Gloucester Air Quality Action Plan 2008
(2011 Review)

Note this is a Draft Plan and subject to change after consultation and refereeing.


A Plan for the Air Quality Management Areas
at
Priory Road, Painswick Road and Barton Street
in the
City of Gloucester

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If you have a print version of this paper, note that a colour version is available on the web at www.gloucester.gov.uk/pollution, which may make the graphs, maps and main tables easier to read.

Summary

This Air Quality Action Plan is produced under Part IV of the Environment Act 1995. It is not directly a part of the County Council's second Local Transport Plan, but will be used to update that plan (Ref 15). The plan covers specifically the two Air Quality Management Areas declared in August 2005, Barton Street and Priory Road, and the AQMA declared in Painswick Road in October 2007. Maps of these areas are at the end of Chapter 1.

Since the first draft of this report was published, proposals for Painswick Road have been added. All of the proposals in Chapter 2 have been reassessed resulting in changes in costs and feasibilities. This report provides the detailed narrative for the outcomes listing required by the Department of Transport, which will be found in the County Report of Progress on the current Local Transport Plan. See www.gloucestershire.gov.uk/ltp2.

It should be stressed that while the air in the three Air Quality Management Areas is suffering nitrogen dioxide levels above the National target concentration, the general concentrations of nitrogen dioxide within the City of Gloucester away from heavy traffic, are not rising. **Air quality in Gloucester away from heavy traffic remains good.**

The first chapter explains the background to the air quality management areas. The second, produced by Gloucestershire County Transport planners, lists all the solutions that were considered with their advantages, disadvantages and cost-effectiveness, and then makes recommendations. It also lists things that are ongoing that will help reduce poor air quality. The recommendations in this chapter are the subject of public consultation. The third chapter discusses other relevant issues. The fourth chapter describes the consultations and hence the chosen actions. Chapter five identifies future traffic and air quality monitoring needs and review of this work.

The recent Rogers review of national enforcement priorities for local authority regulatory services (Ref 14) placed air quality firmly at the top of the local authority agenda. However most of the action plan we propose cannot be enforced – much of it is not directly within our remit. The City Council will have to work closely with the County Council as Highway Authority and with the local community to bring about air quality improvements. This plan has been developed jointly by the City and County and has been subjected to consultation particularly within the areas that are directly affected.

The plan should give a date or dates by which the air quality will be brought back within the target; in these three cases, when the annual average nitrogen dioxide concentration in the area is reduced below 40 ug/m3. On recent investigation, only Priory Road will be above the target by 2010, and we aim for it to be below target by 2014, when improvements to other parts of the road network should reduce traffic through the area. The lifetime of this plan is to match the current Local Transport Plan.

Chapter 2 Highways Authority Proposals

This chapter explains the options that have been considered and details the Highway Authority's (Gloucestershire County Council) proposals for the three AQMAs that have been designated in Gloucester:

Barton Street

The City Council's "Detailed Assessment of Local Air Quality for 2003/4" [Ref 4] report shows an annual mean nitrogen dioxide concentration of between 41 and 47 micrograms per cubic metre compared with the objective of 40. It also found that "air quality on the even (southern) side of the road is much worse than on the odd side" and it is concluded that this is due to the even side being closer to city bound queuing traffic. The calculation of 2010 figures, which are based on the average national vehicle mix, shows that pollution concentrations may have dropped below the objective level by 2010. But in spite of the improvements in vehicle technology, providing greater numbers of less polluting vehicles, a reduction in the concentration to below the limit is unlikely to occur without intervention to discourage growth in traffic or exposure to harmful emissions as the projection includes only an assumption that traffic will grow at the National average rate and is not able to take account of local circumstances. Though Gloucestershire's growth rate is similar to the National growth rate at between 1 – 1.4% pa, additional growth in the AQMAs is predictable due to permitted future development. The impact of future development will be even more relevant to St. Oswald's Road / Priory Road.

Painswick Road North

For this AQMA discussion, the length of Painswick Road north and west of the junction with Eastern Avenue is referred to as Painswick Road North.

Two sites have been monitored monthly since September 2003, with others nearby which were dropped after the detailed assessment of 2004, which showed the area not then to be a problem. Monitoring during 2005 of the remaining two sites showed that one of them on the west of the canyon on Painswick Rd North was marginally over the target of 40 μgm^{-3}, thus requiring a detailed assessment.

For the detailed assessment, monitoring at these two sites continued, with a new site in the next housing block on the Painswick Rd North (west side) added. Unfortunately both the original site and the new site at no. 88 were well above the target in 2006, with Painswick Rd South (the eastern side of the road) remaining below the target. Projection to 2010 shows that no.106 may well still be above the target then.

Consultation with residents after this chose both sides of the road to be included. The Air Quality Management Area includes 42 residents, plus 2 empty properties likely to be converted to residential. This includes the redundant chapel, so that planning improvements taking air quality into account can be required for the expected redevelopment at this site.

