



**Air Quality Action Plan
Army and Navy
Air Quality Management
Area (AQMA)**

July 2008

i) Executive Summary

In December 2005 Chelmsford Borough Council declared an area around Chelmsford's Army and Navy Roundabout as an Air Quality Management Area (AQMA) by exercising powers conferred upon it by section 83 (1) of the Environment Act 1995.

The Borough Council is obliged, under Section 84 of the Environment Act 1995, to produce an Action Plan within 18 months of designation, setting out measures that the Council and associated organisations will take in order to lower pollutant concentrations within the AQMA. The Council is also obliged to consult with the public and key stakeholders (including DEFRA) on the Action Plan following which a formalised Action Plan is agreed and submitted to DEFRA. This document fulfils Chelmsford Borough Council's statutory obligation.

This Action Plan and the improvements that will stem from it also contribute to the Council's Corporate Plan, under Corporate Priority number 11 "Reduce the Impact of Climate Change on the Borough."

This Action Plan considers all areas that the Council has jurisdiction over that affect air quality. The main areas that the Council has powers over are planning (planning policy and development control) and corporate policy.

The plan highlights the measures that the Council and its partners are able to take and considers their potential impact on air quality. These measures include, amongst others, local highways infrastructure, public and private transport and the legislative powers to improve air quality.

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1.0 Introduction

- 1.1 The Environment Act 1995 provides the legislative framework from which Local Air Quality Management operates. Provisions in Part IV of the Act obligate local authorities to monitor and assess air quality as a local function.
- 1.2 The Environment Act 1995 requires DEFRA to produce a National Air Quality Strategy and for this to be periodically reviewed and updated. The First National Air Quality Strategy was published in 1997, with subsequent revisions and amendments in 2000, 2003 and 2007. This strategy sets out strict Guideline Values for 7 major atmospheric pollutants that local authorities must assess. These Guideline Values are maximum permitted levels based on EU and World Health Organisation (WHO) guidelines that in turn are based on predicted impacts of the pollutants on human health.
- 1.3 Chelmsford Borough Council has been assessing outdoor ambient air quality within the borough for a number of years using a combination of passive and automated samplers. The Council has undertaken increasingly detailed assessments of the air quality within the town and the majority of the borough meets the strict Guideline Values set out in Part IV of the Environment Act 1995 and the National Air Quality Strategy 2000 and subsequent revisions.
- 1.4 The concentration of Nitrogen Dioxide (NO₂) in the area around the Army and Navy Roundabout (ANR) was, however, predicted to exceed Guideline Values. Passive monitoring in 2005 validated this, showing NO₂ values in excess of 50µg/m⁻³ within the AQMA. This exceedence of the NO₂ Guideline Value resulted in Chelmsford Borough Council designating an area surrounding the Army and Navy Roundabout as an Air Quality Management Area (AQMA).
- 1.5 The Air Quality Management Area was formally declared (see Appendix 1) on 11th November 2005 and came in to force on 1st December 2005 encompassing the designated area shown on Figure 1.1.

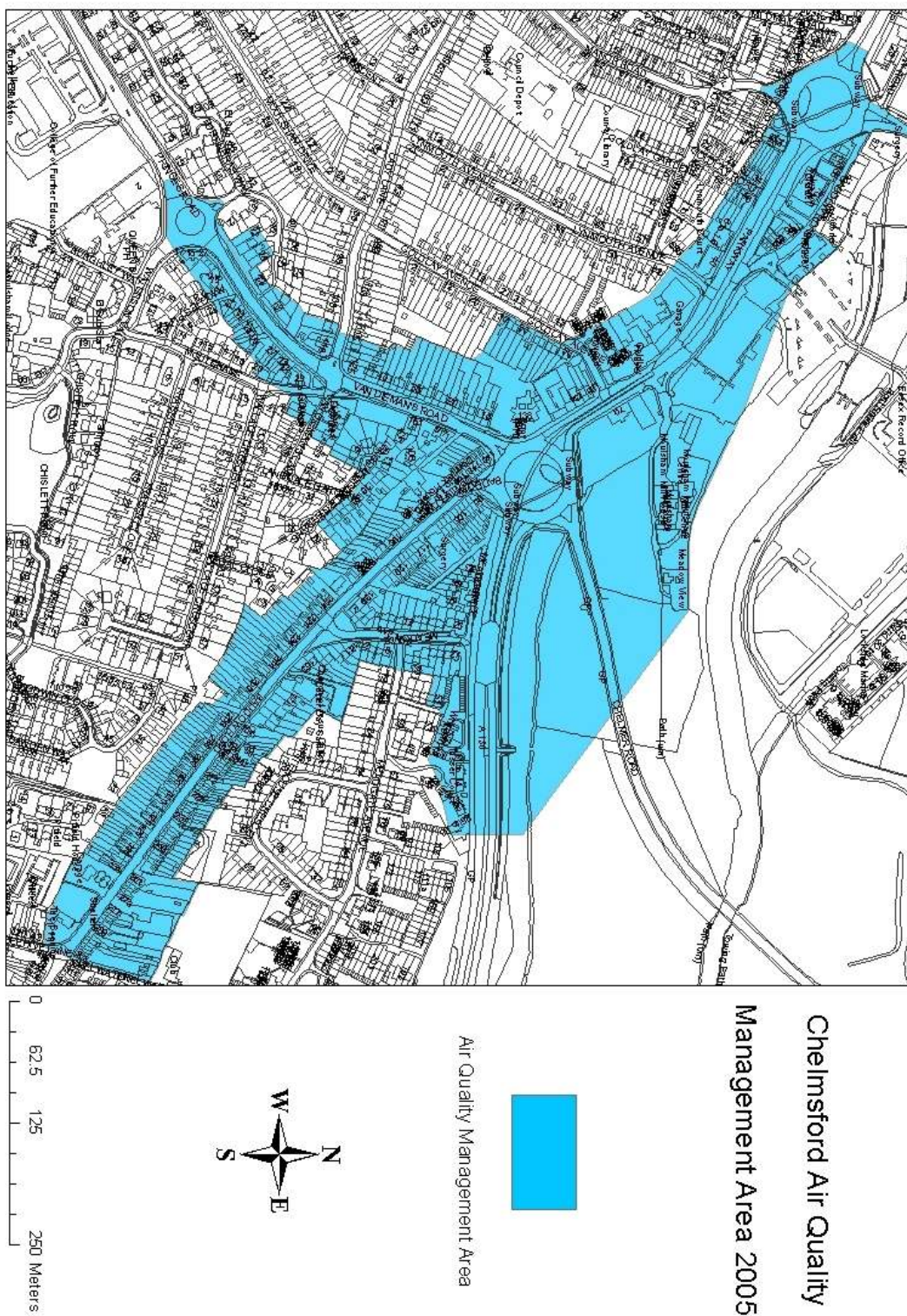
Under Section 84 (2) of the Environment Act 1995 the Council is required to undertake a Further Assessment which models the future pollutions levels. The Council is also obliged to produce an Action Plan detailing measures to be considered in more detail to resolve air quality issues within the designated area. This document is the Army and Navy AQMA Action Plan (hereafter termed the Action Plan) and sets out to define the major sources of pollution and potential measures to reduce them to below statutory Guideline Values.

- 1.6 Since the AQMA order came in to force the actual area where the level of NO₂ exceeds the Guideline Value has decreased. This is due in part to general nationwide reductions in Oxides of Nitrogen (NO_x). The

introduction of the Sandon Park and Ride Scheme along with lane changes on the Baddow By Pass/ approach to the Army and Navy roundabout may also have played a contributory part. Whilst the area affected has reduced, Chelmsford Borough Council does not propose amending the AQMA boundary at the present time but will continue to monitor air quality over the next 3 years.

- 1.7 It is modelled in the Further Assessment that the statutory NO_x Guideline Value will be met in the AQMA by 2010 without Local Authority intervention. This Action Plan therefore considers methods to alleviate the anticipated temporary nature of the pollution problem. It is also considered prudent to undertake some active measures rather than rely on passive improvement to reduce air pollution.

Monitoring of pollution within the AQMA relies upon results from passive diffusion tube sampling. Diffusion Tubes are a widely accepted method of screening for air pollution and used in all Local Authority air quality assessments. Diffusion tubes are generally found to provide an over-estimation of pollution concentrations by an average of 10% when compared with automated monitoring equipment results. To err on the side of caution a correction factor has not been applied to the results included in this report. Since Summer 2007 the Council has been comparing its diffusion tube results with new automated monitoring equipment with a view to producing its own correction factors by the middle of 2008.



2.0 The Air Quality Strategy 2007

- 2.1 The first Air Quality Strategy was introduced by HM Government and devolved administrations in January 2000 and established a framework with which to coordinate air quality management. The document was subsequently amended and revised with the most recent document being published by DEFRA in July 2007.
- 2.2 The overall aim of the national Air Quality Strategies is to:
- “...map out, as far as possible, current and future ambient air quality policy in the United Kingdom in the medium term”.
- “...provide the best practicable protection to human health and the environment by setting evidence based objectives for the main pollutants.”
- “...describe the air pollution climate in the UK to provide a framework to allow all those who contribute to air pollution, who have a part to play in its abatement, or are affected by it, to identify their role in improving air quality.”
- 2.3 The Air Quality Strategy, and subsequent amendments, provides health-based objectives for seven important atmospheric pollutants (see Table 1.0) below which research indicate that there are no discernable impacts on human health.
- 2.4 The Air Quality Strategy is the national policy governing air quality within the United Kingdom; the requirements within the strategy are undertaken at a local level by Local Authorities.

Pollutant	Objective	Concentration measured as	Date to be achieved
Sulphur Dioxide	266 $\mu\text{g.m}^{-3}$ 350 $\mu\text{g.m}^{-3}$ 125 $\mu\text{g.m}^{-3}$	15 minute mean 1 hour mean 24 hour mean	31 st December 2005 31 st December 2004 31 st December 2004
Polycyclic aromatic hydrocarbons	0.25 ng.m^{-3}	Annual mean	31 st December 2010
Benzene	16.25 $\mu\text{g.m}^{-3}$ 5 $\mu\text{g.m}^{-3}$	Running annual mean Annual mean	31 st December 2003 31 st December 2010
1,3- butadiene	2.25 $\mu\text{g.m}^{-3}$	Running annual mean	31 st December 2003
Carbon monoxide	10 mg.m^{-3}	Maximum daily running 8 hour mean.	31 st December 2003
Lead	0.5 $\mu\text{g.m}^{-3}$ 0.25 $\mu\text{g.m}^{-3}$	Annual mean Annual mean	31 st December 2004 31 st December 2008
PM10	50 $\mu\text{g.m}^{-3}$ 40 $\mu\text{g.m}^{-3}$	24 hour mean Annual mean	31 st December 2004 31 st December 2004
PM2.5	25 $\mu\text{g.m}^{-3}$	Annual mean	31 st December 2019
Nitrogen Dioxide	200 $\mu\text{g.m}^{-3}$ 40 $\mu\text{g.m}^{-3}$	1 hour mean annual mean	31 st December 2005 31 st December 2005
Ozone	100 $\mu\text{g.m}^{-3}$	8 hour mean	31 st December 2005

Table 1.0 Current UK Air Quality Strategy Objectives

3.0 The Chelmsford Local Development Framework

- 3.1 Planning Authorities are required to produce local development frameworks providing coordinated development strategies. The Framework documents are an important vehicle enabling Local Authorities to protect air quality in their borough through long term planning policies. This framework therefore supports Local Authorities duties under the National Air Quality Strategy.
- 3.2 In 2006 Chelmsford Borough Council produced a draft Local Development Framework that sought to provide a coordinated development strategy for the borough until 2021 – this was approved by Government Inspectors and adopted on 20th February 2008. This framework is the key directional policy within the borough enabling air quality considerations to be made prior to developments progressing. Chelmsford Borough Council has incorporated a number of specific planning guidelines that serve to safeguard air quality. When combined these guidelines are intended to provide sufficient measures to protect air quality against the negative impacts of certain developments.

Strategic Objective EPE2:

“Seek to ensure development has a net beneficial effect on the local and global environment by reducing the generation of pollution and the waste and the consumption of natural resources, including fossil fuel-based energy consumption. The generation of energy from renewable resources will be encouraged.”

Policy CP13: Minimising Environmental Impact

“The Borough Council will seek to ensure that development proposals minimise their impact on the environment and that they do not give rise to significant and adverse impacts on health, amenity including air quality, and the natural environment”

Policy CP14: Environmental Quality and Landscape Character

“The Borough Council will promote and support the enhancement of the environmental quality of the borough’s countryside and settlements”

Policy DC28: Air Quality

“Within designated Air Quality Management Area the Borough Council will promote measures to improve air quality and will expect development proposals to reduce sources of air pollution. Where the Borough Council considers that air quality objectives

are likely to be prejudiced or proposals fall within an Air Quality Management Area, applicants will be required to submit a detailed specialist report which sets out the impact that the proposed development has on air quality. Planning permission will not be granted for development where there is a significant adverse impact upon air quality within the Air Quality Management Area.”

Policy DC29: Amenity and Pollution

“Planning permission will be refused for development, including changes of use, which will or could potentially give rise to polluting emissions to land, air, and water by reason of noise, light, smell, fumes, vibration or other (including smoke, soot, ash, dust and grit) unless appropriate mitigation measures can be put in place and permanently maintained.”

- 3.3 The remainder of the Local Development Framework will continue to evolve over the coming years. Progressing detailed plans on an area by area basis. A planning inspectorate examination for the Town Centre Area Action Plan was held in April 2008 to assess the feasibility for future proposals for development of Town Centre up to the Army and Navy Roundabout. Some of the infrastructural proposals provide long term road developments that are beyond the scope of this Action Plan.

4.0 Aims and objectives

The statutory purpose of the Action Plan, and thus the Council's overall aim in producing this Action Plan, is to reduce the harmful the level of NO₂ within the AQMA – whilst reductions in congestion may improve air quality this is not the primary aim of this document. The purpose of the Action Plan is to consider a wide variety of options that will contribute to an improvement in air quality and select viable options for development.

To this end a steering committee was established to consider the nature of the problem. The committee utilised the various expertise found within Chelmsford Borough Council and Essex County Council to develop all possible measures to reduce air pollution. These measures were included in a draft Air Quality Action Plan that was made available for public comment between December 2007 and February 2008. The draft Air Quality Action Plan has been amended as a result of the consultation process to produce this finalised Air Quality Action Plan.

The nature of the problem and the proposals put forward to alleviate this are considered in the following section.

5.0 Identifying the Problem

- 5.1** Chelmsford serves as a major transportation hub for the centre of the county of Essex. The borough encompasses a population of 157000 with plans for a further fourteen thousand new dwellings by 2021. Car ownership within the town is broadly comparable with the national average but is expected to grow by between 20% and 30% between 1998 and 2011. A combination of a high commuting and a largely centralised population leads to critical stresses being placed on the transportation network that results in a compromise in air quality. The expansion of the town is focused in the northern areas with two new communities being proposed. The impacts of these developments on the AQMA are expected to be limited as commuters will access the A12 and other major commuter corridors from other areas of the town.
- 5.2** Chelmsford's AQMA is focused on the Army and Navy Roundabout which serves as a junction to both the A1114 and the A138 Chelmer Road. In addition to these trunk roads, two major residential link roads (Baddow Road and Van Diemens Road) also converge on the roundabout. Congestion is a major issue on all of the converging roads; this is most acute during peak period traffic. The AQMA encompasses a large residential area surrounding the roundabout and the converging roads. Baddow Road is a particular pollution hotspot within the AQMA and is discussed in more detail in section 6.
- 5.3** Planning permission has been granted for the redevelopment of the site of the former Army and Navy Public House into a mixed-use development comprising of an eighty-bedroom Travelodge™ Hotel, 2495m² of commercial premises including a Frankie and Bennys'™ restaurant, twelve, one bed residential flats and seventy-seven parking spaces. At the planning consultation phase both CBC and ECC highlighted air quality as a material concern. Access to the site has been moved to a side road for vehicles accessing the development, in order to minimise congestion at the Roundabout. In February 2008 construction began on the site with a completion deadline of November 2008.
- 5.4** Within the Chelmsford Town Centre Area Action Plan is the proposed construction of a large-scale mixed-use development ("Chelmer Waterside") on the land between the A1114 and the River Chelmer bordering the AQMA. The first phase of redevelopment would be the construction of a supermarket. The exact details of any development are subject to the planning process and a full air quality impact assessment will be required for any development on this site using advanced modelling of future air pollution concentrations and designed in accordance with Policies DC29/DC30 (see above).

6.0 Defining the Problem

6.1 Sources of Nitrogen Dioxide (NO₂)

6.1.1 Oxides of Nitrogen (NO_x) predominantly comprise of Nitrogen monoxide (NO) and Nitrogen dioxide (NO₂) and are a bi-product of combustion processes. Sources of NO₂ nationwide include industrial activities and electricity generation. However, there are no significant industrial processes in the vicinity of the AQMA nor are there any electricity generators. The prime source of NO₂ in the AQMA is, therefore, traffic related. This is validated by our Further Assessment, which is discussed in the following sections.

6.2 Health and Environmental Implications of Nitrogen Dioxide

6.2.1 NO₂ can interact with other chemical in a synergistic fashion to produce ground level Ozone (O₃) and particulate aerosols through conversion to nitrate.

6.2.2 There are both acute and chronic health implications of high concentrations of NO₂. There is preliminary evidence to link atmospheric concentrations of NO₂ and hospital admissions of people with pre-existing respiratory conditions. There is also preliminary evidence for the long-term effects of NO₂. These effects are considered in the National Air Quality Strategy but are not currently considered robust enough to establish a causative link. Despite this, the World Health Organisation has confirmed a guideline value of 40µg.m⁻³ on the basis of the precautionary principle and has been adopted by the National Air Quality Strategy 2007.

6.3 Source Apportionment

6.3.1 Road Traffic has been identified through pollution modelling to be the primary contributor of NO_x within the AQMA (55.2%).

6.3.2 HDV class vehicles were found to be contributing over 60% of traffic related NO_x despite representing less than 7% of the total vehicle movements in the AQMA. Traffic counts for the roads that link with the Army and Navy Roundabout indicate that the majority of HDVs are public service vehicles (PSVs). In particular, in Baddow Road over 80% of HDVs are PSVs.

Receptor	NO _x concentrations 2007	%	µg/m ³
140 Baddow Road (x=571463, y=205978)	Background	44.8	47.3
	Road traffic	55.2	58.3
	HDV*	33.7	35.6
	LDV*	21.5	22.7
*As proportion of road traffic emissions contribution			

Table 2.0 Source apportionment at worst case receptor.

6.4 Reduction Required

6.4.1 Before examining the options to reduce air quality it is essential to examine the level of reduction required to meet EU and UK Guideline Value for NO₂. The Further Assessment modelling undertaken by Bureau Veritas provide the concentrations at the “worst case receptor” i.e. the current peak in pollution.

6.4.2 To assess the reduction required we use a simple difference function (Equation 1).

6.4.3 From this it is calculated that a reduction of 9.4% in NO₂ from 2007 levels is required to meet Air Quality Strategy Guideline Values..

Equation 1: Reduction required to meet EU and UK Guideline Values

Improvement required (%) = $((\text{Predicted concentration} / \text{Guideline Value}) \times 100) - 100$

Worked example:

$$\begin{aligned}
 & ((43.7\mu\text{g.m}^3/40.0\mu\text{g.m}^3) \times 100) - 100 \\
 & (10.94 \times 100) - 100 \\
 & 109.4 - 100 \\
 & = 9.4\%
 \end{aligned}$$

6.5 The prime congestion issues affecting the AQMA

1. Essex Yeomanry Way-Army and Navy Roundabout

This section of highway is prone to congestion particularly during peak traffic flows. This has been partially alleviated by infrastructural changes undertaken by Essex County Councils Development, Highways and Transportation Department in 2006. This consisted of a dedicated bus lane, constructed as part of the introduction of a Park and Ride scheme; this in turn has reduced the number of vehicle movements at the junction particularly during the peak period. There

are no further viable improvements to be made to this section of highway without significant capital investment (i.e. flyover replacement).

