Council will promote the use of Park and Ride as part of Strategic Urban Traffic Management and Parking Plans, where this is shown to support agreed policies and has a strong business case. Park and Ride infrastructure must conform to the outline specifications highlighted in the Passenger Transport Infrastructure Design Guide.

Policy TMP5 – Coach Parking and Layover Facilities

Worcestershire County Council will seek to provide coach parking and layover facilities either on-street or off-street in partnership with Worcestershire Borough, City and District Councils, to ensure optimum accessibility to constrained urban centres for these economically essential visitors. Where appropriate Worcestershire County Council will investigate locations where the measures can be integrated with those for heavy good vehicles. Coach set-down/Pick-up locations will, where feasible in terms of capacity, congestion and safety, be integrated with those for other passenger transport modes (see LTP3 Integrated Passenger Transport Policy)

Walking and Public Realm Policy

Objectives of policy in context of air quality:

LTP3 Objective	Worcestershire Sustainable Community Strategy Objective	How policy delivers against these objectives
<p>To reduce the impacts of transport in Worcestershire on the local environment, by reducing noise and transport related emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change and reducing the impacts of transport on public health.</p> <p>The Environment Objective</p>	<p>A better environment for today and tomorrow</p>	<p>Walking, applied with a strategic area-based approach, can make a significant contribution to reducing transport's carbon emissions and climate change impacts. It does not involve the use of carbon-emitting vehicles and will not directly be affected by concerns of peak oil production. Meanwhile, public realm improvements can often provide ways of mitigating against climate change, such as tree planting for shade in warmer temperatures and as 'carbon sinks', or as part of flood prevention schemes.</p>
<p>To enhance the quality of life for Worcestershire's residents, by promoting a healthy, natural environment, conserving our historic built environment and preserving our heritage assets.</p> <p>The Quality of Life Objective</p>	<p>Improving health and well being</p>	<p>Walking and Public Realm measures applied strategically can lead to journeys transferring from other, more polluting or environmentally damaging modes. This leads to a reduction in congestion and noise pollution, and improvements in air quality and environmental quality overall. Walking and Public Realm measures can help citizens access the natural environment and preserve and enhance the setting of the county's historic built environment and ensure quality of life in residential areas.</p>

Policy W1 – Partnership Working to Deliver a Strategic Walking Network and Public Realm

Worcestershire County Council will work in partnership with key partners, including the Worcestershire Borough, City and District Councils, private sector partners and those representing disability groups, to create and maintain a walking network and wider public realm which:

- caters for all groups of people, including less mobile pedestrians, those with sight or hearing impairments and who use mobility scooters or wheelchairs;

- is free from obstructions, including parked vehicles, and minimises barriers to access;
- is permeable and legible, with appropriate levels of signage where necessary;
- is clean, attractive and comfortable;
- is safe to use;
- maximises directness, minimises unnecessary deviation or delay and pays regard to pedestrians' desire lines; and
- is where possible includes routes which are shorter or quicker than the equivalent journeys by car.

Particular attention will be paid to the quality of routes to key destinations, such as schools, colleges, employment sites, town centres, public transport interchanges and healthcare facilities and addressing accident cluster sites.

Parts of the walking network, particularly in urban areas, will be reviewed in line with best practice guidelines when funding permits to ensure the network meets users' needs.

Policy W4 – Public Realm

Worcestershire County Council will seek to work with partners to develop and manage the county's public realm in a sensitive and sustainable way, balancing its duties of giving due regard to needs of all highway users (including parking and loading), with conserving and enhancing landscape, townscape, biodiversity and heritage assets. It will take account of the diverse non-transport roles the public realm plays and consider local context and distinctiveness.

The County Council will seek to provide a public realm which is both robust and functional as well as being distinctive, attractive and which helps to preserve the county's historic character. This will be essential to develop Worcestershire's economy, particularly as a centre for sustainable tourism.

Policy W5 – Spatial Planning and Developer Contributions for Walking and Public Realm Improvements

Worcestershire County Council will continue to work closely with the Worcestershire Borough, City and District Councils and developers to ensure that new developments:

Are located to maximise pedestrian accessibility to local facilities;

Are designed to maximise permeability and legibility for pedestrians, and minimise delays to journeys on foot;

Are designed to maximise natural surveillance on pedestrian routes; and

Make suitable financial contributions towards improvements to the local public realm and pedestrian networks.

Policy W6 – At Grade Pedestrian Crossings

Worcestershire County Council will continue to provide appropriate types of crossing facilities for pedestrians in locations where it can be demonstrated that the number of pedestrian movements, volume and speed of traffic and cost of installation and maintenance justifies the installation of a particular type of crossing.

Where formal pedestrian crossings are required, it is the county council's general policy to provide at-grade crossings on pedestrian desire lines wherever it is possible and safety considerations allow it.

The County Council will seek to minimise pedestrian wait times at crossings, especially in locations where it is a priority mode in the hierarchy and ensure that the width of crossings are suitable for the number of pedestrians using them.

Policy W7 – Grade Separated Pedestrian Crossings (Underpass, Subways and Footbridges)

The provision of grade separated pedestrian/cycle crossings (such as underpasses, subways and foot bridges) will in general be avoided by Worcestershire County Council, except where the volume and speed of traffic renders alternative, at-grade options unsafe.

As funding is made available, Worcestershire County Council will seek to remove such existing infrastructure and replace it with at-grade alternatives. Where appropriate, interim measures to improve the attractiveness and lighting of subways will be considered.

Where a grade-separated crossing is required, Worcestershire County Council will generally prefer the provision of bridges, on account of the personal safety, lighting and flooding issues associated with underpasses and subways.

Policy W10 – New Footways

Worcestershire County Council will consider the requirement for new footways where none currently exist. They will be considered against factors such as the volume and speed of vehicles, the current and potential number of pedestrians, requirements to access to local facilities and bus stops, costs of provision and whether alternative, more appropriate measures could be introduced.

Policy W14 – Street Trees

Worcestershire County Council recognises the benefits of street trees. It will continue to regularly survey its stock of street trees to ensure they do not pose a risk to road users and that even footways are maintained. If trees must be removed due to disease, old age or other reasons, a suitable replacement will be planted. Additional street trees of a species suitable to the location will usually be considered as part of public realm improvements. (See the Worcestershire LTP3 Transport Asset Management Plan for further details on Street Trees).

Network Management Plan

Objectives of plan in context of air quality:

LTP3 Objective	Worcestershire Sustainable Community Strategy Objective	How policy delivers against these objectives
<p>To reduce the impacts of transport in Worcestershire on the local environment, by reducing noise and transport related emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change and reducing the impacts of transport on public health.</p> <p>The Environment Objective</p>	<p>A better environment for today and tomorrow</p>	<p>Increasing traffic growth and restrictions on traffic flow not only causes increased congestion but also decreases the air quality of the area. The NMP aims to improve the efficiency of the transport network reducing congestion (see above) and wasted mileage and thus reducing traffic related emissions.</p> <p>The NMP will ensure traffic is most appropriately routed to reduce negative impacts on the environment.</p> <p>Worcestershire's Traffic Manager will work closely with the District Council Environmental Health Departments to produce Air Quality Action Plans for the removal of current AQMA designations and the prevention of further deterioration in air quality due to traffic levels and flows.</p>