St. Oswald's Road / Priory Road

This AQMA has been designated to include two blocks totalling 13 houses just south of the priority junction with St. Oswald's Road. It has been estimated that two sampling sites will be above the air quality objective for nitrogen dioxide in 2005, with levels of nitrogen dioxide of 41 to 58 micrograms per cubic metre compared with the objective of 40, and one is predicted to be above the level in 2010. The City Council's "Detailed Assessment of Local Air Quality for 2003/4" suggests that "poor air collects in the dip under the railway arch and is pushed towards the houses by vehicles emerging from the dip."

Since the last available monitoring two changes have taken place which may affect air quality. Firstly, the junction of St. Oswald's Road and Priory Road was signalised in August 2005 as part of a major retail development at the nearby Cattle market. This has provided a controlled right turn lane for traffic from Priory Road and from Westgate Gyratory whereas previously these turns were difficult to make. Secondly, the final section of the Gloucester South West bypass, that allows traffic to skirt Gloucester on the western side, opened in May 2007. It is not yet possible to estimate what impact either of these changes will have on nitrogen dioxide concentrations in the AQMA, and a proper assessment will require the collection of at least one year's worth of monitoring data by the City Council.

Potential Solutions

A number of potential measures are described and assessed according to the following criteria: Impact on air quality in the AQMA; the likely timescale and cost of implementation; feasibility and the non-air quality impacts.

The measures have been categorised according to their objectives:
For Barton Street the objectives are: (i) to reduce through traffic; (ii) reduce emissions from traffic: and (iii) to encourage local trips by non-car modes.
For St. Oswald's Road / Priory Road measures aim: (i) to reduce traffic flows and (ii) to reduce the reception of pollutants.

Key to cost-effectiveness calculation

Low Cost (< £50k) = 3
Medium Cost (£50k to £250k) = 2
High Cost (> £250k) = 1

Low Effectiveness (< 5% reduction in through traffic) = 1
Moderate Effectiveness (5% to 10% reduction in through traffic) = 2
High Effectiveness (>10% reduction in through traffic) = 3

For benefit, low indicates a likely improvement in NO_2 of less than 0.2 microgrammes per cubic metre, medium an improvement of 0.2 to 1 microgramme per cubic metre, and high an improvement of more than 1 microgramme per cubic metre.

Hierarchy

Cost	Effectiveness	Score
3	3	6
2	3	5
1	3	4
3	2	5
2	2	4
1	2	3
3	1	4
2	1	3
1	1	2

Key to timescale

Short = Within one financial year
Medium = Within one Local Transport Plan Period (current is 2006 to 2011)
Long = Over 5 years

Table 1 Barton Street									
Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effectiveness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
(a) To Reduce Through Traffic									
1.Variable Message Signs (VMS)	A real-time air quality-monitoring unit would be used to activate a message telling drivers about poor air quality and suggesting an alternative route OR VMS signs to alert drivers of significant queuing traffic leading up to Bruton Way signals. Could also advise drivers of incidents on Barton Street such as road works and accidents	2 (Moderate)	2 Real-time air quality-monitoring unit = approx. £30,000 Would be dependent upon the implementation of the County's Intelligent Transport System	4	Long Term	**Currently part of consideration as part as part of an AQ Model on the wider area as part of the Planning Application for development on Metz Way**	☺ Less traffic on Barton Street would improve the environment ☹ Increased traffic/congestion alternative routes	☺ Less traffic on Barton Street would improve perception of safety and community ☹ Identification of 'poor' air quality in the area may introduce a 'stigma' ☹ Increased traffic/congestion on alternative routes	☺ Less traffic on Barton Street would make the street more attractive to shoppers ☹ Identification of 'poor' air quality in the area may introduce a 'stigma' ☹ Increased traffic/congestion on alternative routes ☹ Extra costs to drivers who divert
2.Improvements/Control of the signals at the junction of Barton Street, Bruton Way, Trier Way and Eastgate Street	With measures 1 & 2 the ITS could be used to restrict traffic from turning into Barton Street to travel eastbound. Access for buses could be prioritised without making this measure ineffective as bus movements into Barton Street turn left from Bruton Way and buses on this arm could be prioritised	2 (Moderate)	3 (<£50k) Would be dependent upon the implementation of the County's Intelligent Transport System	5	Short	**Not possible at this time due to financial constraints**	☺ Less traffic on Barton Street would improve the environment ☹ Increased traffic/congestion on alternative routes	☺ Less traffic on Barton Street would improve perception of safety and community ☹ Increased traffic/congestion on alternative routes	☺ Less traffic on Barton Street would make the street more attractive to shoppers ☹ Increased traffic/congestion on alternative routes ☹ Extra costs to drivers who divert
3.Environmental traffic signals	Measures 1 and 2 could be combined with traffic signals just before the junction with Upton Street which would go to red for city bound traffic when	2/3 Moderate to High) When combined with Option	1 (> £250k)	3	Long Term	No	☹ A major problem is that westbound buses would be caught by the signals at Upton Street. To overcome this would either require the buses to bypass the queue using a bus lane, which	☹ Increased waiting traffic / congestion on Barton Street before the Upton Street junction city bound, on Derby Road towards Horton Road and on Barton Street outbound	☹ Extra costs to drivers who divert ☹ Increased traffic/congestion on alternative routes