2. Van Diemens Road-Army and Navy Roundabout

This location is within approximately 60 metres of the main pollution receptor in Baddow Road and 30 metres of the main receptor in Parkway where Guidance Values for NO_x are exceeded.

There is significant stationary traffic during the majority of the day at the Van Diemens Road junction with the Army and Navy Roundabout. Traffic regularly backs up beyond the Lady Lane turning. Traffic needing to access the roundabout are hindered by town centre (Parkway) bound traffic being held up by the limited highway space parallel with the flyover – where the highway takes merging traffic from the ANR and Van Diemens Road but is only 1.5 lanes wide. This is further exacerbated by the pedestrian crossing that is within 15 metres of the roundabout itself.

The location of the pedestrian crossing in Van Diemens Road is under review and it may be possible to introduce a split pedestrian crossing, which could result in less time when traffic is stationary. Any actions to ease the flow of traffic onto and along this short section of Parkway would assist other traffic queuing at Van Diemens Road accessing the ANR and the general flow on the remainder of the roundabout.

3. Parkway-Chelmer Road turning

This location is within approximately 80 metres of the main pollution receptor in Baddow Road and 100 metres of the main receptor in Parkway where Guidance Values for NO_x are exceeded.

There is significant stationary traffic during the majority of the day at the Parkway – Chelmer Road/ANR junction, even when the tidal flyover is set for outbound traffic. Traffic queuing to access the Chelmer Road has to queue alongside traffic wishing to use the ANR, thereby exacerbating the queues. This is further exacerbated by the pedestrian crossing that is within 20 metres of the roundabout itself. Action to enable the free flow of traffic onto the Chelmer Road would have a significant impact on congestion at this point. A dedicated left turn lane from Parkway to Chelmer Road has been provided, but has limited stacking capacity.

4. Baddow Road

This location is adjacent to the main pollution receptor in Baddow Road and 100 metres of the main receptor in Parkway where Guidance Values for NO_x are exceeded.

Stationary traffic queuing in Baddow Road attempting to access the Army and Navy Roundabout is a major contribution to the AQMA pollution problems experienced at this location. The nature of the problem requires particular consideration. The queue of traffic can extend from the roundabout to beyond Beehive Lane, a distance of ca. 600 metres.

Traffic flowing from the roundabout towards Great Baddow is not considered to be a contributor to the air pollution and congestion problems, other than when overtaking cars parked to the side of the Baddow Bound carriageway. There is no off street parking for premises 182-262 Baddow Road and given the close proximity of premises to the highway it is not possible to provide this.

Hamlet Terrace (140-156 –evens- Baddow Road) are Grade II listed properties and as such are protected and any schemes for road widening to provide extra capacity cannot be considered.

The road is a well-established major bus route and congestion interferes with service delivery of the buses. The congestion causes buses to idle in traffic jams and is likely to form a significant component of the HDVs pollution contribution. Buses, however, are considered to be a major factor in reducing air pollution through wider sustainable transport measures. It is therefore important that Action Plan initiatives concentrate on measures that will improve bus journeys and/or pollution emissions.

As buses are an important component of tackling air pollution, the Steering Committee sought cooperative working with all bus companies operating within the AQMA, this will be discussed in greater depth in subsequent sections considering air pollution reduction methods.

7.0 The Proposals Investigated (see Table 3.0)

- a. **Infrastructural Changes to Army and Navy Junction**
 - Immediate Changes to the roundabout
 - Left hand filter lane from Van Diemens Road to Parkway.
 - Chelmer Viaduct
 - Left hand filter lane from Parkway to the Chelmer Road.
 - Access roads to the Chelmer Waterside Development.
 - Replacement of the tidal flyover with 2-way flyover.

- b. **LDV and HDV Movements within the AQMA**
 - Retrofitting of Buses with Particulate Traps to reduce Particulate Matter (PM10) emissions.
 - Standard of Buses operating along Baddow Road.
 - Redistribution of buses operating along Baddow Road – i.e. only most modern used on this route.
 - Construction of new access route from Meadgate Terrace to Baddow By Pass for buses.
 - Re-routing of buses from Baddow Road to the Army and Navy Roundabout by diverting them through Meadgate Avenue, Longmead Avenue onto the Baddow By Pass.
 - Initiatives from First Group plc.
 - A section of the town centre bound carriageway of Baddow Road to be for buses only.
 - Restricting LDV and HDV access to the AQMA.

- c. **Pedestrian and Cycling Improvements in the AQMA**
 - To close the pedestrian crossing on the feeder roads to the Army and Navy Roundabout to help prevent unnecessary queuing.
 - Alterations to the pedestrian crossings

- d. **Roadside Emissions Testing (RET)**
 - RET within the AQMA.

- e. **Promoting Change**
 - The Council as a leader in sustainability.
 - Chelmsford Borough Councils Travel Plan
 - Chelmsford Borough Council s Climate Change Action Plan
 - Education and promotion of Air Quality.
 - Park and Ride Expansion.
 - New Railway Station.
 - Website Developments.

8.0 The Proposals Expanded (see Table 3.0)

a. Infrastructural Changes to the Army and Navy Junction

Six infrastructure changes to the road network around the Army and Navy Roundabout are proposed by Essex County Council. The aim of the proposals being to increase traffic flow, reduce congestion on feeder roads and thereby reducing emissions.

1. Immediate Changes

i Control of the tidal flyover

Essex County Council advise that the original switchgear controlling the tidal flyover has exceed its working life. Without significant resources this would necessitate the setting of the flyover to in one direction only. Air Quality Modelling has shown that the air quality objectives can still be met with the flow set one way. However, it would be beneficial to road users for it to be tidal. Essex County Council has recently announced plans to introduce a scheme to manage the operation of the flyover more efficiently through “daytime dynamic operation” - this means switching the flyover to deal with greatest demand as and when necessary as opposed to a timetabled basis. Essex County Council also propose the closure of the flyover overnight to improve safety at low flow periods. Until operational we cannot accurately predict the impact of this scheme on air quality. However, it is anticipated that this will result in an improvement in air quality at the Army and Navy Roundabout.

ii Control of traffic at the roundabouts through signal control.

Essex County Council propose the partial reintroduction of the signal controls located at the roundabout, The Chelmer Road entry (and possibly Parkway) would be controlled by levels of congestion as opposed to time switches. Similar schemes operating elsewhere have resulted in a 20% reduction in congestion time. This system has been used in over 50 local authorities in the UK including London, Birmingham, Liverpool and Manchester. Until the controls are operational we cannot accurately predict the impact of the system on air quality. However, it is anticipated that this will result in an improvement in air quality at the Army and Navy Roundabout.

Funding for these schemes are in place and implementation are scheduled to start in August 2008 with completion by March 2009.

2. Dedicated left hand filter lane from Van Diemens Road to Parkway

The creation of a feeder lane leading from Van Diemens Road to the ANR leading to the A1114, and widen the 1.5 lanes around the base of the flyover to 2 full lanes. see Appendix 6, was considered. This scheme was examined alongside locking of the tidal flyover either inbound or outbound.

This scheme was modelled to further reduce the overall concentrations of NO₂ by 0.4µg m³ with the average concentration experienced at the worst case receptor predicted to be 33.8µg m³, 6.2µg m³ below government guideline values during average meteorological conditions. However, the gains may be significantly less during poor meteorology although still remains within guideline limits. Should the tidal flyover be for inbound traffic only the predicted benefits are halved to 0.2µg.m³. These benefits would be gained despite the predicted increase in traffic volumes in the coming years.

A detailed site investigation by Essex County Council has now revealed that underground services would require relocation for the scheme to progress with an estimated cost in excess of £1.5 million, make the full scheme financially unviable at the present time.

Whilst implementation of the entire scheme is unviable Essex County Council announced in April 2008 proposals to implement part of the above proposal which is not affected by the underground services. This is to remove the pinch point at the base of the flyover to accommodate two lanes of traffic. This is intended to reduce delays caused by two lanes merging into 1,5 lanes, produce smoother flow and increased capacity and thus reduce congestion at the Army and Navy Roundabout-Parkway exit. Although we cannot accurately predict the impact of this scheme on air quality until it is operational, it should contribute to an improvement in air quality at the Army and Navy Roundabout.

3. Chelmer Viaduct

The existing Viaduct (A1114) has serious structural problems and is to be rebuilt. At present, a new structure alongside, to the east of the existing, which will be demolished, is proposed by the Highways Agency. The new structure should have greater traffic capacity than the existing, which should reduce congestion. Once complete the Highways Agency will pass responsibility for the new viaduct across to Essex County Council.

However, the detailed analysis of the traffic impact of this proposal is yet to be undertaken and therefore quantification of the air quality impact of this proposal is not possible at this stage. The decision over the progression of any such schemes relies on Essex County Councils Development, Highways and Transportation Department and the Highways Agency.

4. Left hand filter lane from Parkway to the Chelmer Road

A further proposal to provide a dedicated filter lane to feed traffic from Parkway onto Chelmer Road has been considered, see Appendix 7. This would be dependent upon Essex County Council acquiring land at the front of the former Jewson site. This would enable the through traffic to flow freely without adding to the congestion at the roundabout. The congestion reduction is expected to have a positive impact on pollution in the AQMA. The acquisition of land and provision of the filter lane could take place independently of any works in connection with the Waterside Development. Whilst implementation of this proposal would take some time it could be implemented as a medium term option. At present, there are discussions in progress with potential developers of the site, which forms part of a much larger development aspiration for the area. However, ultimate decision over the progression of this scheme relies on Essex County Council Highways Department.

The effect of this scheme would be to provide increased capacity for the entry to the roundabout from Parkway. However, the detailed analysis of the traffic impact of this proposal is yet to be undertaken and therefore quantification of the air quality impact of this proposal is not possible at this stage.

5. Access to the Chelmer Waterside Development

A long-term, proposal is the construction of an access road to the Chelmer Waterside Development from various points on the existing road network surrounding the proposed development. A number of proposals have been considered by Transport Planners from Essex County Council that would have differing impacts on the traffic flows at the ANR. A major proposal in the Town Centre Area Action Plan is for the access roads to key in to a new roundabout to be constructed on the rebuilt Chelmer Viaduct. The Council will require a full air quality and traffic assessment as part of the final proposals for the Waterside Development to ensure that air quality at the Army and Navy Roundabout is not compromised.

6. Replacement of the tidal flyover with two-way flyover

A further option that may be considered in the long term is the closure of the "tidal flyover" on the Army and Navy Roundabout and replacement with a two-way flyover, see Appendix 8. This would result in increasing traffic flow across the junction, thereby reducing queuing times on approach roads. Reduction in congestion would alleviate the air quality problems at the AQMA.

However, this is a long-term consideration and one that would need to be considered alongside major redevelopment proposals, such as the Chelmer Waterside Development. The major infrastructural changes required for access to this development are not predicted to be in place before 2012 and this option is, therefore, beyond the timeframe of this Action Plan. The cost

implications of this are significant and the option would require detailed consideration by Essex County Council and Chelmsford Borough Council.

The final decision by Essex County Council is yet to be made regarding the long-term reconstruction of the network feeding into the Army and Navy Roundabout and may be dependent on future developments in the area. This option must be investigated further over the coming years to assess the impact of a two-way flyover on both congestion and air quality. This action plan therefore proposes to fully investigate both the feasibility and justification for such major investment.

b. Public Transport Movements within the AQMA

Heavy Duty Vehicles (HDVs) contribute to 61% of the all traffic related NO_x pollution within the AQMA. A large proportion of HDVs are Public Service Vehicles (PSVs) and therefore consideration has been given to how concentrations of pollutants may be reduced from these vehicles. Buses are a key to sustainable transport and Chelmsford Borough Council supports the continued increases in bus patronage in its Local Development Framework. Increased bus accessibility at the Army and Navy Roundabout is included in Chapter 10 of the Chelmsford Town Centre Area Action Plan (2001-2021), the first document in the Local Development Framework.

1. Retrofitting of Buses with Particulate Traps to reduce PM10 emissions.

Over the previous years there have been technological advances that have led to improvements in bus emissions through the retrofitting vehicles with particulate traps. These traps reduce the emissions of PM10s. The Air Quality Expert Group at DEFRA has however demonstrated that this results in an increase in the emission of Nitrogen Dioxide due to lower efficiency of the engines. PM10 levels are not currently a concern in the area and as particulate traps may exacerbate the NO_x emissions this is not considered to be a viable option for the purposes of the Action Plan. However, ultimately this decision lies with the individual bus companies operating routes in Chelmsford.

2. Standard of Buses operating along Baddow Road

During peak periods approximately 40 buses per hour travel along Baddow Road. It is therefore desirable for this class of vehicle to be of the highest standard.

The European Union devised a statutory program of progressive improvements to the standards of heavy-duty vehicles; these are termed the EURO standards. All new heavy duty vehicles had to comply with the Euro I from 1993. The latest standard, Euro IV, for new heavy duty vehicles came into effect in 2005. The next EURO standard, EURO V is scheduled to come

into force in 2008. Vehicles purchased before 1993 were not subject to the Euro standards.

Discussions have taken place with the major fleet operator to consider any impact their fleet renewal programme will have on air quality. The company have demonstrated a commitment to environmental protection and have advised that buses operating along Baddow Road meet a minimum standard of EURO II, although the majority of the fleet operate at EURO III standard (introduced 2005).

It is possible that some vehicles may be operated by some smaller operators may be pre-1993 vehicles. Whilst the extent of this is currently unknown discussions are currently taking place with Essex County Council to look at smaller fleet operations with a view to encouraging fleet improvement.

The main provider of bus services through the AQMA also undertakes emissions testing on its vehicle fleet on a 28-day basis that is above their statutory obligation. They are also keenly pursuing a programme of fleet renewal over the coming year, all of which will be a minimum of EURO IV standard. However, ultimately this decision lies with the individual bus companies operating routes in Chelmsford.

3. Construction of new access route from Baddow Road to the bypass for buses

To reduce congestion and improve bus travel times relocation of buses away from congestion at the junction of Baddow Road and the ANR has been considered. One option was to divert buses along Meadgate Terrace creating a new access onto the Essex Yeomanry Way (see Appendix 9). This would undoubtedly ease congestion at the end of Baddow Road with a concomitant improvement in air quality. It would also have a positive impact upon travel times and thus service level of the buses.

This option has however been deemed impracticable from a highways engineering perspective given the height of the Bypass compared to the lower level of Meadgate Terrace. The rerouting and engineering works, if physically possible, would have a detrimental impact on properties along Meadgate Terrace. The distance between this and the roundabout entry also gives serious road safety concerns, it falling well below the requirement of the Design Manual for Roads and Bridges.

4. Re-routing of buses from Baddow Road to the Army and Navy Roundabout by diverting them through Meadgate Avenue and Baddow By Pass

A further option to divert buses from the junction of Baddow Road and the ANR was to reroute them onto the bypass. The only viable route would be via

Meadgate Avenue/Longmead Avenue and access the A414 at the Maldon Junction, see Appendix 10.

Whilst this option would increase the travel distance of the buses to reach the ANR, given congestion on Baddow Road, the addition to journey times is less certain and would require further investigation. It is, however, anticipated as being unpopular with the public who would have to travel in the opposite direction of their final destination. This may have a be contrary to council policies aimed at increasing bus patronage within the Great Baddow and Galleywood areas of the town, contrary to the aims of the Action Plan.

The buses would still need to travel around the ANR and the diversion may simply move the congestion problem onto the By Pass. Owing to the uncertainties regarding the impact on air quality and the detrimental impact on bus patronage this option has been discounted for further consideration.

5. Town Centre bound section of carriageway of Baddow Road to be for Buses only

An option to ease congestion at the town centre bound end of Baddow Road and ensure the free flow of buses up to the roundabout would be to make a section of the highway open to buses only (and residential access), see Appendix 11. This would allow buses to operate freely along this congested stretch of highway and reduce the pollutants at the critical receptors at the Army and Navy end of Baddow Road.

The potential problems of this measure would be the access to residential properties, the redistribution of the current LDV traffic and delivery of goods to private households.

All LDVs and HDVs (other than buses) using Baddow Road would have to find an alternative route and the impact of this on other areas is currently unknown and would require further detailed analysis.

The extent of the road closure necessary requires careful consideration and the reduction in congestion need to be balanced against the needs of residential occupiers accessing their properties. The length of road from the Meadgate Avenue turning to the ANR would have to be for access to residential properties only. Such reallocation of road space would have a legal basis under the Road Traffic Regulation Act 1984. This would require capital investment to provide signage and equipment. However, the predicted expenditure for such a scheme would be moderate with an expected improvement in terms of air quality and improved bus journey times.

For this option to be considered further a full traffic analysis is required to determine the effect the displaced traffic would have on the existing road network. A full air quality assessment would also be required.

6. Restricting LDV and HDV access to the AQMA

The imposition of a weight restriction on Widford Bridge to limit the number of lorries using Van Diemens Lane was raised a number of times during the public consultation exercise. The extent to which this would be effective in reducing air pollution is unclear. However, this option has since been discussed with Essex County Council Highways Department and it is noted that whilst a weight restriction on Widford Bridge would assist in the removal of lorries from Van Diemens it would create unacceptable pressures on other sections of the road network and may merely displace the problem elsewhere in the Borough. This option is not, therefore being progressed.

c. Pedestrian and Cycling Improvements in the AQMA

1. The maintenance of pedestrian access across the Army and Navy Roundabout and feeder roads

Pedestrian crossings close to the Army and Navy Roundabout may be viewed as counterproductive to free flowing traffic. However, maintaining pedestrian access across the Army and Navy Roundabout is considered essential to provide access on foot to the town centre. Chapter 10 of the Chelmsford Town Centre Area Action Plan (2001-2021) highlights the need to reconnect the two halves of Baddow Road to pedestrian access. The crossings at key connection points are essential for the preservation of road safety and also promote central government policies to encourage both walking and cycling as alternatives to the use of the private car.

Complimentary to the immediate proposed improvements to the Army and Navy Roundabout (see above) is the plan to relocate the existing pedestrian crossing on the Gards side of Parkway to increase the distance between the crossing and roundabout. This has the benefit of maintaining pedestrian access across the junction whilst contributing to improved stacking space of vehicles between the roundabout and the crossing and ergo flow of traffic from Van Diemens Road. The first phase of this scheme is scheduled for completion by March 2009.

2. Improvement to the Army and Navy underpass

The Army and Navy underpass is a key to maintaining pedestrian access to the town centre. It is however, dimly lit and uninviting. Improvements in lighting would help encourage usage. Upgrading of CCTV in the underpass will be considered over the coming year. Whilst a number of persons have suggested structural alterations to the subways to provide a shared cycle/pedestrian link, such changes are prohibited by the proximity of major underground service.

3. Improvements to cycling facilities

The Chelmsford Borough Council Local Development Framework also aims to improve the provision of cycling facilities in the borough setting minimum cycle parking requirements for all new developments and the development of sustainable transport plans for larger development schemes. These need to be rigorously enforced within, and beyond, the AQMA.

Borough wide improvements to walking and cycling facilities are included in the LDF, we propose that these should be utilised to allow better provision pedestrian and cycle access to the town centre from the Great Baddow area of the town. Over 80% of consultees supported the provision of improvements to the cycle network on and around the Army and Navy Roundabout.

d. Roadside Emissions Testing (RET)

1. Roadside Emissions Testing in the AQMA

Section 83 of the Environment Act 1995 and Road Traffic (Vehicle Emissions)(Fixed Penalty)(England) Regulations 2002 permits Local Authorities that have declared an AQMA to undertake Roadside Emissions Testing (RET).

RET has been widely employed in the London area and is a method of targeting the most polluting vehicles using the road network. Vehicles that fail the test can be issued with £60 Fixed Penalty Notices under the 2002 Act noted above. The Local Authority has the option to waive the fine should the owner seek improvements to the vehicle. RET, coupled with a publicity campaign, has the potential to dramatically increase public awareness of air quality.

The cost implications of RET require significant resource investment in terms of staff and equipment. RET cannot be undertaken without support from the Police Authority, with uniformed presence to pull vehicles over to the roadside. It is predicted that with two officers of the Council a maximum of 40 cars could be checked per day thus making it an inefficient use of officer time.