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Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effectiveness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
	triggered by an air quality problem or significant queuing on Barton Street	1					would require sufficient land to be available; or the signals would need to detect the bus and allow it through, however this could encourage traffic to use Barton Street	☹ Increased traffic/congestion on alternative routes	
4. Journeys from the City Centre that are signed to use Barton Street to use Metz Way instead	Currently drivers are signed from Bruton Way down Barton St. for "B4073 Painswick". The "City Centre" is signed along Metz Way rather than along Barton St. from the roundabout on Eastern Avenue	1 (Low) If implemented in isolation, as many drivers on through journeys already know this route and find it quicker than Metz Way	3 (< £50k)	4	Short	Yes But There is now evidence that only 20% of cars are through traffic. **This is being reviewed in light of the Metz Way development**	☺ Less traffic on Barton Street would improve the environment ☹ Increased traffic/congestion on alternative routes including Metz Way and Bruton Way	☺ Less traffic on Barton Street would improve perception of safety and community ☹ Increased traffic/congestion on alternative routes	☺ Less traffic on Barton Street would make the street more attractive to shoppers ☹ Increased traffic/congestion on alternative routes ☹ Extra costs to drivers who divert
5. Restrict all City bound (westbound) traffic	From just east of Derby Road. This may be achieved through the use of devices such as rising bollards to allow only buses to pass the affected area of Barton Street. As the main problem occurs at the façade of houses on the south side of the road a restriction in this direction is preferable. An alternative access to the city centre would be signed via Metz Way for through traffic.	3/2 (High to Moderate) Depending on the size of the scheme	2 £50k to £250k	4	Medium to Long	Unknown Would need modelling. Evidence from Quedgeley and elsewhere shows bollards cause other problems	☺ Less traffic on Barton Street would improve the environment ☺ Would allow retiming of the Derby Rd lights to reduce queuing on Derby Rd ☹ Increased traffic/congestion on alternative routes ☹ Complementary traffic management measures on Upton St may be required to deter detours around the barrier if only a section of Barton St. is affected	☺ Local traffic could still use Tredworth Rd and Derby Rd but these routes would be unattractive for through trips ☺ Less traffic on Barton Street would improve perception of safety and community ☹ There would be an adverse impact on emergency services that would need to be considered and ameliorated ☹ Increased	☺ Local traffic could still use Tredworth Rd and Derby Rd but these routes would be unattractive for through trips ☺ Less traffic on Barton Street would make the street more attractive to shoppers ☹ Increased traffic/congestion on alternative routes ☹ Extra costs to drivers who divert

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Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effectiveness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
	Local traffic would still be able to use Barton St in both directions						☹ Reduced direct access by car will mean longer journeys to reach destinations	traffic/congestion on alternative routes	
6. Introduce a restriction on traffic travelling both ways on Barton St at Derby Road junction, except for buses and cycles	This measure would require rising bollards with bus detection at the Derby Rd signals. An alternative access to the city centre would be signed via Metz Way	3 (High)	2 (£50k to £250k)	5	Long	Yes **Not possible at this time due to financial restrictions**	☺ Less traffic on Barton Street would improve the environment ☺ Would allow retiming of the Derby Rd lights to reduce queuing on Derby Rd ☹ Local vehicle traffic would have more restricted use of Barton St and the use of streets around it may increase as a result ☹ Through traffic would still be able to use Derby Rd, and may use Hopewell St instead to reach Trier Way or Eastern Avenue	☺ Less traffic on Barton Street would improve perception of safety and community ☹ Local vehicle traffic would have more restricted use of Barton St and the use of streets around it may increase as a result ☹ Increased traffic/congestion on alternative routes ☹ Probable strong local objections	☺ Less traffic on Barton Street would make the street more attractive to shoppers ☹ Increased traffic/congestion on alternative routes ☹ Extra costs to drivers who divert
7. Make the entire length of Barton St eastbound only with a contra flow bus lane in the westbound (city centre bound) direction	This measure would require rising bollards with bus detection at the start of the bus lane with an alternative access to the city centre signed via Metz Way. As the main air quality problem occurs at the façade of houses on the south side of the road reducing traffic in this direction is preferable. Local and through traffic would still be able to use Barton St eastbound	2 (Medium)	2 (£50k to £250k)	4	Long	Yes But requires modelling **Not possible at this time due to financial constraints**	☺ Less traffic on Barton Street would improve the environment ☹ Local vehicle traffic would only be able to use Barton St eastbound and the use of streets around it may increase as a result, so complimentary traffic management measures would be required as a result	☺ Less traffic on Barton Street would improve perception of safety and community ☹ Local vehicle traffic would only be able to use Barton St eastbound and the use of streets around it may increase as a result ☹ Increased traffic/congestion on alternative routes	☺ Less traffic on Barton Street would make the street more attractive to shoppers ☹ Increased traffic/congestion on alternative routes ☹ Extra costs to drivers who divert