To be effective RET needs to be undertaken at peak travel times. However, to do so in the AQMA would have major congestion implications and seriously impede persons travelling to work.

The direct impact of RET on atmospheric pollutant concentrations is minimal but the publicity that such schemes generate can have a large impact on public perception of air quality and focus the public on how their own actions impact on air quality.

This option is not considered to be a useful tool in directly reducing emissions within the AQMA but should remain a future consideration in the general promotion of air quality and improvement of vehicular emissions.

e. Promoting Change

With increasing car ownership (>20% between 1998-2011) and population expansion (>14000 new homes by 2021) predicted to take place in Chelmsford in the mid- to long-term, the borough, through its Local Development Framework, will seek to ensure improvements in sustainable modes of transport and accessibility across the borough. This is essential to avoid the designation of further Air Quality Management Areas. This examination and investigation of air quality will take the form of a Local Air Quality Strategy that will comprehensively address all issues impacting on air quality throughout the borough.

1. Education and promotion of Air Quality

It is believed that the promotion of environmental issues starts with the education of children and young people. Work is currently underway for CBC to continue partnership working with ECC in the following ways:

- a. develop an air quality initiative with the Education Department to provide materials that would fit in with elements of the National Curriculum.
- b. to promote the national Walk to School Scheme that aims to encourage children to walk to school once a week.
- c. to support road safety officers on cycling initiatives for children.
- d. The development and implementation of School Travel Plans.

2. The Next Local Transport Plan (LTP)

The Local Transport Plan (LTP) is developed by officers at Essex County Council with the aim of providing strategic developments in the transportation network across the county. CBC is a statutory consultee and air quality will be considered and in accordance with the LDF, air quality issues will be addressed.

3. Park and Ride Expansion

There are plans within the current LTP to expand the Park and Ride Scheme with a new site at Essex Regiment Way. The development of a suite of Park and Ride locations is fully supported in Policy DC65 (Park and Ride) of the Chelmsford Borough Council Local Development Framework. The impact of this particular scheme on the AQMA will, however, be very limited but is expected to improve air quality and congestion on other arterial routes. However, owing to wider sustainability issues the Action Plan supports further expansion in Park and Ride throughout the Borough.

4. New Railway Station

Approximately twenty thousand passengers commute to and from Chelmsford on a daily basis using the Town Centre Railway station. The LTP supports provision for a railway station in North East Chelmsford. A new station in this location would reduce the number of passengers travelling from the outskirts of the town, surrounding villages and parishes, to access the town centre railway station. This will have an impact on congestion in the town centre congestion and on arterial roads. It is also expected to have a positive impact on air quality in the AQMA.

In conjunction with the out of town railway station, improvements are scheduled for the existing town centre railway station to cope with expanding rail usage and links to other modes of transport. Both the new station and improvements to the existing town centre station are supported by Policy CP4 (Securing Infrastructure) in the Local Development Framework.

5. Website Developments.

Chelmsford Borough Council is continually developing the air quality website (www.chelmsford.gov.uk/airquality). It is intended to provide a single point of reference for air quality issues within the borough. The interactive web site has recently gone live to provide real time data from our 3 air quality monitors in the borough. It will also provide web/e-mail alerts for susceptible members of the public in the event of incidents of poor air quality. Work is underway to enable real time displays to be available within the town and a Displax™ interactive window to be installed in a highly visible public location. This project has been funded and supported by DEFRA.

6. Chelmsford Borough Councils' Travel Plan

Chelmsford Borough Council has recently established a Travel Plan Working Group to oversee the development of a workplace travel plan for employees of Chelmsford Borough Council. Phase I of the travel plan will be launched in the summer of 2008 with a series of discounts on public transport and promotion of the Essex Travel Share Scheme (Budi). This plan will develop over the coming years to incorporate a wider suite of incentives for sustainable choices. Whilst not having a direct impact on the air quality within the AQMA this serves to show the Borough Councils' commitment to sustainable transport.

7. Chelmsford Borough Councils' Climate Change Strategy

In January 2008, Chelmsford Borough Council established an inter-departmental group with the aim of assessing the carbon footprint of the Borough Councils' operations with a plan of action to reducing its environmental impact. The group aims to publish its strategy by May 2009. The Council recently became a signatory of the Nottingham Declaration on Climate Change. This is a further example of how Chelmsford Borough Council will provide community leadership on climate change issues.

Table 3.0 The proposals expanded

Proposal	Cost	Body Responsible	Air Quality Improvement	Non Air Quality Impact	Forwarded	Delivery
"Dynamic Daytime Operation of flyover"	Mod	ECC	+	Reducing congestion by responding to queues	YES	March 2009
Reintroduction of signal controls at Chelmer Road and possibly Parkway exits	Mod	ECC	+	Displacement of pollution away from properties	YES	March 2009
Relocation of pedestrian crossing on Parkway.	Mod	ECC	=	Increased stacking of queues on Parkway	YES	March 2009
Replacement of existing crossing on Van Diemens Road with staggered crossing	Mod	ECC	+	Better pedestrian safety, reduced stopping times for individual lanes	YES	March 2009
Replacement of Chelmer Viaduct	Very High	Highways Agency	?	Replacement of existing 1930s structure	YES	2008-2012
Dedicated LH Feeder lane from Van Diemens Road to Parkway	Very High	ECC	+	Reducing congestion at the ANR	NO	Not currently being progressed
Removing pinch point at the base of flyover by widening 1.5 lanes to 2 full lanes	Mod	ECC	+	Improve flows of traffic where currently stationary	YES	March 2009
Left hand filter lane from Parkway to Chelmer Road	High	ECC	+	Reducing congestion at the ANR	Investigate Further	Not Applicable
Access to Chelmer Waterside Development	High	ECC	?	Details are as yet unconfirmed	Investigate Further	Not Applicable
Replacement of tidal flyover with two way system	Very High	ECC	+	Reducing congestion and increasing traffic flow at the Army and Navy Junction	Investigate Further	Not Applicable
Retrofitting of buses	Mod	Private Bus Operators	+	Cleaner emissions from bus fleet	As part of business plan	Not Applicable
Renewal of bus fleet	High	Private Bus Operators	+	Cleaner emissions from bus fleet and more appealing bus operations	As part of business plan	Not Applicable
New Access Route from Baddow Road to the Bypass for buses only	High	ECC	+	Detrimental to private residents on path of new bus route	NO	Not Applicable
Rerouting of buses away from the town centre end of Baddow Road	Mod	ECC/CBC	?	LDVs will have to reroute around the diversion	Investigate Further	Not Applicable

Table 3.0 The proposals expanded (continued)

Proposal	Cost	Body Responsible	Air Quality Improvement	Non Air Quality Impact	Forwarded	Delivery
The maintenance of pedestrian access across the Army and Navy Junction	Mod	ECC/CBC	=		YES	Alongside any changes
Review of CCTV in the Army and Navy Underpass	Low	CBC	=	Will determine if new CCTV can be progressed.	YES	Funding dependent
Improvements to cycling facilities across the town	Mod	CBC/ECC	=		YES	Funding dependent
Roadside Emissions Testing	Mod	CBC/VOSA	=	Raising of air quality awareness	NO	Not Applicable
Green driving and fleet improvements be encouraged on Council vehicles and County contracts	Mod	CBC/ECC	+	Cleaner emissions and leading by example		
Education and Promotion of Air Quality	Mod	CBC/ECC	=	Greater awareness of sustainability and the work of the Council	YES	March 2009
Work on the next LTP	=	ECC	?		YES	2010
Park and Ride Expansion	Very High	ECC/CBC	?		YES	2011/12
New Railway Station	Very High	Private Developer	+	Strengthening the commuter accessibility to Chelmsford and beyond	YES	Next LTP
Website Developments	High	CBC	=	Greater awareness of sustainability and the work of the Council	YES	Ongoing
Phase I of Chelmsford Borough Councils' Sustainable Travel Plan	Low	CBC	=	Community Leadership	YES	Summer 2008
Chelmsford Borough Councils' Climate Change Action Plan	?	CBC	=	Community Leadership	YES	May 2009
AQ Grant Funding Application for OPSIS Open Path NOx analyser	High	CBC/DEFRA	=	Improved knowledge/Statement of Commitment	YES	March 2008
Installation of New Air Quality Monitoring Equipment	High	CBC	=	Improved knowledge/Statement of Commitment	Investigate Further	Funding dependent. (see above)

+Positive

=Neutral

-Negative

? Unknown

9.0 Impact Assessment

Four scenarios were examined using Atmospheric Dispersal Monitoring Software (ADMS-Urban produced by CERC) to represent the various infrastructural changes proposed for the Army and Navy Roundabout. These were:

- Option 1a: Provision of an additional near-side lane on approach to the roundabout from Van Diemens Road for left-turners only. A1060 / A114 Army and Navy Flyover-Inbound only.
- Option 1b: Provision of an additional near-side lane on approach to the roundabout from Van Diemens Road for left-turners only. A1060 / A114 Army and Navy Flyover-Outbound only.
- Option 2a: Provision of a left hand slip lane to take traffic directly from Van Diemens Road to Parkway without giving way. A1060 / A114 Army and Navy Flyover-Inbound only.
- Option 2b: Provision of a left hand slip lane to take traffic directly from Van Diemens Road to Parkway without giving way. A1060 / A114 Army and Navy Flyover-Outbound only.

The modelled results for the scenarios are shown in Table 4.0. The EU limit is predicted to be met in the baseline 2010 scenario. With the traffic management options in place, an improvement is predicted to occur on the modelled baseline for all four scenarios tested. At the worst-case receptor, an improvement of 0.2-0.8 $\mu\text{g m}^{-3}$ is predicted and on average a 0.2-0.4 $\mu\text{g m}^{-3}$ improvement is predicted. Options 1b and 2b are predicted to provide the most significant improvements in terms of air quality.

	NO ₂ Annual Mean Concentration					Difference in $\mu\text{g/m}^3$ between the 2010 baseline and scenario options			
	Baseline 2010	Option 1A	Option 1B	Option 2A	Option 2B	Base – Option 1A	Base – Option 1B	Base – Option 2A	Base – Option 2B
Maximum	39.5	39.2	38.6	39.2	38.7	0.3	0.8	0.2	0.7
Minimum	32.0	31.6	31.8	31.6	31.8	0.4	0.2	0.4	0.2
Average	34.1	33.9	33.7	34.0	33.8	0.2	0.4	0.2	0.4

Table 4.0 Technical Analysis of the benefits of ECC Transport Schemes

10.0 Measuring success

- 10.1 Key to successful action planning on air quality issues is the continued monitoring of air pollutants within the designated area. CBC has been measuring air pollution using diffusion tubes at five locations within the AQMA. As a pre-emptive measure this has recently been expanded to ten locations to enable more robust monitoring of the effects of the Action Plan on air pollution within the designated area.
- 10.2 Diffusion Tubes are a widely accepted method of screening for air pollution and used in all Local Authority air quality assessment. The results can be corrected through comparison with results from automatic monitoring equipment. Ideally the automated equipment would be stationed within the AQMA. However, a suitable site could not be found and modelling will therefore be verified from co-location studies. The Jewson site provides a potential location for positioning automated monitoring equipment within the AQMA and an agreement will be sought for the site to be available for this purpose with the developers.
- 10.3 It is proposed that this is equipped with apparatus to monitor both oxides of Nitrogen and also particulate matter. This will require significant capital expenditure but is essential to target the air pollution problem within the AQMA. An application has been made to DEFRA for funding of an automated monitor in the AQMA in the 2008/9 Air Quality Grants programme.
- 10.4 The reports that have resulted in the designation of an AQMA are naturally conservative due to problems relating to bias adjustments of diffusion tube results. Bureau Veritas has advised that in order to produce more precise reporting in future CBC should produce its own bias adjustments through collocation studies at the Springfield Road Automated Monitoring Station, this process began in April 2007.

11.0 Key Stakeholders and Receptors

- 11.1 The AQMA encompasses a total of 487 properties that are predominantly a combination of owner occupied and rented residential properties. Those living within these properties are the key receptors and stakeholders within the consultation process.
- 11.2 Within Chelmsford Borough Council the key members of the Steering Group included representatives from Environmental Services' Environmental Protection Team, the Planning and Building Control Services, Essex County Council Highways and Public Transportation, Town Centre Management (a full list is included in the Appendix 13).
- 11.3 Chelmsford Borough Council is a member of the Essex Air Quality Consortium (www.essexair.org), an organisation that aims to coordinate air quality monitoring and responses. All members of this consortium were invited to attend the consultation process fulfilling Policy Guidance LAQM. PG (03).
- 11.4 Schedule 11 of the Environment Act 1995 outlines the statutory obligation of local authorities to consult with a number of external agencies, a full list of consultees is included in Appendix 14.

12.0 The Consultation Process

- 12.1 The public consultation process began on 7th December 2007 and closing on 29th February 2008.
- 12.2 The Draft Action plan was sent out to all statutory consultees and other interested parties. A full list of groups is given in appendix 14. Copies were also available in libraries, the Civic Centre and County Hall and online at www.chelmsford.gov.uk/airquality. Formal responses were welcomed by e-mail or post.
- 12.3 The draft action plan was made available to the visually impaired community through the use of the “Read Out Loud” function in Adobe Acrobat that converts text to speech through text recognition software.
- 12.4 The council offered a translation service for this document to allow for participation for those of whom English is not a first language.
- 12.5 Officers from Chelmsford Borough Council were available to discuss the Action Plan and answer the public’s queries at two informal “information days” in a major shopping precinct in the town centre. A further information day was held at a community hall within the AQMA itself, aimed at attracting AQMA residents. It was held on a Saturday to facilitate attendance by those with a traditional working week. In order to maximise interest the information days were widely publicised prior to the event through the distribution of leaflets, press release and local radio coverage. Letters were also hand delivered by Chelmsford Borough Council Officers to all households within the AQMA to notify them of the Action Plan, consultation process and information days.
- 12.6 As a result of the publicity Officers were invited by a local environmental group, Chelmsford Environment Partnership, on the evening of 6th February 2008 to attend a meeting, make a presentation on the action plan and answer queries. A number of residents from the AQMA were represented among the 70 attendees.
- 12.7 At all events and meetings, questionnaires were provided with a total of 121 being completed at the information days alone.
- 12.8 The draft Action Plan was also forwarded to DEFRA on 8th December 2007. A formal response was received on 2nd April 2008. This document has been amended on account of the recommendations provided by DEFRA.

13.0 Response to Consultation

13.1 All responses to the consultation are included in Appendix 15.

14.0 Conclusions

Modelling indicates that air quality in the AQMA will continue to improve over coming years to the extent that pollution levels will meet acceptable levels by 2010. It is not, therefore, considered appropriate to implement measures that will mean large-scale disruption to the transport infrastructure, considerable expense and have potentially negative impacts on some local residents. However, there is a danger for complacency with minor exceedences and all departments and organisations impacting on the AQMA need to work cooperatively to ensure that air quality *does* continue to improve as predicted.

We will continue to monitor the air pollution within the AQMA using diffusion tubes. In addition to passive monitoring the council has applied for funding under the Air Quality Grant Scheme provided by DEFRA to purchase real time monitoring equipment to be placed within the AQMA.

The air quality in the AQMA will be continually monitored to ensure the protection of human health and this document will be periodically amended to reflect developmental changes taking place within the AQMA.

Future developments within Chelmsford, most particularly the Chelmer Waterside Development, require careful infrastructural planning and it is through these long-term schemes that further improvements to air quality in the AQMA will be made. Under the circumstances long term solutions are not being developed as part of this Action Plan.

There are several infrastructural changes that will be developed in the short term by Essex County Council (see Recommendations below). These, combined with various other initiatives would assist congestion and thus have a positive impact on reducing pollution.

14.1 Recommendations

It is recommended that

1. the immediate congestion relief schemes for the Army and Navy Roundabout are implemented by the agreed dates:
 - Dynamic daytime operation of flyover
 - Removal of pinchpoint at the base of the flyover on Parkway
 - Reintroduction of signal controls at Chelmer Road and possibly parkway exits
 - Relocation of pedestrian crossing on parkway
 - Replacement of existing crossing on van Diemens Road with a staggered crossing
2. Further investigation of left hand filter lane from Parkway to the Chelmer Road.
3. Green driving and fleet improvements be encouraged on Council vehicles and County contracts (improvement not modelled).
4. Monitoring to be undertaken.

In the event that predicted improvements do not occur, the following measures may be further considered:

- a. Replacement of the tidal flyover with two-way flyover. (Point 4 on Page 20)

Acknowledgements

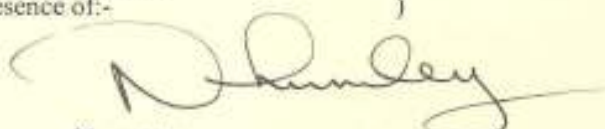

Simon Rudge (Essex County Council),
Clare Alexander (Essex County Council),
Katherine Fox-Boudewijn (Essex County Council),
Andrew Cook (Essex County Council),
Nicola Keeble (Essex County Council),
Richard Bailey (Essex County Council),
Kathryn Bell (Coventry City Council),
Andy Watt (Norwich City Council).

Appendix 1 Air Quality Management Area Order 2005**ENVIRONMENT ACT 1995 PART IV SECTION 83(1)****CHELMSFORD BOROUGH COUNCIL
AIR QUALITY MANAGEMENT AREA ORDER 2005**Made 11th November 2005Coming into force 1st December 2005

Chelmsford Borough Council, in exercise of the powers conferred upon it by section 83(1) of the Environment Act 1995, hereby makes the following Order:-

1. This Order may be cited as Chelmsford Borough Council Air Quality Management Area Order 2005 and shall come into effect on 1st December 2005.
2. The area that is to be designated as the Air Quality Management Area incorporates several roads leading into the Army and Navy roundabout as shown in blue on the map annexed to this Order. The area includes parts of the A1114, Amcotes Place, Baddow Road, Fortinbras Way, Goldlay Avenue, Goldlay Road, Lady Lane, Langdale Gardens, Lynmouth Avenue, Meadgate Avenue, Meadgate Terrace, Moulsham Chase, Parkway, Rochford Road and Van Diemens Lane and Van Diemens Road. The map may be viewed at the Council Offices.
3. This area is designated in relation to a likely breach of the annual mean objective for the pollutant Nitrogen Dioxide as specified in the Air Quality Regulations (England) (Wales) 2000.
4. This Order shall remain in force until it is varied or revoked by a subsequent Order.

THE COMMON SEAL of
CHELMSFORD BOROUGH COUNCIL
was hereunto affixed on
in the presence of:-


Mayor,

Head of Legal and
Business Services.