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Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effectiveness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
8. HGV ban on Barton St and/or Derby Road, except for access	This measure would affect up to 700 HGVs. There already is a ban except for access, but it may be flouted.	1 (Low)	2 (£50kto £250K)	3	Medium to long	Would require ANPR cameras **This is being considered along with voluntary Low Emission Zone**	☺ Less HGV traffic on Barton Street would improve the environment ☹☺ Increased HGV traffic on alternative routes	☺ Less HGV traffic on Barton Street would improve perception of safety and community ☹☺ Increased HGV traffic on alternative routes	☺ Less HGV traffic on Barton Street would make the street more attractive to shoppers ☹☺ Increased HGV traffic on alternative routes
(b) To Reduce Emissions from Traffic									
9. Greater restriction and better timing of deliveries on Barton Street	Currently deliveries are banned from 8-9 am and 5-6pm. The aim would be to get deliveries made in the least trafficked period of the day and so reduce the traffic queuing they cause. Gloucestershire's Freight Quality Partnership may provide one avenue for communication if it reaches smaller independent firms.	1 (Low)	2 (£50k to £250k)	3	medium	Yes **This is being considered as part of an Air Quality campaign**	☺ Less congestion on Barton Street during peak periods would improve the environment	☺ Less congestion on Barton Street may improve perception of safety and community ☹ Less congestion on Barton Street may increase vehicle speeds and increase number or severity of accidents	☺ Less congestion on Barton Street may encourage shoppers to visit ☹ Delivery problems for shops
10. "Turn off engine when stationary" signs at Horton Road and Derby Road signals		1 (Low)	3 (< £50k)	4	Short	Yes **This is being considered**	☺☹ Switching off and re-starting an engine for very short periods may be worse in emission terms	☺☹ Less noise and emissions would improve conditions for pedestrians and cyclists and would enhance the sense of community. Engines stopping and re-starting may be more intrusive	☺☹ Less noise and emissions would improve conditions for pedestrians and cyclists and would encourage shoppers. Engines stopping and re-starting may be more intrusive
11. Encourage bus	Currently services 1, 3, 13 and 7 use Barton St	1 (Low)	1 (> £250k)	2	Term would be defined	Yes already	☺ Less emissions would	☺ Less emissions would	☺ Less emissions would

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company to buy new vehicles to provide the bus services travelling along Barton St or investigate ways of reducing emissions from existing buses	for approx. 28 two way journeys per hour during the working day				by the identification of funding. In reality as commercial services it is the bus operators fleet replacement policy which will have an impact.	slowly happening. **Bus routes are being reviewed by the bus operators. Bus operators will be contacted as part of the Air Quality Campaign**	improve the environment	improve conditions for pedestrians and cyclists and would enhance the sense of community	improve conditions for pedestrians and cyclists and would encourage shoppers ☹ Such intervention may be 'anti competitive'
12. Reduce illegal parking on Barton Street	Cars are sometimes parked illegally or partly on the footway which causes traffic to queue behind them waiting to get past. Measures would include 1st management of the shoppers parking in Sinope Street which is currently used all day by commuters. 2nd Improved enforcement delivered through the decriminalisation of parking enforcement	1 (Low)	2 (£50k to £250k)	3	Medium	Yes **Parking Enforcement has been significantly increased by Gloucester City Council along with road signs along the length of Barton Street**	☺ Less congestion on Barton Street would improve the environment	☺ Less congestion on Barton Street may improve perception of safety and community ☹ Less congestion on Barton Street may increase vehicle speeds and increase number or severity of accidents	☺ Less congestion on Barton Street may encourage shoppers to visit ☹ Shoppers who currently park illegally may shop elsewhere
(c) To Encourage local trips by non-car modes									
13. Promote alternatives through	Individualised marketing scheme	2 (Moderate)	2 (£50k to £250k)	4	Short to Medium	Yes	☺ Less traffic on Barton Street would improve the environment	☺ Less traffic on Barton Street would improve perception of safety and	☺ Less traffic on Barton Street would make the street more attractive to

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Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effectiveness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
a 'TravelSmart' intervention								community ☺ Encouraging more active modes will Improve health	shoppers
14. Promote the use of alternative modes through School Travel Plans	Work with schools on encouraging parents and children to use modes other than the car for the school run	1 (Low)	3 (< £50k)	4	Short to Medium	Yes	☺ Less traffic on Barton Street would improve the environment	☺ Less traffic on Barton Street would improve perception of safety and community ☺ Encouraging more active modes will Improve health	☺ Less traffic on Barton Street would make the street more attractive to shoppers
15. Promote the use of alternative modes and alternative routes through Business / Employer Travel Plans	Influence mode (and route) of travel through travel plans developed voluntarily and those required by the planning process. Use existing for a to disseminate information	1 (Low)	3 (< £50k)	4	Short to Medium	Yes	☺ Less traffic on Barton Street would improve the environment ☹ Increased traffic/congestion on alternative routes	☺ Less traffic on Barton Street would improve perception of safety and community ☺ Encouraging more active modes will Improve health ☹ Increased traffic/congestion on alternative routes	☺ Less traffic on Barton Street would make the street more attractive to shoppers ☹ Increased traffic/congestion on alternative routes ☹ Extra costs to drivers who divert

Table 2 Painswick Road North									
Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effectiveness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
(a) To Reduce Through Traffic									
1.Variable Message Signs (VMS)	A real-time air quality-monitoring unit would be used to activate a message telling drivers about poor air quality and suggesting an alternative route OR VMS signs to alert drivers of significant queuing traffic leading up to Bruton Way signals. Could also advise drivers of incidents such as road works and accidents	2 (Moderate)	3 (< £50k) Real-time air quality-monitoring unit = approx. £10,000 Would be dependent upon the implementation of the County's Intelligent Transport System	5	Medium to Long term	Yes	☺ Less traffic on Painswick Road North would improve the environment ☹ Increased traffic/congestion alternative routes	☺ Less traffic on Painswick Road North would improve perception of safety and community ☹ Identification of 'poor' air quality in the area may introduce a 'stigma' ☹ Increased traffic/congestion on alternative routes	☺ Less traffic on Painswick Road North would make the street more attractive to shoppers ☹ Identification of 'poor' air quality in the area may introduce a 'stigma' ☹ Increased traffic/congestion on alternative routes ☹ Extra costs to drivers who divert
2.Through route journeys from the City Centre to Painswick signed to use Barton Street/Chequers Bridge/Painswick Road North to use Metz Way instead	Currently drivers are signed from Bruton Way down Barton Street/Chequers Bridge/Painswick Road North for "B4073 Painswick". The "City Centre" is signed along Metz Way rather than along Barton St. from the roundabout on Eastern Avenue	1 (low) If implemented in isolation, through route journeys by local drivers may continue as they find it quicker than Metz Way	3 (< £50k)	4	Short	Yes	☺ Less traffic on Painswick Road North would improve the environment ☹ Increased traffic/congestion on alternative routes including Metz Way and Bruton Way	☺ Less traffic on Painswick Road North would improve perception of safety and community ☹ Increased traffic/congestion on alternative routes	☺ Less traffic on Painswick Road Norh would make the street more attractive to shoppers ☹ Increased traffic/congestion on alternative routes ☹ Extra costs to drivers who divert
3. Enforce the existing HGV ban on Painswick Road North/Chequers Bridge/Barton St except for buses and access	This measure could affect 1400 HGVs. (4wk/7day/24hr average excl. buses/coaches) were counted on Painswick Rd North at the last count Oct 2007 but some of these will be	2 (medium)	2 (£50k to £250k)	4	Medium to long	Yes Would require ANPR cameras	☺ Less HGV traffic on Painswick Rd North would improve the environment ☹☺ Increased HGV traffic on alternative routes	☺ Less HGV traffic on Painswick Rd North would improve perception of safety and community ☹☺ Increased HGV traffic on alternative routes	☺ Less HGV traffic on Painswick Rd North would make the street more attractive to shoppers ☹☺ Increased HGV traffic on alternative routes

Table 2 Painswick Road North									
Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effectiveness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
	accessing local premises								
4. Alter signage to allow all traffic from Chequers Lane onto Eastern Avenue	Allow access for all vehicles to turn left through Chequers Lane onto Eastern Avenue (at present it is buses only)	1 (Low)	3 (<£50k)	4		No	☹ Safety Issues ☺ Less HGV traffic on Painswick Rd North would improve the environment ☹☺ Increased HGV traffic on alternative routes	☺ Less HGV traffic on Painswick Rd North would improve perception of safety and community ☹☺ Increased HGV traffic on alternative routes	☺ Less HGV traffic on Painswick Rd North would make the street more attractive to shoppers ☹☺ Increased HGV traffic on alternative routes
5. Signalise Painswick Rd/Eastern Ave	A real-time air quality-monitoring unit would be used to activate a message telling drivers about poor air quality and suggesting an alternative route. Would only work if linked to measures 1&2 for Painswick Rd and Barton Street	3 (High)	1 (> £250k)	4	Long term	Unknown But a junction capacity study is about to start	☺ Less traffic on Painswick Road North would improve the environment ☹ Increased traffic/congestion alternative routes	☺ Less traffic on Painswick Road North would improve perception of safety and community ☹ Identification of 'poor' air quality in the area may introduce a 'stigma' ☹ Increased traffic/congestion on alternative routes	☺ Less traffic on Painswick Road North would make the street more attractive to shoppers ☹ Identification of 'poor' air quality in the area may introduce a 'stigma' ☹ Increased traffic/congestion on alternative routes ☹ Extra costs to drivers who divert
(b) To Reduce Emissions from Traffic									
6. Encourage bus company to replace buses travelling along Painswick Rd North/Barton St with modern low emission vehicles or investigate ways of reducing emissions from existing buses	Currently services 1, 3, 13 and 7 use Painswick Rd North/Chequers Bridge/Barton St for approx. 28 two way journeys per hour during the working day	1 (Low)	3 (< £50k)	4	Term would be defined by the identification of funding. In reality as commercial services it is the bus operators fleet replacement policy which will have an	Yes This is already happening slowly	☺ Less emissions would improve the environment	☺ Less emissions would improve conditions for pedestrians and cyclists and would enhance the sense of community	☺ Less emissions would improve conditions for pedestrians and cyclists and would encourage shoppers ☹ Such intervention may be 'anti competitive'