Appendix 2 CBC Diffusion Tube Results

Location	Site Type	Exposure	Nitrogen Dioxide Concentration (ug.m-3)				
			2002	2003	2004	2005	2006*
49 King Edward Road	Background	Weekly	24.6	23.7	20.7	20.1	19.3
Cat and Kitten, Blackmore Road	Roadside	Weekly	24.3	25.8	22.9	22.3	32.1
Danbury Police Station	Roadside	Weekly	47.6	45.7	38.1	37.1	39.8
Cleves Court, Boreham	Roadside	Weekly	38.4	36.4	31.3	30.5	N/A
Parkway	Roadside	Weekly	59.2	53.6	48.3	47.1	N/A
High Bridge	Roadside	Weekly	53.3	49.7	40.5	39.4	31.8
Argos Roundabout	Roadside	Weekly	57.4	50.0	45.0	43.9	36.4
Balmoral Court	Roadside	Weekly	49.6	42.4	39.0	38.0	N/A
Chelmer Road	Roadside	Weekly	45.1	46.8	35.4	34.5	38.3
Baddow Road	Roadside	Weekly	68.6	60.4	52.6	51.3	47.4
Wood Street	Roadside	Weekly	58.3	53.4	45.9	44.7	N/A
Waterhouse Lane	Roadside	Weekly	44.3	36.7	38.0	37.0	42.7
Rainsford Road	Roadside	Weekly	49.7	45.7	43.6	42.5	N/A
Broomfield Road	Roadside	Weekly	49.3	43.2	37.6	36.6	29.2
New London Road	Roadside	Weekly	43.7	40.3	36.0	35.1	N/A
10 Van Diemens Road	Roadside	Monthly	37.9	48.7	31.9	31.1	31.0
6 Moulsham Chase	Roadside	Monthly	24.4	34.2	27.2	26.5	29.4
9 Rosebury Road	Roadside	Monthly	25.1	35.0	23.6	23.0	29.2
Tylers Close	Roadside	Monthly	21.3	30.4	24.2	23.6	25.8
Cleves Ct.	Roadside	Monthly	N/A	N/A	N/A	N/A	25.4
Parkway	Roadside	Monthly	N/A	N/A	N/A	N/A	42.0
Balmoral Ct.	Roadside	Monthly	N/A	N/A	N/A	N/A	38.1
Wood St.	Roadside	Monthly	N/A	N/A	N/A	N/A	45.6
Rainsford Rd	Roadside	Monthly	N/A	N/A	N/A	N/A	39.4
New London Rd.	Roadside	Monthly	N/A	N/A	N/A	N/A	37.1
Allen Way	Roadside	Monthly	N/A	N/A	N/A	N/A	28.6
Baddow Road 2	Roadside	Monthly	N/A	N/A	N/A	N/A	33.1
Howe Green Interchange	Roadside	Monthly	N/A	N/A	N/A	N/A	45.1
Broomfield Road 2	Roadside	Monthly	N/A	N/A	N/A	N/A	37.0
Main Road, Great Leighs	Roadside	Monthly	N/A	N/A	N/A	N/A	28.2
Colchester Road	Roadside	Monthly	N/A	N/A	N/A	N/A	36.3
Main Road, Boreham	Roadside	Monthly	N/A	N/A	N/A	N/A	29.2
Springfield Road	Roadside	Monthly	N/A	N/A	N/A	N/A	41.2
Victoria Road	Roadside	Monthly	N/A	N/A	N/A	N/A	33.9
Webbs Farm Cottages	Roadside	Monthly	N/A	N/A	N/A	N/A	41.3
Moulsham Street	Roadside	Monthly	N/A	N/A	N/A	N/A	36.6
Primrose Hill	Roadside	Monthly	N/A	N/A	N/A	N/A	39.2
Hodge Court, Broomfield Road	Roadside	Monthly	N/A	N/A	N/A	N/A	40.4
Springfield Road, Prison 1	Roadside	Monthly	N/A	N/A	N/A	N/A	35.3
Springfield Road, Prison 2	Roadside	Monthly	N/A	N/A	N/A	N/A	37.8
Springfield Road, Prison 3	Roadside	Monthly	N/A	N/A	N/A	N/A	31.6

AQMA
AQMA
AQMA
AQMA

Appendix 3 ADMS Roads 2.2 Modelled Results

Receptor name	X(m)	Y(m)	2006 NO ₂ Annual Mean in µg/m ³	2007 NO ₂ Annual Mean in µg/m ³	2008 NO ₂ Annual Mean in µg/m ³	2009 NO ₂ Annual Mean in µg/m ³	2010 NO ₂ Annual Mean in µg/m ³
1	571799	205952	39.3	38.0	36.8	35.3	33.1
2	571665	205946	39.7	38.1	37.1	35.7	33.3
3	571663	205939	39.4	37.8	36.8	35.4	33.0
4	571662	205932	39.1	37.6	36.6	35.1	32.9
5	571661	205924	38.9	37.5	36.3	34.9	32.7
6	571660	205916	38.7	37.3	36.2	34.8	32.6
7	571659	205908	38.5	37.2	36.0	34.6	32.4
8	571713	205928	38.7	37.4	36.2	34.8	32.6
9	571745	205940	39.0	37.6	36.4	35.0	32.8
10	571756	205936	38.8	37.5	36.3	34.9	32.7
11	571770	205943	39.0	37.6	36.4	35.0	32.8
12	571786	205951	39.4	38.0	36.8	35.4	33.2
13	571828	205952	39.3	37.9	36.7	35.3	33.1
14	571842	205950	39.1	37.7	36.6	35.1	32.9
15	571862	205927	38.3	37.0	35.8	34.4	32.3
16	571898	205938	38.5	37.2	36.0	34.6	32.5
17	571922	205923	38.2	36.9	35.7	34.3	32.2
18	571895	205926	38.2	37.0	35.7	34.4	32.2
19	571893	205915	38.1	36.8	35.6	34.2	32.1
20	571933	205919	38.1	36.8	35.6	34.2	32.1
21	571944	205915	38.0	36.7	35.5	34.1	32.0
22	571956	205910	37.9	36.7	35.5	34.1	32.0
23	571967	205906	37.9	36.6	35.4	34.0	31.9
24	571994	205898	37.7	36.4	35.2	33.9	31.8
25	572015	205889	37.5	36.3	35.1	33.7	31.7
26	572039	205882	37.4	36.1	34.9	33.6	31.5
27	572069	205872	36.9	35.7	34.5	33.1	31.1
28	571579	205847	39.3	38.7	36.8	35.3	33.8
29	571521	205911	40.4	39.7	37.8	36.3	34.7
30	571486	205949	41.7	41.0	39.0	37.5	35.8
31	571489	205945	41.5	40.8	38.8	37.3	35.6
32	571505	205965	44.0	43.4	41.2	39.6	37.9
33	571512	205957	42.4	41.6	39.6	38.1	36.4
34	571519	205949	41.4	40.6	38.7	37.2	35.5
35	571525	205942	40.8	39.9	38.1	36.6	34.9
36	571531	205935	40.3	39.4	37.7	36.2	34.5
37	571503	205932	41.2	40.4	38.5	37.0	35.3
38	571537	205926	39.9	39.0	37.3	35.8	34.1
39	571532	205899	40.1	39.4	37.5	36.0	34.4
40	571540	205890	39.9	39.2	37.3	35.9	34.3
41	571548	205881	39.8	39.1	37.2	35.7	34.2
42	571559	205902	38.9	38.1	36.4	35.0	33.3
43	571565	205895	38.7	38.0	36.2	34.8	33.2
44	571572	205888	38.6	37.8	36.0	34.6	33.1
45	571577	205881	38.4	37.7	35.9	34.5	33.0

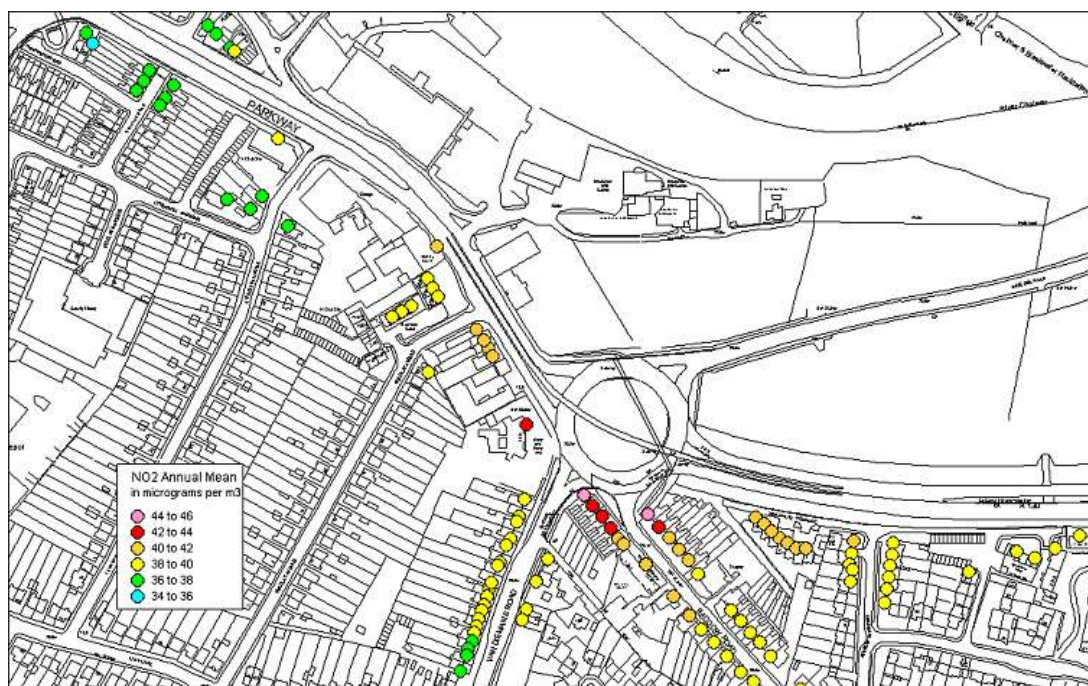
Appendix 3 ADMS Roads 2.2 Modelled Results (cont.)

Receptor name	X(m)	Y(m)	2006 NO ₂ Annual Mean in µg/m ³	2007 NO ₂ Annual Mean in µg/m ³	2008 NO ₂ Annual Mean in µg/m ³	2009 NO ₂ Annual Mean in µg/m ³	2010 NO ₂ Annual Mean in µg/m ³
46	571585	205873	38.3	37.6	35.8	34.4	32.9
47	571556	205873	39.7	39.0	37.1	35.6	34.1
48	571565	205863	39.5	38.9	36.9	35.5	34.0
49	571573	205856	39.7	39.1	37.1	35.6	34.2
50	571604	205851	38.0	37.5	35.5	34.1	32.7
51	571575	205963	41.9	39.6	39.2	37.6	34.6
52	571580	205958	41.4	39.2	38.7	37.2	34.3
53	571585	205954	40.9	38.9	38.2	36.7	34.0
54	571590	205949	40.5	38.6	37.9	36.4	33.7
55	571596	205946	40.3	38.4	37.7	36.2	33.6
56	571601	205943	40.0	38.3	37.4	36.0	33.4
57	571608	205943	40.0	38.2	37.4	36.0	33.4
58	571639	205947	40.1	38.3	37.4	36.0	33.4
59	571637	205939	39.6	38.0	37.0	35.6	33.2
60	571636	205932	39.3	37.7	36.7	35.3	33.0
61	571638	205929	39.2	37.7	36.6	35.2	32.9
62	571636	205921	38.9	37.5	36.4	35.0	32.7
63	571402	205916	38.5	36.9	36.0	34.6	32.3
64	571425	205974	40.0	39.1	37.4	35.9	34.1
65	571421	205964	39.6	38.4	37.0	35.6	33.6
66	571420	205960	39.5	38.3	36.9	35.5	33.4
67	571416	205949	39.2	37.8	36.6	35.2	33.1
68	571413	205945	39.0	37.7	36.5	35.1	32.9
69	571409	205934	38.8	37.4	36.3	34.9	32.7
70	571407	205931	38.8	37.3	36.2	34.8	32.6
71	571403	205921	38.6	37.0	36.0	34.6	32.4
72	571400	205911	38.4	36.8	35.9	34.5	32.2
73	571398	205906	38.3	36.7	35.8	34.4	32.1
74	571397	205902	38.2	36.7	35.7	34.3	32.0
75	571395	205897	38.1	36.6	35.7	34.3	32.0
76	571393	205892	38.1	36.5	35.6	34.2	31.9
77	571426	205903	38.7	36.7	36.1	34.7	32.1
78	571423	205896	38.5	36.6	36.0	34.6	32.0
79	571432	205921	39.1	37.2	36.5	35.1	32.6
80	571440	205935	39.5	37.8	36.9	35.5	33.1
81	571392	205888	38.0	36.4	35.5	34.1	31.8
82	571390	205883	37.9	36.3	35.4	34.1	31.7
83	571388	205877	37.8	36.2	35.4	34.0	31.7
84	571387	205874	37.8	36.2	35.3	33.9	31.6
85	571383	205863	37.6	36.0	35.2	33.8	31.5
86	571463	205978	44.9	44.2	42.0	40.3	38.6
87	571469	205970	43.5	42.8	40.7	39.1	37.4
88	571475	205963	42.7	41.9	39.9	38.3	36.6
89	571481	205956	42.1	41.4	39.4	37.9	36.2
90	571368	206139	40.8	41.5	38.2	36.7	36.2

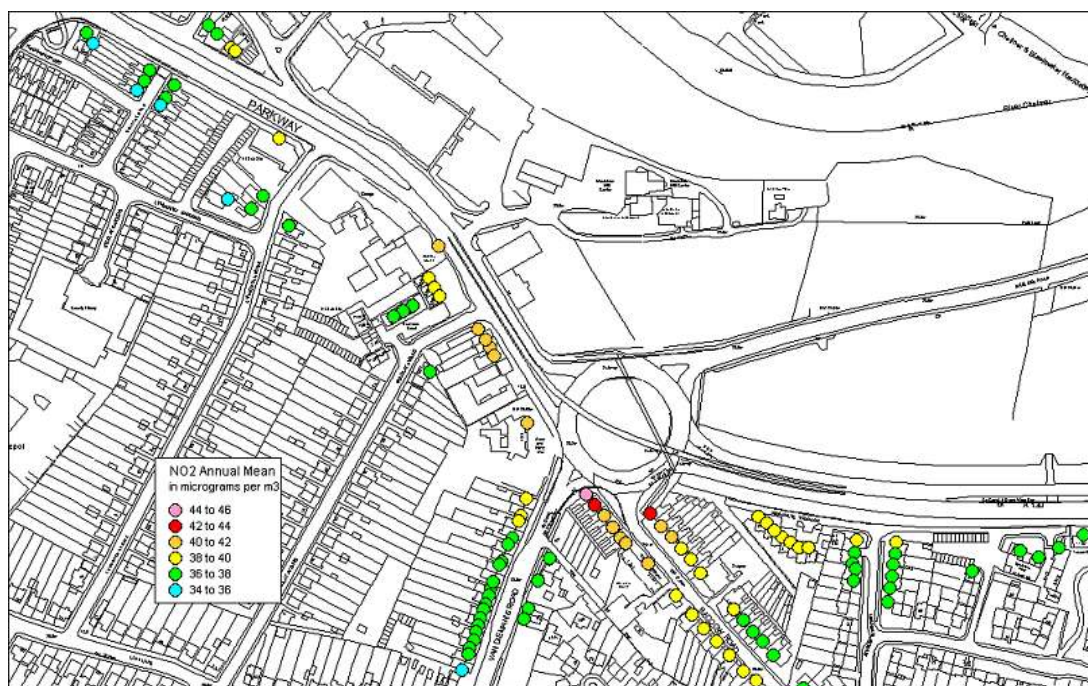
Appendix 3 ADMS Roads 2.2 Modelled Results (cont.)

Receptor name	X(m)	Y(m)	2006 NO₂ Annual Mean in µg/m³	2007 NO₂ Annual Mean in µg/m³	2008 NO₂ Annual Mean in µg/m³	2009 NO₂ Annual Mean in µg/m³	2010 NO₂ Annual Mean in µg/m³
91	571361	206118	39.0	38.9	36.5	35.0	33.9
92	571365	206112	39.1	38.9	36.6	35.2	34.0
93	571369	206106	39.2	39.0	36.7	35.2	34.1
94	571351	206100	38.4	37.9	35.9	34.5	33.1
95	571345	206097	38.2	37.6	35.7	34.3	32.8
96	571338	206093	38.0	37.4	35.6	34.2	32.6
97	571393	206085	40.8	40.8	38.1	36.6	35.6
98	571398	206077	41.0	41.0	38.3	36.8	35.8
99	571401	206073	41.1	41.1	38.4	36.9	35.9
100	571404	206068	41.1	41.1	38.4	37.0	35.9
101	571362	206057	38.5	37.8	36.0	34.6	33.0
102	571140	206277	36.1	36.0	33.8	32.4	31.5
103	571219	206282	37.1	37.0	34.7	33.3	32.3
104	571225	206277	37.4	37.4	34.9	33.6	32.7
105	571234	206267	38.0	38.1	35.5	34.1	33.3
106	571236	206265	38.1	38.4	35.6	34.2	33.5
107	571181	206253	37.4	37.2	34.9	33.6	32.5
108	571177	206246	36.6	36.3	34.2	32.9	31.7
109	571173	206240	36.1	35.6	33.7	32.4	31.1
110	571197	206243	37.6	37.4	35.1	33.8	32.7
111	571191	206235	36.7	36.4	34.3	33.0	31.8
112	571188	206230	36.4	35.9	34.0	32.7	31.4
113	571264	206209	38.9	39.0	36.4	35.0	34.0
114	571254	206171	37.0	36.4	34.6	33.3	31.8
115	571246	206163	36.8	36.0	34.4	33.0	31.5
116	571231	206169	36.5	35.8	34.1	32.8	31.2
117	571271	206152	37.1	36.5	34.7	33.3	31.8
118	571144	206270	35.9	35.6	33.5	32.2	31.1
119	571426	206023	42.2	41.6	39.4	37.9	36.2

Appendix 4 ADMS Roads 2.2 Mapped exceedences

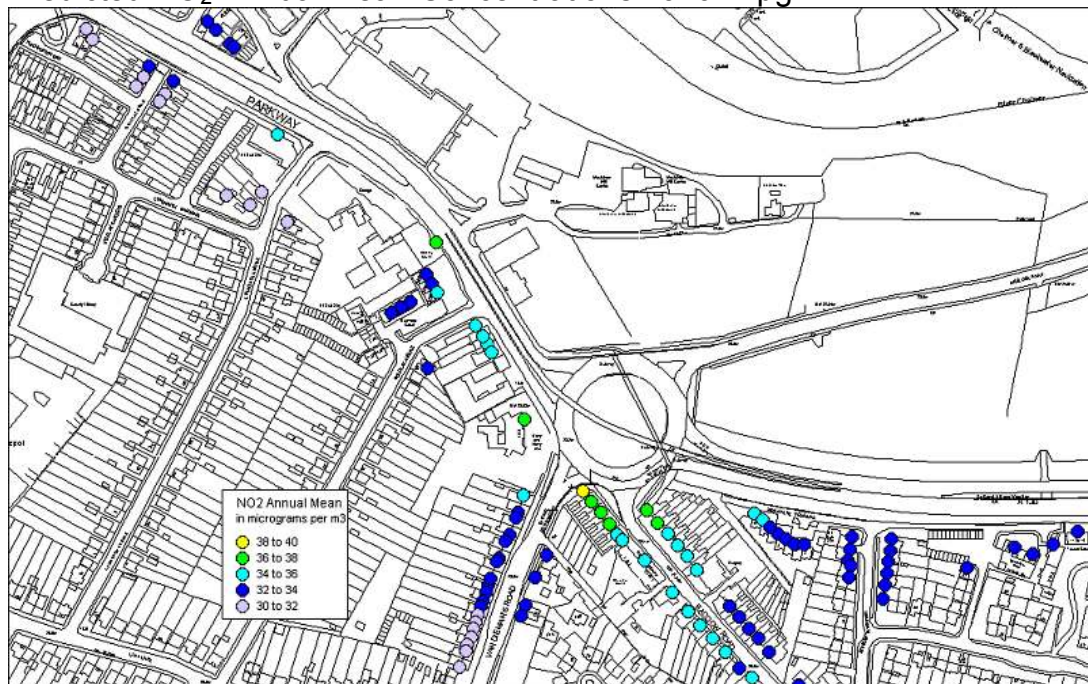


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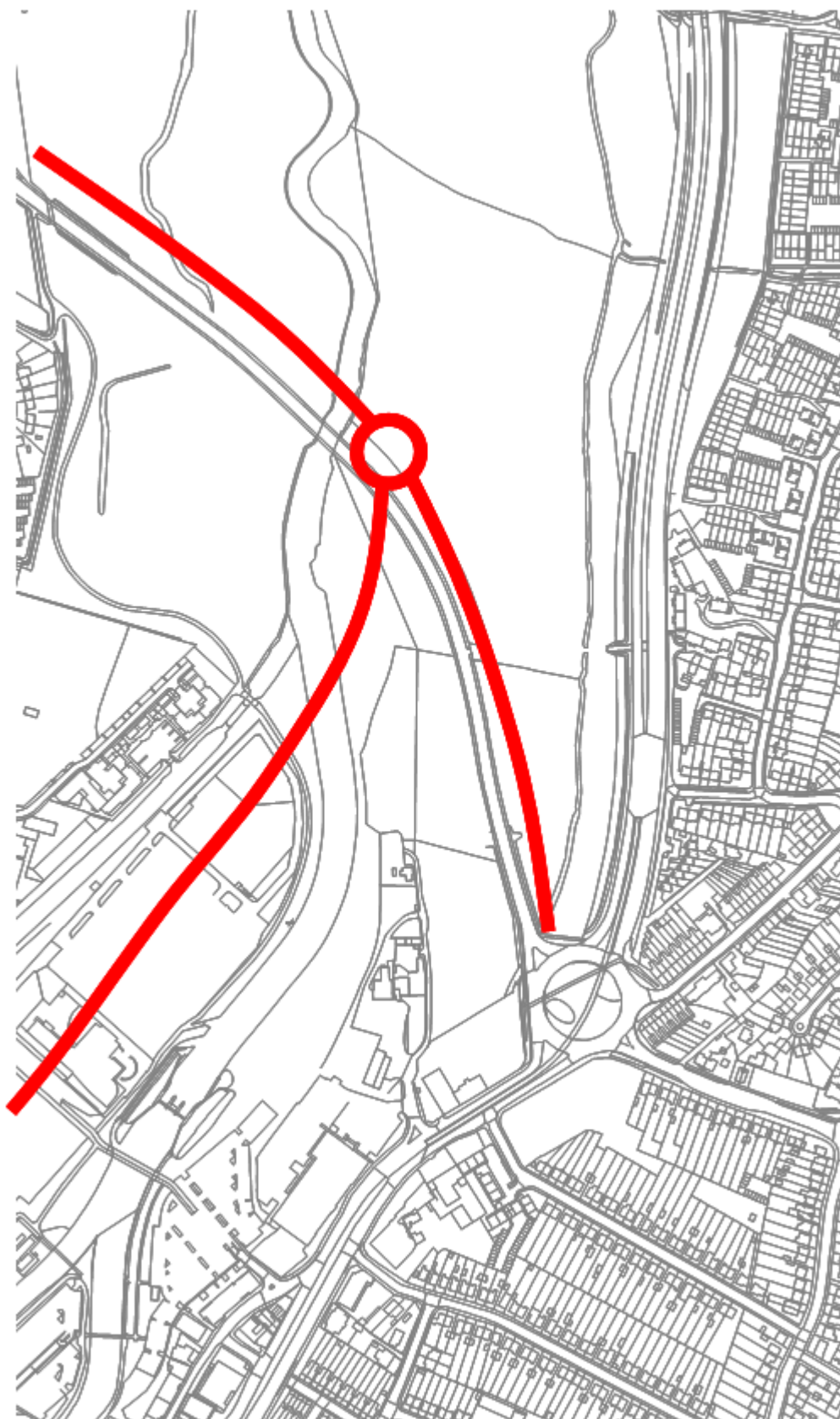