Table 2 Painswick Road North									
Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effective ness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
					impact				
7. Reduce illegal parking on Painswick Road	Cars are sometimes parked illegally or partly on the footway which causes traffic to queue behind them waiting to get past. Measures would include Improved enforcement delivered through decriminalised parking enforcement	1 (Low)	2 (£50k to £250k)	3	Medium	Yes	☺ Less congestion on Painswick Road would improve the environment	☺ Less congestion on Barton Street may improve perception of safety and community ☹ Less congestion on Barton Street may increase vehicle speeds and increase number or severity of accidents	☺ Less congestion on Barton Street may encourage shoppers to visit ☹ Shoppers who currently park illegally may shop elsewhere
(c) To Encourage Local trips by non-car modes									
8. Promote alternatives through a 'TravelSmart' intervention	Individualised marketing scheme	2 (Moderate)	2 (£50k to £250k)	4	Short to Medium	Yes	☺ Less traffic on Painswick Rd North would improve the environment	☺ Less traffic on Painswick Rd North would improve perception of safety and community ☺ Encouraging more active modes will Improve health	☺ Less traffic on Painswick Rd North would make the street more attractive to shoppers
9. Promote the use of alternative modes through School Travel Plans	Work with schools on encouraging parents and children to use modes other than the car for the school run	1 (Low)	3 (< £50k)	4	Short to Medium	Yes	☺ Less traffic on Painswick Rd North would improve the environment	☺ Less traffic on Painswick Rd North would improve perception of safety and community ☺ Encouraging more active modes will Improve health	☺ Less traffic on Painswick Rd North would make the street more attractive to shoppers
10. Promote the use of alternative modes and alternative routes through Business / Employer Travel Plans	Influence mode (and route) of travel through travel plans developed voluntarily and those required by the planning process. Use existing for a to disseminate information	1 (Low)	3 (< £50k)	4	Short to Medium	Yes	☺ Less traffic on Painswick Rd North would improve the environment ☹ Increased traffic/congestion on alternative routes	☺ Less traffic on Painswick Rd North would improve perception of safety and community ☺ Encouraging more active modes will Improve health ☹ Increased traffic/congestion on alternative routes	☺ Less traffic on Painswick Rd North would make the street more attractive to shoppers ☹ Increased traffic/congestion on alternative routes ☹ Extra costs to drivers who divert

Table 3 St. Oswald's Road / Priory Road									
Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effectiveness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
(a) To Reduce Traffic Flows									
1. Re-timing the traffic signals on Priory Rd, St. Oswald's Road and Worcester Street to deter traffic using this route	These signals are controlled by UTC and a signal plan could be set up to be implemented, for example, in the peak traffic periods	1 (Low) Since larger reductions in pollutants would probably require significant traffic diversion which is unlikely to be acceptable	3 (< £50k)	4	Short to Medium	No	☹ Given the strategic importance of this route and the lack of suitable alternative routes this measure may divert traffic into the city centre and on to residential streets such as Archdeacon Street instead	☹ Given the strategic importance of this route and the lack of suitable alternative routes this measure may divert traffic into the city centre and on to residential streets such as Archdeacon Street instead	☹ Given the strategic importance of this route and the lack of suitable alternative routes this measure may divert traffic into the city centre and on to residential streets such as Archdeacon Street instead ☹ Extra costs to drivers who divert
2. Traffic management measures in the city centre and Western Waterfront areas to reduce traffic passing through this AQMA	A traffic study carried out for the City and County Councils recommended traffic management changes to Westgate gyratory and other streets that would significantly reduce traffic in this AQMA and on the Commercial Rd/ The Quay route to the west of the city centre	2 (Moderate)	1 (> £250k) Potential Developer Contributions	3	long	unknown	☺ Significant reductions in traffic on the edge of city centre and in the western waterfront will improve the environment		☺ Significant reductions in traffic on the edge of city centre and in the western waterfront will make these areas more attractive to shoppers ☹ Increased traffic/congestion on alternative routes
3. Improvements to junctions on the A40 Gloucester Northern bypass could encourage east/west through traffic to use this route rather than St. Oswald's Road	Traffic modelling has shown that a significant proportion of through east/west traffic uses roads within the urban area including St Oswald's Road, because of congestion on the A40 Northern bypass. A study carried out for	2 (Moderate)	1 (> £250k) Capital funding through LTP3 and potential for additional improvements through Major Scheme Bid and Developer Contributions	3	Long term	Yes	☺ Reduced traffic, congestion and environmental nuisance on east/west routes through Gloucester ☺ Significant reductions in traffic on the edge of city centre and in the western waterfront will improve the environment		☺ Significant reductions in traffic on the edge of city centre and in the western waterfront will make these areas more attractive to shoppers