Predicted NO₂ Annual Mean Concentrations 2007 in µg/m³

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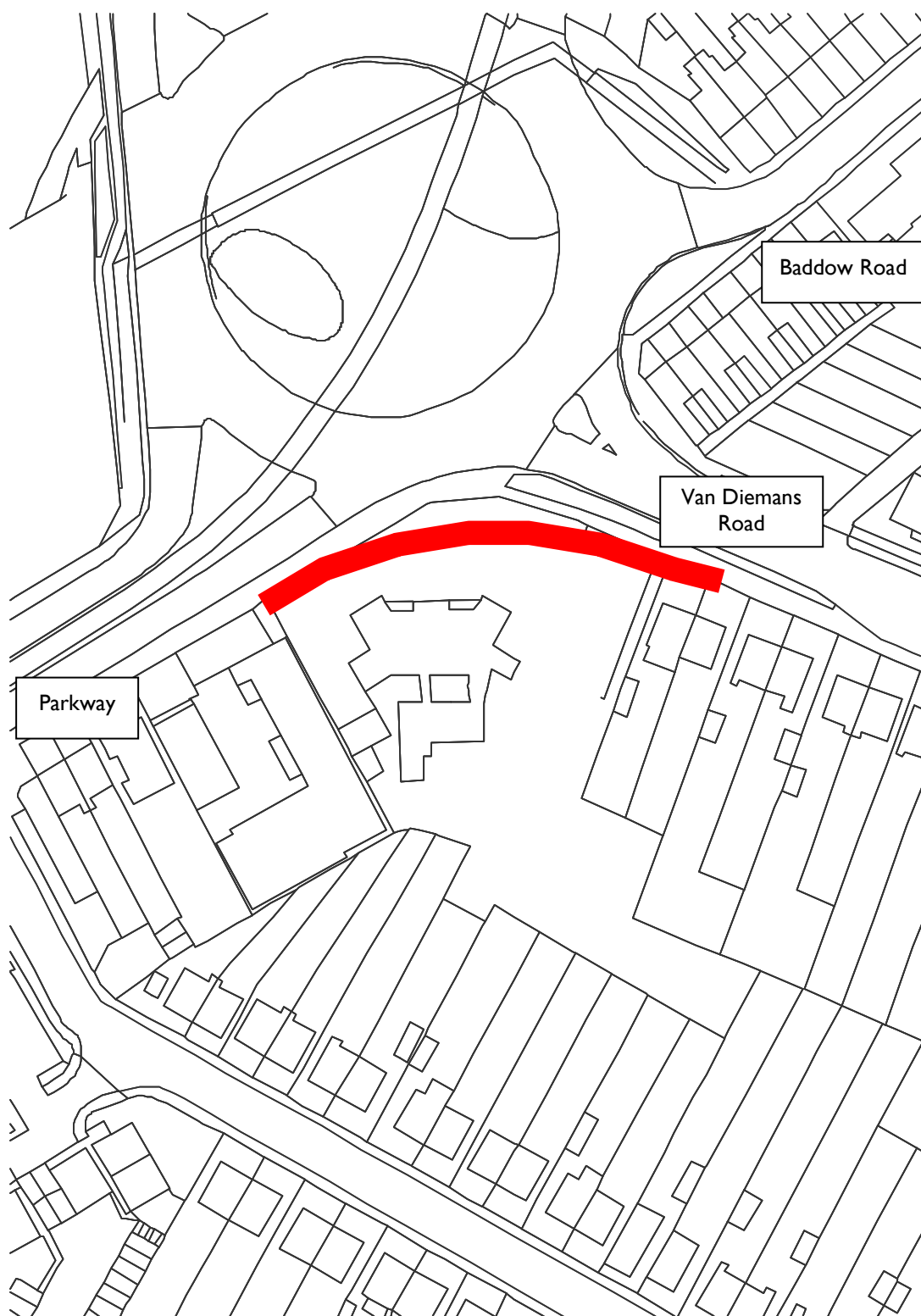
Appendix 4 ADMS Roads 2.2 Mapped exceedences (cont.)
Predicted NO₂ Annual Mean Concentrations 2010 in µg/m³

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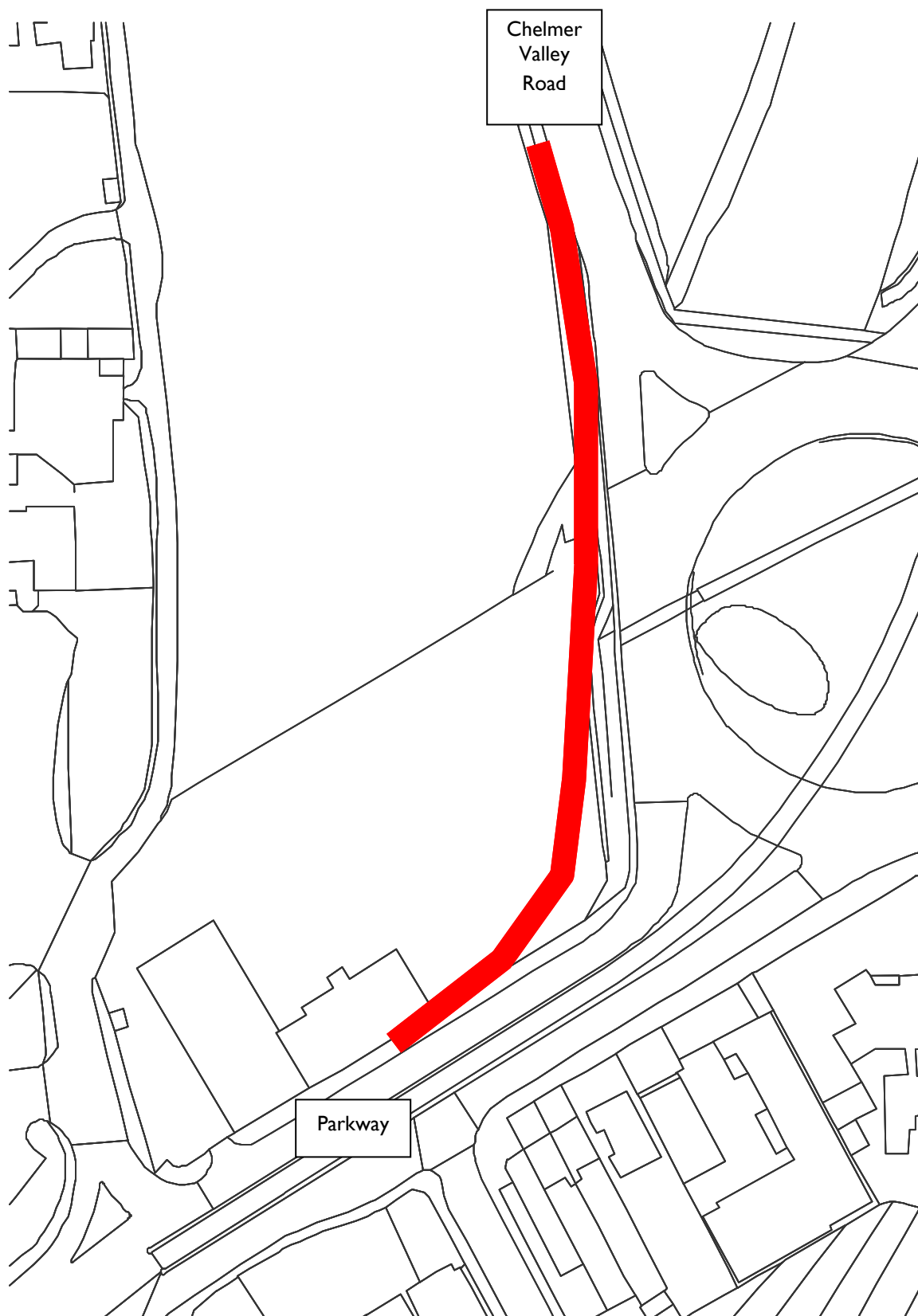
Appendix 5 Chelmer Waterside Access Map.

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Appendix 6.
Considered lefthand filter lane from Van Diemens Road to Parkway



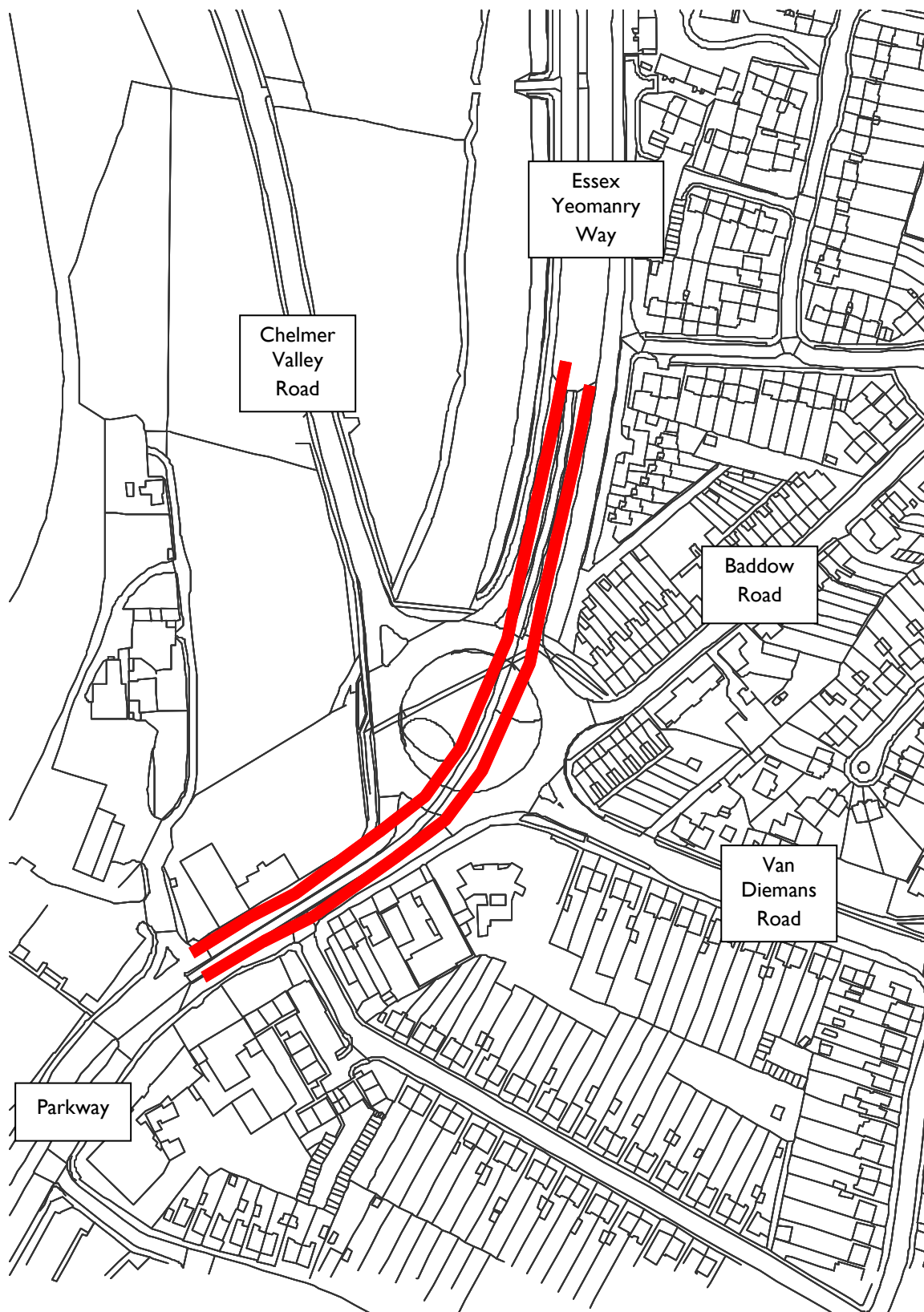
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Appendix 7**Considered lefthand filter lane from Parkway to Chelmer Road**

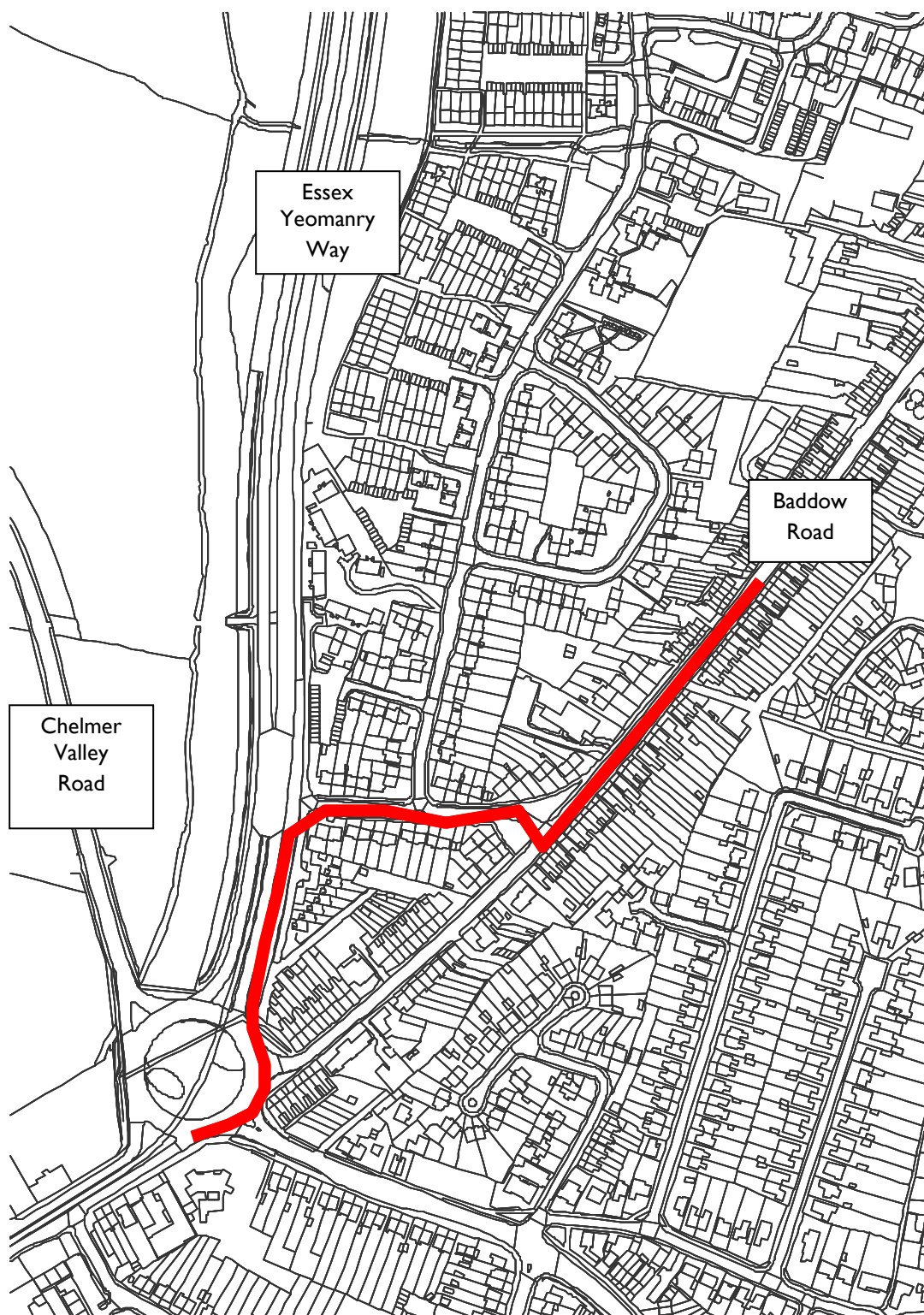
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Appendix 8

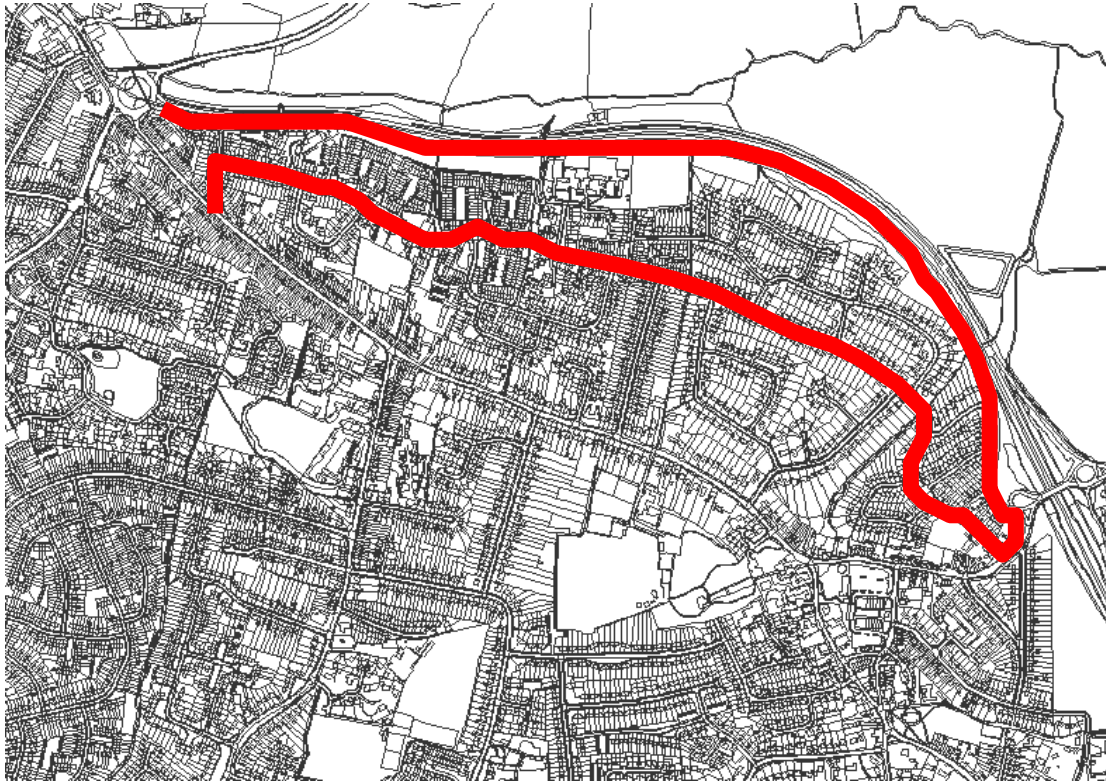
Considered replacement of current tidal flyover with a two way system



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Appendix 9**Considered construction of new access route from Baddow Road to the bypass for buses**

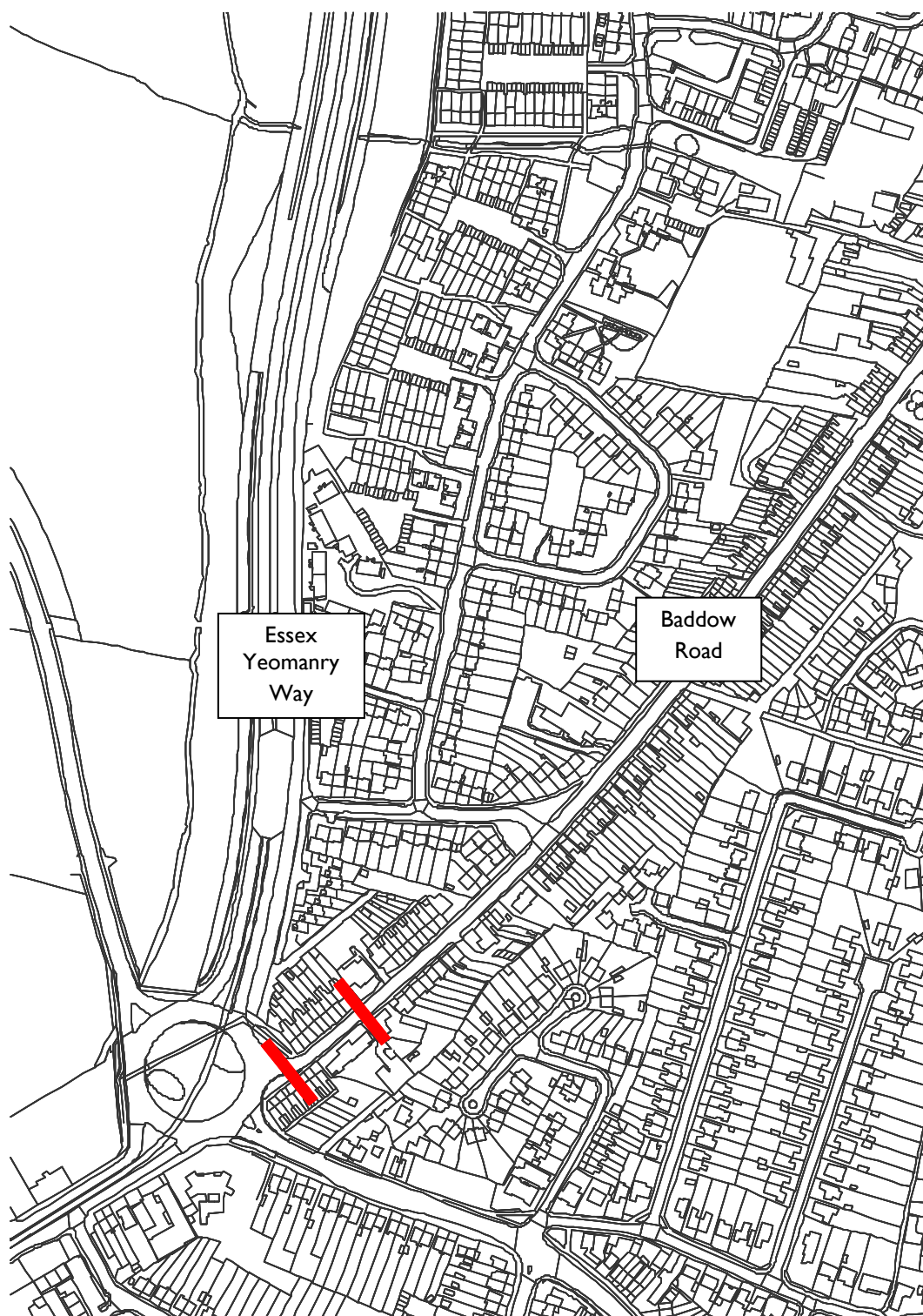
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Appendix 10**Considered rerouting of buses away from the end of Baddow Road**

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Appendix 11

Considered town Centre bound section of carriageway of Baddow Road to be for buses only



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Appendix 12
Glossary of terms

ANR	Army and Navy Roundabout.
AQMA	Air Quality Management Area.
CBC	Chelmsford Borough Council.
DEFRA	Department for Environment, Food and Rural Affairs.
ECC	Essex County Council.
LDF	Local Development Framework
LTP	Local Transport Plan
MAFF	Ministry of Agriculture, Fisheries and Food.
NO₂	Nitrogen dioxide
NO_x	Oxides of Nitrogen
O₃	Ozone
PM₁₀	Particulate Matter less than 10µm in diameter.
PM_{2.5}	Particulate Matter less than 2.5µm in diameter.
RET	Roadside Emissions Testing
TCAAP	Town Centre Area Action Plan
VOSA	Vehicle and Operator Services Agency

Appendix 13

Invited Members of the Steering Group:

Paul Brookes (CBC)
Anne Culverwell (CBC)
Varuna Parsad Addy (formerly CBC)
Nathan Pittam (CBC)
Paul McBride (CBC)
Mike Smith (CBC)
Michael Wray (CBC)
John Pollard (CBC)
Town Centre Management (CBC)
Corporate Strategy (CBC)
Katherine Fox-Boudewijn (ECC)
Claire Alexander (ECC)
Elliot Smith (ECC)
Nicola Keeble (ECC)
Simon Rudge (ECC)
Richard Bailey (ECC)
Chelmsford NHS Primary Care Trust
Janet Calleer (Environment Agency)
Victor Whiteley (Environment Agency)

Appendix 14

Consultation List (this will be expanded)

Department for Environment, Food and Rural Affairs (DEFRA)

Essex County Council

Uttlesford District Council

Braintree District Council

Maldon District Council

Rochford District Council

Basildon District Council

Brentwood Borough Council

Epping Forest District Council

Thurrock District Council

Harlow Council

Colchester Borough Council

Tendring District Council

Southend District Council

Castlepoint District Council

Freight Transport Association

Chelmsford Environment Partnership

Mid Essex Friends of the Earth

Chelmsford Cycling Action Group

Tesco plc.

Marriages Country Stores

The Meadows Shopping Centre

Essex Record Office

Church of Jesus Christ Of Latter Day Saints

Chelmsford College of Further Education

John Lewis (Owners of the former Jewson Site.

First Group plc

Regal Busways Ltd.

Baddow Hall Infants School

Baddow Hall Junior School

Larkside Primary School

Meadgate Infant School

Meadgate Junior School

Moulsham Mill (Marriage Partnership)

Writtle College of Further Education

Anglia Ruskin University, Chelmsford

St Johns Ambulance, Chelmsford

Salvation Army, Chelmsford

Great Baddow Parish Council

Chelmer Cycling Club

CPREssex

Appendix 15 Consultation Responses

ID95 Resident of Great Baddow

I appreciated the opportunity to meet Dr Nathan Pittam and a colleague on Saturday 23 February 2008, when the opportunity was provided to discuss the proposals at the Millennium Centre, Great Baddow.

In general, I approve of the proposals, particularly the proposed slip lanes from Van Diemens Road into Parkway and from Parkway on to Chelmer Road (A138). I think the latter will be of more benefit in eliminating congestion for traffic exiting the town than the former as I assume that the amount of traffic turning left from Van Dieman's Road is of a more limited nature¹. I understand that access to the hotel and other properties currently under construction on the old Army And Navy pub site will be from the rear thus removing the additional entry/exit on the corner of the roundabout².

- 1 The Action Plan supports the slip road from Parkway to Chelmer Road as part of the redevelopment of the former Jewsons site. Please see section 8a of the Action Plan for more details regarding the slip road from Van Diemens Road to Parkway.
2. Access to the Army and Navy redevelopment has been designed to minimise its impact on the existing road network through careful positioning of entry and exits in Goldlay Avenue.

It is my assumption by observation that the primary traffic movements are west/east via the old A12 from Van Dieman's Road across to Chelmer road (A138) and the dual flows to/from the town and Baddow Road and Baddow bypass (A130). The problems are the congestion at the roundabout created by queuing in Baddow Road sometimes as far back as the junction with Beehive Lane, access to the roundabout itself due to the number of converging roads (5), and peak time intensity of traffic and actual flows which are conflicting. As a result, it is difficult to emerge from some of the junctions due to constant flow from the right, aggravated by lack of signalling intention by some drivers and inadequate road markings. For example, although there are lane markings clockwise between Van Dieman's Road and the Chelmer Road exit, there are no lane markings on the other side of the roundabout and as a result traffic bound for the Bypass, Baddow Road and Van Dieman's Road takes a variety of routes from the Town entry onto the roundabout. I think when the traffic lights were originally installed full lane markings were applied to the entire roundabout and it may be appropriate to reapply them now³

3. The left hand filter lanes will ease the flow of traffic and should make circumvention of the roundabout clearer. The suggestion for clearer road markings has been forwarded to Essex County Council.

I understand that there is the possibility of a Waitrose supermarket being built on the old Jewson's site and the consultation document states access will be from Parkway. While this is of interest to consumers providing additional choice of food stores, it will create additional traffic flow around the Army and

Navy vicinity, even if direct access and exit avoids the Army and Navy roundabout itself. Hence my own view which should be passed to the planners is that any proposal for a supermarket on this site, or indeed any other proposal which is likely to introduce high volume, short duration (e.g. up to 1 hour) parking requirements in the immediate vicinity should be rejected⁴.

4. All major development in the AQMA will be subject to a requirement to produce an Air Quality Impact Assessment and to minimise its environmental impact. Any future proposal for major development will be subject to a requirement to produce an Air Quality Impact Assessment.

Views have also been requested on provision of appropriate routes for pedestrians and cyclists. I believe there is sufficient space within the existing cycle/footpath across the roundabout for both classes of user, and use of the path should be encouraged⁵.

5. Chelmsford Borough Council is committed to delivering cycling routes wherever it has the powers to (i.e. Central and Cardinal Park). Cycle lanes on the public highway are controlled by Essex County Council who have advised that the provision of cycle/pedestrian shared pavements around the army and Navy Roundabout is not possible owing to limited pavement space.

The subways need cleaning, much improved lighting and CCTV coverage⁶.

6. The Action Plan proposes further consideration of CCTV in the underpass. See section 8b

The pedestrian crossings across both Baddow Road north (i.e. town side) and the one in Van Dieman's' road should be removed completely, and relocated well away from the junction to stop queuing on the roundabout itself which I have observed on many occasions. I'm uncertain whether the split crossing now being planned for Van Diemen's road will be sufficiently far away from the junction but it should be an improvement on the present form and position⁷.

7. Removal of the crossings will result in pedestrians 'chancing' crossing the roads which may result in accidents. We are keen to encourage all modes of sustainable transport including walking and this proposal would be counterproductive. However, the pedestrian crossing on Parkway will now be moved to allow for greater stacking capacity between Van Diemens Road and the crossing. See Section 8a

Encouragement to cross earlier or use the subway should be provided at appropriate places nearer the town and in Baddow Road e.g. at the zebra crossing close to Meadgate Avenue. For cyclists, a well signed, route using the subway and making use of further reserved footways into town is essential to encourage this form of transport⁸.

8. Cyclists are prohibited from using the subway for safety reasons. Upgrading of CCTV in the underpass will be considered over the coming year. Wider structural alterations to the subways, such as a shared cycle/pedestrian link, are prohibited by a number of major underground services

Those are my views on the present situation and immediate considerations.

However, I am concerned at the overall longer term implications for traffic movement to the South of Chelmsford. 'Solving' the Army and Navy problem which I think the vast majority of both residents and Council officials would like to do, could result in simply moving the problem elsewhere to a new bottleneck at the Odeon roundabout, where again there are merging flows from Baddow and the High Bridge, both major access routes into the town centre⁹.

9. Any major infrastructural change would require careful modelling and analysis.

Unfortunately, Chelmsford has inherited a built environment which does not lend itself readily to radical improvements in traffic flows; indeed there is a requirement for an internal distribution road system which is free flowing and extends the present Parkway to include dual carriageway across the north of the town centre along a line currently occupied by Rectory Lane and then across to the Springfield Road and on to Chelmer road or at least round to the High Bridge, to create an effective internal ring road system. This is impractical in the short term, and longer term may result in loss of buildings along route alignment, but may be necessitated by traffic growth in future and requires planning for 10-20 years hence.

A future distribution ring road should be made free flowing as far as possible and this means removing traffic light controlled junctions, creating further dual carriageways and making entry /exit points along the alignment by roundabout wherever possible¹⁰.

10. This is beyond the scope and timescales of the Action Plan.

It is my belief that the pedestrian crossing at Moulsham Street should be removed, not only on safety grounds as has been argued by others but also to improve traffic flow¹¹.

11. This is outside the scope of the Air Quality Management Area. It would, however, have no significant impact on air quality improvement and is likely to result in accidents to persons 'chancing' crossing Parkway.

The traffic light controlled junction with London Road is also an inhibitor to free flow but short of removing the right turn from Parkway again, and forcing traffic to loop round the Odeon roundabout as some years ago, there is little which can be achieved here within the space footprint on the ground. But longer term and here I am thinking of a 20 year planning cycle, Chelmsford will almost certainly require a radical approach to road provision and utilisation and this may only be achievable by loss of properties¹².

12. The point is noted. However, it is outside the scope and timescales of the Action Plan

A more realistic scenario is to consider what can be achieved with the present road system and use of public transport. Further long term contingency

proposals are in the consultation document which suggests restricted use of the bottom part of Baddow Road and changes in bus routes. Although some of these are possible and would certainly alleviate movement from Baddow Road onto the roundabout, more radical solutions are required which encourage individuals to make greater use of public transport and make it cheaper than private car use. It is my belief that for 2 adults or more, car travel into Chelmsford is probably cheaper than public transport from the centre of Great Baddow and beyond, even taking into account running costs, and potential parking charges. This bias in favour of private car use can only be overcome by a substantial increase in parking charges and a corresponding reduction in bus travel costs together with an increase in service provision¹³.

13. This suggestions calls for encouragement to use sustainable transport options. CBC believe that there is a need for a combination of sustainable transport/reduced reliance on the private car and management of the road network.

I present a list of options to consider for the medium 5 year term. No timetable for these options but they are all potentially achievable within 5 years, some immediately.

- The Park and Ride facility at Sandon has been highly successful but should be further developed, in parallel with other sites to provide not only park and ride but also a transport interchange.
- A bus interchange should be built at Sandon¹⁴ to allow the following.
 - All buses along the Maldon Road, at present 31(x), 36 should stop at the Sandon Interchange.
 - The Southend service (present route 3 operated by Regal Coachways) should be rerouted along Maldon Road and also serve the interchange. It could then be directed along the Westbound A12 to rejoin at Howe Green or alternatively loop back and travel via Molrams Lane to rejoin the bypass.
 - The Canvey Island service which already operates via Molrams Lane should also be routed via this interchange.
 - All non terminating coach services via the A12 (e.g. London Victoria – Felixstowe) should serve this interchange.
- 14. Essex County Council is currently investigating the viability of expanding the current Park and Ride in addition to providing extra Park and Ride sites around the town. See section 8e. However, there are no current plans to introduce a new bus interchange.
- Traffic from the east and requiring to turn could do so at present by continuing to the Roundabout at the entry to the slip road to the bypass near the fire station and return on the other side of the road.

- If it was cost effective, a closer roundabout could be constructed on the present triangular junction at Molrams Lane/Maldon road which would also improve sight lines and ease of exit for traffic exiting from Molrams Lane.
- A frequent service should be provided to the town centre from the Interchange and for pedestrians this should be free.
- All local bus services should be required to provide full interoperability of tickets i.e. if I buy a return ticket on a Regal Coachways service I should be able to return on a First bus.
- All local services should provide through ticketing to adjacent towns e.g. I should be able to buy a ticket from Galleywood to Maldon which covers use of a local bus to town and out again on the Maldon service.
- Local services within Great Baddow should be available which serve the Sandon interchange; e.g. the 50 could be rerouted from Longmead Avenue via Maldon Road to the Interchange and then back via Molrams Lane or alternatively to reroute the present return journey from West Hanningfield Road via Church Street, Molrams Lane. There are a variety of other options including a local Baddow circular service¹⁵.

¹⁵ .Since deregulation of the bus services the cost of the fare and decisions over routes and timings of services is the decision of the operator.

Whichever options are defined and cost effective, the intention should be to improve through journey choices, enable through ticketing, and encourage use of a transport interchange with free pedestrian transfer to town. Existing examples of free transfer include the journey between Heathrow terminals 1, 2, 3 and 4 by Heathrow Express, so the proposal has a precedent albeit in an air terminal environment.

The purpose of this response has been to encourage lateral and out of the box thinking! Some of the proposals are radical and would require council subsidy as already implied by new arrangements for senior citizen travel from April 2008.

In order to determine whether these proposals are considered beneficial to the community as a whole, I would hope appropriate modelling and cost/benefit evaluations could be applied to assess the viability for the longer term.

I wish the Council success with its more immediate plan for reducing nitrogen dioxide and other pollutants in the immediate vicinity of the AQMA.

ID96 Councillor K. Francis (Essex County Council)

The general context for my comments arises from my concerns for the future planning of development and transport infrastructure for the town area but also that for central Essex, best described by the area defined in the County Council's Local Transport Plan as 'Chelmsford & the Heart of Essex'.

Separately, I have submitted responses to the Borough's LDF consultation process including, in particular, the Town Centre Area Action Plan. Derek Stebbing in Planning holds a copy which will provide you with the areas of my concern.

Basically, what happens at the Army & Navy and anywhere within either of the Action Plans, flows from policies and programmes for a much wider area.

I contend that if the correct p & p's are pursued then pollution and congestion problems would be largely resolved or adequately managed, at least for the foreseeable future. I accept that there is a need to address the AQMA designation for its own sake but decisions taken now must stand the test of time and be based on sustainability principles and not just be short term measures.

Public health is of prime importance but other factors should not be overlooked that impact on public wellbeing. Many people, who live and/or work in this area, also suffer from undue noise nuisance and varying degrees of visual intrusion as a direct result of traffic flows and highway infrastructure. These impacts should be given greater consideration alongside the toxic effects of poor air quality.

My vision for 2015, if shared, could help to address these issues and can be realised over the intervening period.

The Action Plan's Role¹

Beyond achieving the objective of containing the Air Quality problem this Action Plan should identify the underlying causes and inform other processes towards long term aims for sustainable planning. In part, the consultation document appears complacent and suggests that the current problem will evaporate in due time and without the need to employ much change.

I hope the Action Plan will act as a 'marker' and prompt all relevant agencies to deal with the underlying issues that create such problems.

When I first became aware of the then looming AQMA situation, a few years ago, there was a fear that this area was to be the first of a number of similar problem areas around Chelmsford. Therefore I believe it is necessary to ensure that p&p's produce a form of guarantee that will minimise the chances for the creation of other such areas.

I am heartened by the assurance given at the CEP meeting on 6th Feb. that all proposals, whether they are development schemes or road layout changes, will be assessed for their effect on local air quality.