Table 3 St. Oswald's Road / Priory Road									
Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effectiveness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
	the County Council in 2003 showed that improvements to junctions on the A40 could substantially reduce delays and make this route more attractive								
4. Variable message signs (VMS) to alert drivers to poor air quality in Priory Road Or VMS signs to alert drivers to significant queuing traffic on St. Oswald's Road	A real-time air quality-monitoring unit costing about £10,000 would be used to activate a message telling drivers about poor air quality and suggesting the use of the Gloucester Northern bypass instead	1 (Low)	2 (£50k to £250k) The costs for both measures 4 and 5 assume the implementation of the County Council's Intelligent Transport system	3	Long term	Yes	☺ Less traffic on Priory Road and St. Oswald's Road would improve the environment	☹ Identification of 'poor' air quality in the area may introduce a 'stigma' ☹ Increased traffic/congestion on alternative routes	☹ Identification of 'poor' air quality in the area may introduce a 'stigma' ☹ Increased traffic/congestion on alternative routes ☹ Extra costs to drivers who divert
5. Prohibit traffic turning right out of Priory Road and from St. Oswald's Road into Priory Road. In addition modifying the junction layout to eliminate the need for signal control of traffic except to allow pedestrians to cross at the junction	Traffic that is prohibited from turning right could use Westgate gyratory or the roundabout near Tesco to turn right instead.	1 (Low)	3 (< £50k)	4		No	☹☺ Traffic delays and hence emissions at this junction should be reduced although some vehicles will pass through the junction twice negating the benefit gained ☹ May divert traffic into the city centre and on to residential streets such as Archdeacon Street instead	☹ May divert traffic into the city centre and on to residential streets such as Archdeacon Street instead	☹ May divert traffic into the city centre and on to residential streets such as Archdeacon Street instead ☹ Increased traffic delays and congestion may be caused at the Tesco roundabout, at Westgate gyratory and on alternative routes used by diverted trips ☹ Extra costs to drivers who divert
	Traffic that is	1	2	3	Short	Yes	☹☺ Traffic delays and	☹ May divert traffic into	☹ May divert traffic into

Table 3 St. Oswald's Road / Priory Road									
Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effectiveness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
6. Prohibit traffic turning right out of Priory Road onto St. Oswald's Road (only	prohibited from turning right could use Westgate instead.	(Low)	(< £50k)			It needs investigating further.	hence emissions at this junction should be reduced although some vehicles will pass through the junction twice negating the benefit gained ☹ May divert traffic into the city centre and on to residential streets such as Archdeacon Street instead	the city centre and on to residential streets such as Archdeacon Street instead	the city centre and on to residential streets such as Archdeacon Street instead ☹ Increased traffic delays and congestion may be caused at Westgate gyratory and on alternative routes used by diverted trips ☹ Extra costs to drivers who divert
7. Replacement of St Oswald's P&R with alternative sites.	At present St Oswalds in situated too close to the city centre.	2/3 (Moderate to High)	(> £250k)	5	Medium to Long term	Yes	☺ Less traffic on Priory Road and St. Oswald's Road would improve the environment	☺ Encourage drivers to use alternatives modes including new outer ring of p&r sites ☹ Increased on-street parking in residential areas instead	☹ Increased traffic/congestion on alternative routes ☹ Extra costs to drivers who divert
(b) To Reduce the Reception of Pollutants									
Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effectiveness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
8. Further Monitoring	As a result of changes to the junction, with the installation of traffic lights	N/A		N/A	Short to on-going	Yes	N/A	N/A	N/A
9. A physical barrier between the houses in the AQMA and St. Oswald's Road	The barrier would be directly in front of the houses and would need to be clear to allow light to pass through and be high enough to protect all living spaces within the house	1 Low)	2 (£50k to £250k)	3		No	☹ May be regarded as having a negative aesthetic impact	☹☺ The response of the people in the houses affected would be crucial to the implementation of this measure	☹ The barrier is likely to require significant maintenance, as it is likely to be subject to graffiti and vandalism
10. Planting		1 (Low)	3 (< £50k)	4		No	☹ The use of planting has		

Table 3 St. Oswald's Road / Priory Road									
Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effectiveness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
between the houses in the AQMA and St. Oswald's Road							not shown to improve the air quality from NO2 emmissions.		
11. Demolition of the 13 houses in the AQMA	The land could be used for flats located further from the road and facing away from it. Alternatively the land released could form part of the adjacent public open space	3 (High)	1 (> £250k)	4	Long-term	No The response of the people in the houses affected would be crucial to the implementation of this measure	☺ This measure would allow the AQMA to be rescinded	☹ It may require compulsory purchase of properties and hardship to individuals and families *however* these properties were flooded twice by sewer overflow in June & July 2007	☹ It may require compulsory purchase of properties and hardship to individuals and families
12. Install secondary-glazing and mechanical ventilation using air from the rear of the 13 houses in the AQMA	These measures are sometimes taken when double-glazing is installed under road traffic noise regulations In addition to the glazing and air conditioning it may be necessary to include the installation of some form of renewable power source to provide electricity to off-set running costs	1 (Low) Windows have never been seen open due to traffic proximity	1 (> £250k)	2		No The response from residents in summer 2007 was not positive for rear ventilation.	☺ This measure would slightly reduce the reception of pollutants ☹ This measure would increase households consumption of electricity		☺☹ The installation of this equipment would have an uncertain impact on the property values ☹ Expense of running and on-going maintenance of the system – fall to GCC, GcityC or Residents?
13. Pollutants	The feasibility and acceptability of such a	1 (Low)	1 (> £250k)	2	Medium	Unknown	☺ This measure has the potential to reduce the		☹ The costs of such an innovative system, which