This Plan could provide the basis to advance current policy and best practise for the benefit of the whole county and combine with the air quality strategy within the County Council's LTP.

1. The Action Plan is a statutory obligation purely to target specific pollutant exceedences, in this case it is for Nitrogen dioxide alone. However, in targeting the causes of NO2 other environmental issues may simultaneously be improved. The pollution modelling is based on current 'background' pollution levels, growth in vehicle numbers and an improvement in vehicle technology. Equipment and laboratories are all accredited and our methodology has been accepted by central government. Modelling predicts that pollution will reduce over the coming years. It will not necessarily improve queuing times and thus perhaps the perception of the problem.

Army & Navy Junction

Quite obviously, the operation of this junction is vital in finding a solution.

I have long-considered that too many demands are made of it, especially in its current form, and that traffic flows need to be re-configured by means of a change in layout. However, this is only part of the solution and consideration needs to be given to how the town centre, as a whole, is accessed. There is simply too much reliance on the Parkway entry and this excessive burden needs to be relieved. This can be achieved, at least in part, by a redistribution of accessing flows and I have previously suggested that a new and separate access into the town centre needs to be provided. I have detailed this in my response to the TCAAP DPD which will be examined as a part of the proceedings of the EiP, now delayed until April of this year.

I am naturally encouraged by seeing a proposal on page 19, para. 3 of your Plan document, that mirrors what I have been suggesting as part of an alternative access to the Chelmer Waterside area of the town. I believe that this, including a new eastern access road linking through to Navigation Road will greatly assist in a better distribution of traffic. It will be of particular benefit from the A138 (southbound) as well as the A1114 (westbound), providing relief to both the Army & Navy and Parkway. Please refer to the enclosed indicative road layout/access alternative².

2. Long term proposals for access to the town centre will be considered as part of the proposals for the Waterside Development. As stated above this is included in the Town Centre Area Action Plan.

Part of my vision for this area is to see the removal of the flyover and how this will greatly improve townscape value here. In my view, the 'panacea' option of a larger two-way flyover would be a complete disaster. It would attract and concentrate even more traffic pressure on Parkway and this entry into the town. In addition, it would further degrade townscape value and I doubt

whether it is affordable³. Further, for its likely cost, a range of other sustainable means could be provided, including a completed Park & Ride network.

3. These proposals are for the long term and thus outside the scope and timescale of the action plan. However, County Council is currently examining the expansion of the Park and Ride System.

Other Infrastructural Needs

As referred to in my introductory there is the need to address shortfalls in basic infrastructure, if we are to civilise our transport networks and ensure sustainability.

Improvement of air quality is only one of many gains, as referred to earlier, that could flow from better local transport.

I was disappointed that cycleway development was not included as a proposal to encourage further trips to be made by cycle. This naturally includes reinforcing pedestrian routes as well.

We have yet to see links in the local cycleway network to connect Great Baddow to the town and Princes Road with Chelmer Road. Land has been secured for part of a route fronting the ex-Army & Navy development site but this should spur the delivery of a route from here to the High Bridge Road junction underpass⁴.

4. Chelmsford Borough Councils' Local Development Framework makes clear that the expansion of the current cycle network should be pursued. The action plan proposes that Chelmsford Borough Council work with Essex County Council to examine ways of delivering this. Refer to section 8b

The Borough Council should be bidding for a major cycleway network development scheme within the County Council's LTP process or other funding source. Use of S106 monies alone is insufficient to deliver a full and legible network, capable of offering a meaningful alternative means of local journey-making and within a time-span appropriate to the urgency for this aspect of infrastructure provision.

Park & Ride services should be playing a much bigger role in the reduction of traffic accessing the town area. Further expansion of the Sandon site is now being planned but instead we should be seeing an accelerated delivery of the previously identified sites at Widford, Boreham & NE Chelmsford. The Widford site would be most beneficial in relieving problems around the Army & Navy, and surprisingly, some trips to the Sandon site emanate from this side of town!⁵

5. There are plans within the current LTP to expand the Park and Ride Scheme with a new site at Essex Regiment Way being scheduled to open in 2010. The development of a suite of Park and Ride locations is fully supported in Policy DC65 (Park and Ride) of the Chelmsford Borough Council Local Development Framework.

Other public transport improvements are needed too. We should be looking to the provisions of the Transport Bill 2007, likely to be enacted by the end of the year.

I have been active in encouraging ECC to play a much greater, influential role in public transport services and have requested that Chelmsford & the Heart of Essex area be chosen as a pilot for a Quality Bus Contract. This could extend service networks and timetables and help enormously in terms of accessibility for the many that suffer transport poverty or depend so heavily on the car. In turn, this would further reduce car journeys and local traffic-related problems.

I also see the need for a 'Circular Bus Service' for the town, connecting all key parts of the town from local car parks as well as bus and rail stations. This would allow those who continue to choose to drive to the town centre to park, from their chosen approach, to readily access most places of interest. More detail of what I envisage can be supplied on request. Also, Service 45 could be re-routed via Gunson Gate. These are means to realise the 2015 Vision. Delivery should start without delay.

Unfortunately, there are current proposals that will work against this vision and a sustained resolution of air quality problems.

The most immediate is the scheme to 'improve' the pedestrian crossing and alter highway layout on Van Diemens Road. I contend that this will work against pedestrians and cyclists by virtue of the proposed staggered layout as it will be more difficult to use, take much longer to cross and preclude the possibility of upgrading this crossing to a Toucan as the cycleway network develops.⁶

6. The staggered crossing will allow greater stacking and visibility from Baddow Road and will only halt traffic on one lane at a time and thus easing traffic flow. The increased time for pedestrians activating the crossing controls in two stages is considered negligible.

It also fails to acknowledge and secure an adequate width for the trunk cycleway/footway proposed for this road or assist with improving options for cyclists from/to the Great Baddow direction. Apart from these and other points the scheme offers poor value for money with excessive works as compared with an alternative that helps traffic flow on this approach to the junction and protects future options for cyclists⁷.

7. There needs to be a balance between sustainable transport, road safety and traffic flow. Physical spatial constraints are a further consideration in this area.

Other proposals are about to be announced but these are likely to include further widening of Parkway, dedicated left-turns from/into Parkway and changes to pedestrian facilities⁸. These will be costly compared with their returns and are likely to further prejudice access and safety for both pedestrians and cyclists. They may also include some suggested options in your Action Plan that might be helpful.

8. Since the publication of the Action Plan, Essex County Council have confirmed proposals for works to alleviate congestion around the Army and Navy Roundabout. These will commence later in 2008. Please see Section 8b for further details.

However, and in the main, they should be seen as just the latest in a succession of 'improvements' to the Army & Navy junction that have offered only very temporary relief.

They add to the reliance on this overburdened entry to the town, will cause added capacity problems on other parkway junctions and represent poor value for money.

Current operation of the A & N may have optimised vehicle throughput but at a price. This includes certain flows losing priority e.g. Van Diemens Road and induces greater speed and risk-taking onto and around the junction. It can be characterised as a 'who dares wins' junction. I have heard numerous accounts of drivers of all ages who are intimidated by the pace and risks associated with the present arrangement. Also, there is wholesale abuse of the 'left only' lane to Chelmer Road.

Instead there should be proper management of competing flows and apportionment of priority, ensuring a measured share of access⁹. This was and should be provided by a return to traffic signal control. Signal control also offers greater scope for more lanes at the 'give way' line that helps maximise access capacity. Drivers are less stressed and have a degree of certainty about priority and comfort/safety when given a green light. I ask whether less pollution is produced from this movement pattern as compared with constant revving and harder acceleration with the other.

9. County have recently announced plans to introduce signal control of Chelmer Road and possibly Parkway entries to the roundabout, controlled by levels of congestion. The intended impact is to maximise throughput of the junction. See Section 8.0. It is widely accepted that a smooth consistent style of driving results in lower fuel consumption and less pollution than stop start driving.

Town Centre Action Plan Proposals¹⁰

I believe that some of the road infrastructural proposals will be harmful, to townscape including the waterways and open space that will front the Chelmer Waterside development area.

This area is currently planned to be accessed via two new link roads, both within a relatively short distance of the Army & Navy i.e. from a new junction on Chelmer Road and another from Parkway. In addition, it is proposed to sever High Bridge Road which will, as a consequence, concentrate access to this area by means of these two new link roads. These then combine and lead

through to join Springfield Road and the many areas previously accessed via this severed link road.

Such a concentration of traffic will cause serious congestion and environmental problems that will include air pollution. I anticipate that these problems will not just affect the new development area but will reflect back to add to present difficulties on Parkway, Chelmer Road and the Army & Navy itself. I foresee columns of queuing vehicles tailing back above the river and open space here and will be likely to produce periods of total gridlock over a wide area.

Any short term gains in conditions resulting from the Air Quality Action Plan will be undone by these disastrous proposals and are likely to aggravate them. I therefore request that you study the outcomes resulting from such proposals and be ready to advise the EiP into the TCAAP DPD.

As referred to earlier, I have submitted an alternative town centre accessing strategy that retains High Bridge Road and introduces a new eastern access link road to serve the proposed development area. It then extends to link up with Springfield Road via Navigation Road. This, I believe, better distributes town centre bound traffic from this side of town, sharing the load currently concentrated on Parkway via the Army & Navy.

10. It is understood that your comments have been made to the Town Centre Area Action Plan consultation and examination. Many of these schemes are beyond the scope and timescale of the Action Plan for the Army and Navy Area.

I contend that taken together with other measures and proposals mentioned earlier this arrangement will answer the current problems and go a long way to meeting the demands of development growth in the coming years.

ID97 Friends of the Earth Response

We welcome restrictions from traffic approaching the Army and Navy from Beehive Lane as this will improve air quality for households in the Baddow Road.

As far as present and potential pedestrians/ cyclists/wheelchair users are concerned having to cross the Army and Navy, we think that improving traffic flow could improve their situation. They seem to be the ones who are most directly affected by various exhausts and their path should be led as much away from car traffic as possible. Also their stopping times, when they have to assemble to let any exhaust producing traffic through, should be limited.

The details of the proposal do not clarify how this can be achieved and therefore we can only comment when the entire North South passage across the Army and Navy for alternative traffic is known.

We welcome the government policies to encourage both walking and cycling as alternatives to the use of the private car. So far the Army and Navy subway is being used by pedestrians and cyclists and numbers and support by users are promising (See FLUID and BURO HAPOLD study 2005).

In the consultation document we cannot find any provisions for cyclists and other alternative transport to cross the Army and Navy safely. This concerns safeguards with respect to air quality as well as the passage route¹.

1. Chelmsford Borough Council is committed to delivering cycling routes wherever it has the powers to (i.e. Central and Cardinal Park). However, cycle lanes on the public highway are controlled by Essex County Council. Chelmsford Borough Councils' Local Development Framework makes clear that the expansion of the current cycle network should be pursued. The action plan proposes that Chelmsford Borough Council work with Essex County Council to examine ways of delivering this.

Taking up cycling will instantly enable neighbouring communities to reduce pollution and contribute to everybody's overall target of reducing Carbon emissions.

ID98 Councillor T. Miller (Liberal Democrats)**1) Reserving Land for Future Improvements**

It is vital, while development plans are being made for the land previously occupied by Jewson's and Gard's, that land is reserved for possible improvements to the Army and Navy Roundabout¹. The land should provide room for a two-way flyover and slip roads from Van Diemens Road to Parkway and from Parkway to Chelmer Road.

1. Land has been reserved on the Gards side of the Army and Navy Roundabout, this land will be used to widen the carriageway to two lanes removing a pinch point on Parkway, this work should commence in 2008. The provision of a left land filter lane from Parkway to Chelmer Road is within the plans included in Chelmsford Borough Councils' Local Development Framework and will be pursued over the coming years.

Land must also be reserved for a safe and easy-to-use cycleway from Gt Baddow to the Town Centre and for adequate pedestrian ways that do not conflict with cyclists².

2. Chelmsford Borough Council is committed to delivering cycling routes wherever it has the powers to (i.e. Central and Cardinal Park). However, cycle lanes on the public highway are controlled by Essex County Council. Chelmsford Borough Councils' Local Development Framework makes clear that the expansion of the current cycle network should be pursued. The action plan proposes that Chelmsford Borough Council work with Essex County Council to examine ways of delivering this.

2) Park and Ride

The Park and Ride Site at Maldon Road, Sandon has brought the greatest improvements to congestion on the Gt Baddow bypass and the Baddow Road. This car park is full soon after 9am and needs extending. The network of Park and Ride sites for Chelmsford should also be brought forward to prevent congestion and air quality problems elsewhere and to make it unnecessary for cars to come to Maldon Road from other junctions on the A12 thereby filling the car park prematurely and wasting fuel.³

3. Essex County Council is currently investigating the viability of expanding the current Park and Ride in addition to providing extra Park and Ride sites around the town.

3) Bus Services

Bus services should be improved to provide a good coverage of Gt Baddow both to and from the Town Centre and Broomfield Hospital at popular times⁴. The services should be reliable and not subject to unpredictable cancellations and delays.

4. Since de-regularisation, decisions over individual routes lie with the bus operators and are beyond the local authority's control.

4) Cycleway

A safe and easy-to-use cycleway is needed from Gt Baddow to the Town Centre. In Gt Baddow, the Baddow Road is not appropriate as part of the

cycleway because of the parked cars and heavy or queuing traffic. The Army and Navy underpass is damp and unwelcoming with right-angled bends and cycling is not allowed⁵. The surface alternative of crossing the Baddow Road, Van Diemens Road and Parkway using pedestrian facilities is difficult and involves long delays. The underpass needs to be straightened and widened so both cyclists and pedestrians can use it safely. On the Town side, a route for the cycleway needs to be established to join the existing cycleway south of the river.

5. There are a number of technical difficulties limiting structural alterations of the subways under the Army and Navy Roundabout owing to the number of services (gas, electricity and communication cables). This makes the suggestion unviable.

5) Pedestrian Ways

Pedestrian ways should be broad enough to permit wheelchairs and pushchairs to pass and should follow as nearly as possible the desired direction of travel.

6) Flyover Management⁶

Any change in the times that the flow of traffic is reversed must be preceded by a well-published trial to judge its effect. A permanent flow into the Town might lessen congestion in the Baddow Road in the evening rush hour but would cause traffic to queue right through the Town to access the Army and Navy roundabout.

6. Essex County Council have advised that the switchgear controlling the tidal flyover has exceeded its working life. Without significant resources this would necessitate the setting of the flyover to one direction only. Air Quality Modelling has shown that the air quality objectives can still be met with the flow set one way. However, it would be beneficial to road users for it to be tidal. Essex County Council has recently announced plans to introduce a scheme to manage the operation of the flyover more efficiently through "daytime dynamic operation" - this means switching the flyover to deal with greatest demand as and when necessary as opposed to a timetabled basis. County also propose the closure of the flyover overnight to improve safety at low flow periods. Until operational we cannot accurately predict the impact of this scheme on air quality. However, if works as intended this should result in an improvement in air quality at the Army and Navy Roundabout

7) Travel Plans⁷

Large Employers should be asked to stagger hours and allow more working-from-home where appropriate. Employers, schools and colleges should be asked to prepare Travel Plans that encourage walking, cycling, public transport and car-sharing.

7. Essex County Council provides a travel planning service that is open to private companies. Chelmsford Borough Council is taking a lead by producing a Sustainable Travel Plan for its staff that is due to be launched in July 2008 pending cabinet approval.

ID99 Dr. Peter Foreman, CPREssex

I think that the dismissal of the treatment of the Baddow Road bus changes are appalling and major air quality gains can be achieved reasonably in the following way.

The Baddow Road should be made entrance only. This would make only four double access and exits, which works perfectly well at the Wood Street Roundabout, because it would give Princes Road traffic much better chance of exiting with two options verses three and longer distance from nearest option.

The Baddow Road should be blocked out as exit close to A&N so that private households are accessible, but cannot enter A&N¹.

1. The feasibility closing (to various extents) the end of Baddow Road to vehicles other than buses was considered by the steering group. Whilst this could result in improved air quality. A full study to examine the wider implications (including negative impacts on areas outside the AQMA and general road users) would be essential. The Action Plan therefore proposes to investigate the option of road closure/restrictions further in the event that the expected reduction of Nitrogen Dioxide is not attained. See Section 8b.

P21 section 3 is wrong. I have visited the area and cannot understand why they think it is impossible to break through for a bus access to the buslane. The level looks the same to me and I do not see how the properties would be detrimentally impacted. All you would need is better parking control to ensure route available.

The road is some distance along the buslane, but surely this is not beyond the ability of road engineers to cope with and I dispute that the Design Manual for Roads and Bridges applies, this is just for a bus not any major traffic flow².

2. Air Quality modelling indicates that the NO₂ objectives will be met by 2010 without the need for such infrastructural changes. Essex County Council advise that the height difference is sufficiently significant to make this scheme unviable.

With regard to the buslane along Baddow Road from Beehive Lane, two options are possible.

1) Remove parking along road and establish buslane allowing other traffic to also use both ways. Air quality should be improved, because it will only be used for access and the Doctors' Centre.

2) Leave parking and establish buslane alongside with one way system, but this means that households can only enter from A&N.

The first is obviously the best, but may raise a lot of objections from parking people. However, they may give it support if the air improvement is pointed out, because of the greatly reduced traffic. It will also stop objections from BP, because of potentially lost customers.

This system will make the extra lanes in Van Diemens unnecessary and allow the near buildings have plenty of space for cycle/foot path way, hopefully stretching to the Odeon Roundabout³.

3. The removal of the parking rights and partial closure of Baddow Road would facilitate the provision of dedicated cycle lanes between Beehive Lane and the Army and Navy Roundabout. This has been included in the revised Action Plan, please see Section 8b of the Action Plan.

The hazard to the crossing could be helped by an amber flashing light similar to schools on the roundabout.

Finally, please get all the crossings timed to help the walking/cycling people. If kept down to 15 seconds then more people would be encouraged to use them and traffic would not speed to avoid being stopped, even when they are going to a queue!! Some actually stop on it!!⁴

4. We have no research to state that reducing waiting times at pedestrian crossings increases their usage, we believe that the positioning and safety of crossings is the deciding factor for the majority of people.
-

ID99 Cllr. G. Pooley (Liberal Democrat)

Further to our telephone conversation this morning, please take this as my response. I do include some questions which you may feel able to answer to me as a Councillor as much as a respondee, rather than the answers awaiting your report to Cabinet.

- 1 Although I recognise the need to look ahead to alternative long-term solutions, the timing of these is completely uncertain. The Action Plan must therefore have robust short term actions in it which are significant in their impact¹.
1. Since the publication of the Draft Action Plan in 2007 it has been confirmed that improvements to the road network will commence later in 2008 which should have a positive impact on congestion and, thus, air quality within the AQMA, please see section 8 of the Action Plan.
- 2 Normally, I would argue that traffic reduction measures (or technological innovations or incentives), rather than improved traffic flows, are the only “real” environmentally beneficial ones, as moving vehicles pollute just as stationary ones do. However, given that this is a particularly severely polluted pocket, and it is significantly residential, the Action Plan must focus on short-term methods to improve flow without volume reductions, particularly flows to relieve delays approaching the Army and Navy along Baddow Road and Princes/van Diemens Road².
2. Stationary or idling vehicles do produce more pollution than those which are moving therefore improving traffic flow is part of the solution to improving air quality. For improvements to relieve congestion in the short term please see section 8a of the Action Plan. CBC believe that there is a need for a combination of sustainable transport/reduced reliance on the private car and management of the road network.
- 3 I am aware that County Highways argues strongly that the possible use of the traffic lights does not help and indeed may in total terms worsen throughput numbers. I suggest that needs revisiting. My perception is that the difficulties to “get onto the roundabout are least severe from Parkway (eastbound), and Chelmer Road (westbound); traffic is almost always waiting even if in small numbers in Essex Yeomanry Way, and able to get onto the roundabout when that main flow eases, so that the major difficulties arise consistently and inevitably in Baddow Road and van Diemens Road – *and they are the roads (of the five) that pass through the key residential areas within this problem zone.*
- 4 It follows that in this case the Highways objective of maximum throughput may be at odds with the Environmental objective of easing pollution in residential areas in particular. There are many variations of phasing the lights (or only “needing” them at certain

times), but I suggest these possibilities need again to be modelled, and any results suggesting improved throughput for Baddow Road and van Diemens Road trialled and monitored for throughput AND pollution levels – even if the throughput for the other three roads are to be worsened³.

3. County have recently announced plans to introduce signal control of Chelmer Road and possibly Parkway entries to the roundabout, controlled by levels of congestion. The intended impact is to maximise throughput of the junction. See Section 8.0.
- 5 Some additional thinking would be highly desirable specifically to identify additional short term remedial measures, though I realise none easily spring to mind. Some out-of-the-box brainstorming – see my final para below.

Other points:

- a. A diagram illustrating the possibility described on page 19 para 3 (accessing Chelmer Waterside development) is needed⁴, especially as it is apparently favoured by the Borough. This subject is also addressed in the LDF Town Centre Action Plan, and the AQMA strategy would do well to reflect that.
 4. This has now been included as an appendix in the revised Action Plan.
- b. A dilemma arises from its being the Borough Council's obligation to produce this AQMA, yet the powers and funding necessary for any action are vested in the County Council. What will be its status? Does the County Council have to “approve” it, and if assuming does, or signs off on the relevant parts of it in some way or other, is it then committed to delivery?
 5. The Action Plan is produced in consultation with ECC therefore they are implicitly involved though not statutorily committed to its delivery. DEFRA ‘approve’ the action plan and if actions, for which ECC were responsible, weren’t delivered and air quality levels remained above Government guidelines then ECC would be required to explain their non-compliance.
- c. Given that objectives need to be “SMART”, I suggest that in finalising this Action Plan its objectives can benefit from being revisited and restated with that in mind. And that to be meaningful the objectives must overtly be objectives of the County too.
- d. I am aware that the County Council has allocated £10m in the budget for 2008/9 for the delivery of 12 “congestion busting” schemes – one in each district. I’m told the Army and Navy is the focus of “ours” – how does that tie in? Who has ownership of our share of the £10m? Is it the brief of the same steering group you chair? Who is the political say-so vested in?

6. With regard to the 12 Congestion Busting Schemes please see section 8 of the revised Action Plan, the Army and Navy is the focus of these schemes for Chelmsford. The allocation of the £10million is a function of Essex County Council.

Finally, may I suggest it would be appropriate for a working group of Councillors to work with you in reviewing the responses you have received, in preparing the recommended final document for adoption by Cabinet. I think the final version would benefit from that sort of informal exchange of ideas. I will pass that suggestion to Trevor Miller to propose the LibDem involvement, and hope you will discuss how that might fit with the Steering Group you chair.

6. The manager of Environmental Services has responded to you separately on this issue.

ID100 Chelmsford Cycling Action Group

Dear Sir,

I refer to your draft document on the Air Quality Action Plan for the Army and Navy area and wish to make the following comments

Section 3- Policy CP13: Minimising Environmental Impact

Quote: "The Borough council will seek to ensure that development proposals minimise their impact on the environment and that they do not give rise to significant and adverse impacts on health, amenity including air quality, and the natural environment"

If this aim is to be honoured and substantiated, every effort needs to be made to encourage access and movement in the area for the maximum use of sustainable, non-polluting transport (cycling) and pedestrian mobility.

Chelmsford Borough Council is committed to delivering cycling routes wherever it has the powers to (i.e. Central and Cardinal Park). However, cycle lanes on the public highway are controlled by Essex County Council. Chelmsford Borough Councils' Local Development Framework makes clear that the expansion of the current cycle network should be pursued. The action plan proposes that Chelmsford Borough Council work with Essex County Council to examine ways of delivering this.

Section 9- Policy DC30: Air Quality

Quote: "Within designated Air Quality Management Area the Borough Council will promotes measures to improve air quality and will expect development proposals to reduce sources of air pollution"

If the council intends to promote improved air quality, it would seem appropriate that the non-polluting means of transport be championed with maximum access for the public by walking and cycling. More pedestrians, cyclists and bus use in the area would also be a way of sustaining reduced congestion.

[Please see comment above.](#)

Section 6.5 Parkway –Chelmer turning

It is felt that the impact of the pedestrian crossing is minimal, especially at rush hour/high density periods when the traffic stacks up anyway. It is noted that the other half of the crossing (ex Gards side) was not considered of sufficient significance to warrant mention.

Section 6.6 Baddow Road

This section should refer to the fact that the worst actual and predicted AQMA pollution occurs in Baddow Road. Therefore this should be the top priority

road for the Action Plan. Provision of a left hand filter lane from Van Diemens Road and Parkway will not reduce traffic on the sections of the roundabout near Baddow Road.

Section 7c Pedestrian and Cycling Improvements in the AQMA

The text conflicts with the heading as how can the removal of a facility represent an improvement?

The action plan does not propose removing any facilities. The pedestrian crossings will be maintained and merely repositioned.

Section 7e Promoting Change

These bullet points should also include : improvement of urban bus services

All bus companies operating in Chelmsford were invited to discuss the action plan with the steering committee. Only First Group plc attended and contributed. Chelmsford Borough Council fully supports improvements to the bus services within the town.

Section 8a Infrastructural Changes to the Army and Navy Junction

The report should assess whether the left-hand filter lanes will simply transfer the problem to the next junction. Additionally, the report should contain an assessment of the adverse impact of left hand filter lanes on straight ahead cycle movements and should include compensatory mitigation proposals.

If one looks at Section 9 Table 4, the evidence presented does not support the conclusion that a left hand filter lane will benefit air quality. The results indicate that there is no additional benefit to air quality of the left slip. Therefore this option should not be a priority in the action plan.

Owing to technical problems this scheme will no longer be fully implemented.

Section 8b Construction of a new access route from Baddow Road to the bypass for buses

The comment: "The distance between this and the roundabout entry also gives serious road safety concerns, it falling well below the requirement of the Design Manual for Roads and Bridges." Should have an explanation and assessment of the risk.

Details regarding the risk assessments for this scheme are available from Essex County Council.

Section 8c Pedestrian and Cycling Improvements within the AQMA

This section should propose specific improvements for cycling routes within the AQMA.

[Please see comment above.](#)

Section 8e Promoting Change

With reference to Item 1. Education and promotion of Air Quality. Items b, c and d point towards the need for better cycling facilities at the Army and Navy Roundabout.

Section 8 Table 3.0

The delivery description should be amended so that the priority for sustainable proposals is equal or greater than the priority for general road proposals. In the draft it puts road schemes as ASAP but bus, walking and cycling schemes as "Funding Dependent". That categorisation should be reversed. Further improvements to urban bus services should be added to this table.

Section 9 Table 4

The table allows comparison of an added left-hand lane in Van Diemens Road and an added left hand filter lane in Van Diemens Road continued by a slip onto Parkway. The results indicate that there is no additional benefit to air quality of the left hand slip. This should not be a priority in the action plan, and regard should be paid to the disbenefits it causes to cyclists.

[Owing to technical problems this scheme will no longer be fully implemented.](#)

Section 14.1 Recommendations

In the light of the above comments, the provision of improved pedestrian , cycling and bus facilities should be the priority recommendations.

[As stated above, Chelmsford Borough Council is committed to the delivery of good quality sustainable transport choices and will work with Essex County Council over the coming years to examine methods of delivering this,](#)

Chelmsford Environment Consultative Group

Administered by:



Statement from the Public Consultation Meeting: Army & Navy Air Quality Management Area

Members of the Chelmsford Environment Consultative asked for a meeting to be called to discuss the Chelmsford Borough Council's draft proposals to alleviate the AQMA pollution issues. These notes are the outcome of the meeting held on 6th February.

The general feeling of the Meeting was that the air pollution problems will remain insoluble in Chelmsford unless a halt is called to the drive for development, both commercial and new homes, which must, inevitably, cause an increase in local road traffic. (Paragraph 5.1. of the AQMA Document specifically states that traffic, ".....is expected to grow by between 20% and 30%...")

The scene-setting speakers had said that air pollution in the UK had actually improved since the devastating 'smog' levels of the Fifties and that traffic-generated air pollution does not itself cause respiratory disease but does make it worse. However, there is convincing evidence that it does cause death through heart attacks and strokes through causing inflammation of the lungs. The CBC speakers also said that CBC expects current excessive levels of air pollution in the AQM area to return to satisfactory levels by 2010.

Given that abandoning the present drive for expansion and development in Chelmsford and Essex is a 'non-starter' in the current socio-political climate, and that this is causing the problems in the AQMA and elsewhere in Chelmsford, the Meeting still had observations and recommendations to make in response to the Draft Document.

Models, Monitoring & Public Awareness

1. The Council had failed to keep residents in the AQM area informed. General notices in the press are not sufficient. Most were not aware that their properties are, in fact, in the area of hazard and have not been appraised of the adverse effects on their personal health and property values. CBC needs to be more open, honest, proactive and imaginative in keeping them informed. For some, the Consultative Group's door-to-door leafleting was the first they had heard of their situation.

The council informed occupiers of all properties within the AQMA of its intention to declare an AQMA in October 2005 and there was subsequently considerable media coverage upon designation. The council also wrote to all residents in the AQMA to inform the draft Action Plan had been prepared and how they could be involved in the consultation process, these letters were hand delivered. The availability of the Draft Action Plan was publicised in the media (local press and radio coverage). Officers were available to speak to any interested party in the town centre on two days and an additional day set up at a location within the AQMA on a Saturday to facilitate discussion with residents within the AQMA itself. Officers also attended the CEP meeting upon request. The draft Action Plan and leaflets promoting the consultation process were available online and in all public libraries, County Hall and Civic Centres throughout the consultation period.

2. Although the Meeting was given detailed accounts of the air monitoring carried out by CBC, it was not satisfied that it is adequate, reliable or truly representative of the situation. Actual monitoring stations in the AQM area itself are minimal and too much store is placed on results of modelling rather than personal observation. If the A&NR Travel Lodge developer is able to institute monitoring, which confirmed the already high levels of pollution, why is it so difficult for CBC not to do more and more quickly? The fact that pollution in Baddow Road can be 'tasted' could indicate the real scale of the hazard to public health without instrument-based monitoring. (Discussion of the diesel-v-petrol issue noted that, although diesel produces more particulate pollution, petrol produces directly carcinogenic pollutants.) It was also noted that Chelmsford's monitoring results do not appear to be as easily found on the Internet as those of nearby Southend and Thurrock.

Chelmsford Borough Council monitors the concentrations of Nitrogen dioxide at **10** locations within the AQMA against which modelled results are compared. The pollution modelling is based on current 'background' pollution levels, growth in vehicle numbers and an improvement in vehicle technology. Equipment and laboratories are all accredited and our methodology has been accepted by central government. Modelling predicts that pollution will reduce over the coming years. It will not necessarily improve queuing times and thus perhaps the perception of the problem.

We are continually improving our website to account for this. In 2007/08 we were judged to be in joint 5th position for the best Local Authority website for Air Quality information by Air Quality Management. Since the publication of the draft Action Plan our website has been further improved to incorporate live real-time and backdata from our three automatic air quality monitors. The real-time data from Southend and Thurrock referred to is available from DEFRA as the two authorities are within DEFRA's Automatic Urban Rural Network (AURN) and the equipment is funded by central government.

3. The Council's model puts a lot of hope into the idea that newer cars means a 'natural' reduction in pollutants due to better technology and thus the air levels will be fine. However, the recent increased popularity of diesel cars may reduce this. Also, a general increase in cars, even if they are cleaner, will counter balance this argument, especially if they are stationary in congestion and thus more polluting.

Modelling on which the study was based incorporated predicted increases in vehicle numbers. However, as stated in the Action Plan we will continue to monitor the air quality to ensure that if predicted improvements in air quality are not realised further action can be considered.

Proposed Development

4. Although CBC Officers stated that further development around the AQM area was not settled and would be subject to air quality assessment, the Meeting pointed out that paragraph 5.4. of the Document accepted that, ".....a large-scale mixed-use development ('Chelmer Waterside') is a fact and that, "The first phase of re-development is due to commence in 2008." As this will involve a new

supermarket and 200 parking spaces, it is certainly going to increase traffic in the AQMA area! The general feeling of the Meeting was that this development should be abandoned. It was also understood that it would remove recreational and open space assets, including football pitches. In addition, there will be increased traffic from the hotel which is already being built on the old pub site.

All major development in the AQMA will be subject to a requirement to produce an Air Quality Impact Assessment and to minimise its environmental impact. Any future proposal for major development will be subject to a requirement to produce an Air Quality Impact Assessment. This is already accounted for in the Action Plan.

Options Put Forward by Plan

5. The worst actual and predicted AQMA pollution occurs in Baddow Road (as shown on the maps in Appendix 4 of the Document). Therefore, this should be the priority road for the Action Plan. Provision of left hand filter lanes from Van Diemens Road and Parkway will not reduce traffic on the section of roundabout near Baddow Road.

The feasibility closing (to various extents) the end of Baddow Road to vehicles other than buses was considered by the steering group. Whilst this could result in improved air quality. A full study to examine the wider implications (including negative impacts on areas outside the AQMA and general road users) would be essential. The Action Plan therefore proposes to investigate the option of road closure/restrictions further in the event that the expected reduction of Nitrogen Dioxide is not attained. See Section 8 of the Action Plan.

6. Improving traffic flow movement around the A&NR, from the huge expense of an enlarged fly-over to various lower cost engineering, will only encourage more road traffic. It will also move congestion on to other locations, initially to the Odeon Roundabout, where there are already congestion problems and, probably, yet to be measured pollution issues.

Whilst some schemes have the potential to reduce air pollution levels by increasing through flow, it could shift the bottleneck and pollution further along the road network. Major projects, such as a dual flyover, would require a full air quality impact assessment to ascertain whether or not the project would have a net benefit.

7. The Meeting was divided over the issue of traffic-light operation on the A&NR but discussion did highlight the seriousness of additional pollution caused by prolonged stationary traffic. Moving pedestrian crossings might help this but would hinder attempts to make walking and cycling into town more attractive. Dedicated cycle lanes are needed and more imaginative ways of getting pedestrians over or under roads.

Essex County Council Highway Department advise that the original traffic signalisation scheme at the Army and Navy Roundabout resulted in a net increase in congestion and was thus taken out of operation. However, County have recently announced plans to introduce signal control of Chelmer Road and possibly Parkway entries to the roundabout, controlled by levels of congestion. The intended impact is to maximise throughput of the junction.

8. The report should assess whether left-hand filter lanes will transfer the problem to the next junctions. It should contain an assessment of the adverse impact of left-hand filter lanes on straight-ahead cycle movements and should include compensatory and/or mitigation proposals. The evidence presented in Table 4, Section 9 of the Document, does not support the conclusion that a left hand filter/slip lane will benefit air quality. The results indicate that there is no additional benefit to air quality of the left slip (option 2). Therefore, this should not be a priority in the action plan.

Since the publication of the Draft Air Quality Action Plan in 2007 it has become apparent that the full filter lane from Van Diemens Road to Parkway is unviable on financial grounds and is not currently being progressed by Essex County Council. However, the land acquisition undertaken as part of this scheme allows for the flexibility to implement further traffic alleviation schemes in the future such as the additional roadspace widening outlined in Section 8.

Sustainable Options- Buses, Cyclists, Walkers

9. It was noted that the First Bus Company are taking air pollution seriously and attempting to use only the most non-polluting buses across the AQM area – including the Park-and-Ride vehicles. However, the A&NR situation is so serious, and due to worsen in the Meeting's opinion, that the Company should consider introducing CNG, LPG or even electric units as a matter of priority. Vigorous action is needed to eliminate the less satisfactory vehicles used by other operators. The recently-introduced Park-and-Ride has been successful but the fact that it is generally full by 9am shows that it was long over-due, inadequate and urgently in need of replication around the Town's perimeter.
10. Another point about buses was added- that if all the bus routes from Danbury/Maldon/ S.W.F were taken down the dual carriage way making use of the bus lane, this would help reduce pollutants on Baddow Road (there are numerous routes that serve Gt. Baddow, these ones don't need to!)
11. It was noted that there are few bus routes along Princes road to serve school, college and retail facilities, and that further improvements to bus services should be included, for example reductions for season tickets to encourage use.
12. The delivery description should be amended so that the priority for sustainable proposals is equal or greater than the priority for general road proposals. The Draft Document puts road schemes "ASAP" but bus, walking and cycling schemes as "funding dependent". That categorisation should be reversed.

Since deregulation of the bus services the cost of the fare and decisions over routes, timings of services and bus operation is the decision of the operator. Essex County Council is currently investigating the viability of expanding the current Park and Ride in addition to providing extra Park and Ride sites around the town.

13. In the paragraph headed "Pedestrian and Cycling Improvements", there are no pedestrian and cycling improvements. The only such proposal is to move the pedestrian crossing, which would make walking less convenient. The Army & Navy junction is a critical blockage in the town cycle network, so the Action Plan should contain specific schemes to remedy this.

Chelmsford Borough Councils' Local Development Framework makes clear that the expansion of the current cycle network should be pursued. The action plan proposes that Chelmsford Borough Council work with Essex County Council to examine ways of delivering this.

14. Given that it is difficult to, 'get people out of their cars', the Borough and County Councils need to take immediate and effective action to promote car-sharing. It was noted with regret that neither body had given adequate support to the Essex Travelshare scheme that was developed in Chelmsford, judged by a national independent organisation as the best available but abandoned in 2005. Reference was made to such different communities as Rotherham and Totnes, that proudly proclaim themselves as "Car-Sharing Communities" by conspicuous town boundary sign-posting. Essex and Chelmsford Councils should have followed this sort of initiative.

Essex County Council provides a travel planning service that is open to private companies. Chelmsford Borough Council is taking a lead by producing a Sustainable Travel Plan for its staff that is due to be launched in July 2008 pending cabinet approval.

Other Issues

15. Measures are needed to ensure that lorries use the by-passes. In particular, it was noted that Royal mail heavy lorries are conspicuous on this road going north. CBC could work with Royal Mail – and other local vehicle operators – to impose some consideration and discipline on their drivers.

A permanent restriction of HGV movements on Princes Road/Van Diemens Road would not be promoted as it is the County Council's designated HGV route through this area of town. Essex County Council advise that the temporary weight restriction on Widford Bridge during replacement resulted in traffic problems on other routes. It is anticipated that the majority of HDVs are serving the area and would therefore be exempt from restrictions. However, HDV restrictions could be part of a feasibility study for the closure /restricted use of Baddow Road, should this be necessary.

(This is not only a Chelmsford problem, but it was noted that use of SatNav systems by hauliers brings heavy polluting traffic into congested areas. Programmers are clearly not in touch with local conditions. Princes Road and Baddow Road are classic victims of SatNav failings. Local governments need to address this urgently with central government.) In general, there was criticism of unimaginative road engineering and CBC Officers present noted particular examples. These should be addressed as a matter of urgency.

About 60 persons attended the meeting, many as residents in the AQM area. The Trustees of the Chelmsford Environment Partnership (CEP) wish to record their thanks to Dr. Steve Jenkins, Consultant Respiratory Physician at Broomfield Hospital, to Dr. Nathan Pittam, CBC Scientific Officer for Air Quality, and to Anne Culverwell, CBC Principal Environmental Health Officer, for giving up their time to address the meeting and to answer questions.

The difficulties and costs confronting both the Borough and County Councils were appreciated. However, the issue that kept recurring was that the headlong drive for expansion and development in and around the Borough is obviously going to increase road traffic and, consequently, air pollution faster than technical progress can reduce the damaging impact of individual vehicles. It is to be hoped that the County and Borough Councillors who were present would ensure that this uncomfortable fact is made a public issue in the Borough and County. As was said in "The Chelmsford Declaration", the outcome of the European Conference, 'Sustainable Communities', held in the Borough in 2004, local authorities have a duty to educate their citizens about the problems of sustainability and climate change so that they can, together, solve those problems by local action. For example, communities should accept that options such as walking and cycling are the best options for reducing traffic in a growing town.