Table 3 St. Oswald's Road / Priory Road									
Measure	**Description**	**Air Quality Impact**	**Cost**	**Cost - Effectiveness**	**Timescale**	**Feasibility**	**Environmental Impact**	**Social Impact**	**Economic Impact**
collecting in the dip under the railway bridge to be pumped into a chimney for dispersal or treated in some way	measure would require further investigation	Unknown as the contribution of this source of pollution to overall concentrations is unclear	This measure would require assessment by environmental consultants; Estimate of study costs £20k				reception of pollutants		would be similar to tunnel systems in operation are unknown

Recommendations

All measures need to go through a Priority Assessment process in order to evaluate a cost benefit for any measures. Once a measure has qualified then it can go into the Gloucestershire County Council Capital Programme. This programme is subject to review when financial pressures such as flooding occur.

Barton Street

Completed/Underway

1. Encourage local trips by non-car modes - promote alternatives through a 'TravelSmart' intervention.
2. Encourage local trips by non-car modes - promote the use of alternative modes through School Travel Plans.
3. Reduce through traffic - improvements/control of the signals at the junction of Barton Street, Bruton Way, Trier Way and Eastgate Street. Environmental controlled link to real-time air quality monitoring.
4. Reduced bus emissions - replacement by March 2009 of the fleet (bus service no. 1) with Euro-4 compliant vehicles by the bus operator Stagecoach.
5. **Reduce emissions from traffic – reduce illegal parking on Barton Street, which causes congestion, through increased enforcement.**

Short-term

1. Do further traffic counts to determine the proportion of traffic, both light and HGV that is through traffic. **A quote had been received to carry out this work. Work is taking place to identify resources to carry it out**
2. **Identify car parks locally where commuters are parking to then walk into Gloucester. These car parks could be used for local shoppers only thereby reducing the amount of on-street parking and discouraging commuter traffic.**

On-going

1. Encourage local trips by non-car modes/Reduce through traffic - promote the use of alternative modes and alternative routes through Business/Employer Travel Plans.
2. Continue to work with bus operators to upgrade existing bus fleet to Euro-4 compliant vehicles that are less polluting.

Painswick Road North

Completed/Underway

1. Encourage local trips by non-car modes -promote alternatives through a 'TravelSmart' intervention.
2. Encourage local trips by non-car modes - promote the use of alternative modes through School Travel Plans.
3. Reduced bus emissions - replacement by March 2009 of the fleet (bus service no. 1) with Euro-4 compliant vehicles by the bus operator Stagecoach.

Long-term

1. Reduce through traffic – replace roundabout on Eastern Avenue/Painswick Road junction with signal controls. Studies on Eastern Avenue capacity are scheduled for the medium term.

Ongoing

1. Continue to work with bus operators to upgrade existing bus fleet to Euro-4 compliant vehicles that are less polluting.
2. Encourage local trips by non-car modes/Reduce through traffic - promote the use of alternative modes and alternative routes through Business/Employer Travel Plans.

St. Oswald's Road/Priory Road

Completed

1. Completion of the Gloucester South West bypass that will allow traffic to skirt Gloucester on the western side.

Short/Medium-term

1. Monitor the reception of pollutants - as the junction of Priory Road and St. Oswald's Road has changed since traffic lights were installed and went live in July 2005 (this has provided a right turn lane for traffic from Priory Road and from Westgate Gyratory whereas previously these turns were difficult to make). It will be necessary to monitor the impact of these changes to establish whether this has improved or exacerbated the situation. A joint bid to Defra for real-time air pollution monitoring equipment will assist with signal adjustments.

2. Reduce through traffic – investigation of signal changes to stop right hand turns from Priory Road into St Oswald's Road is underway. It will be necessary to monitor the impact of these changes to establish whether this has improved or exacerbated the situation.

Long-term

1. Reduce through traffic - traffic management measures in the city centre and Western Waterfront areas to reduce traffic passing through this AQMA. Note: current "Western Waterfront" proposals will increase traffic through this zone; reconsideration required.

2. Reduce through traffic - improvements to junctions on the A40 Gloucester Northern bypass to encourage east/west through traffic to use this route rather than St. Oswald's Road.

3. Reduce through traffic - removal of Park and Ride from St Oswalds Way. Replacement with the West of Severn Park and Ride. A bus lane which will facilitate cross river Park and Ride is being constructed now.