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APPENDIX


CLIENT PROJECT REPORT CPR1957

Local Air Quality Management Action Plan for the Air Quality Management Area at Newmarket

DRAFT

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Disclaimer

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1	July 2011	First draft	JP/AS	AL
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Executive Summary

This report constitutes the draft action plan for the Newmarket Air Quality Management Area (AQMA) in Forest Heath, Suffolk. The report was prepared by TRL for Forest Heath District Council in fulfilment of the Council's responsibilities under the LAQM system. Forest Heath District Council confirms that it fully endorses the conclusions and recommendations included in this report.

The focus of the action plan is a n area in the town of Newmarket, where an AQMA was declared for annual nitrogen dioxide (NO_2) concentrations for the High Street and Old Station Road in 2009. A further assessment report was submitted to Defra in 2011. This report confirmed the findings of the 2009 detailed assessment and showed that the most significant source of NO_x emissions were from local roads, particularly from cars and heavy goods vehicles. This report constitutes the draft action plan which takes into account comments received as part of the local authority's stakeholder consultation exercise. The report identifies measures to be adopted as part of the formal action plan and sets out how these measures will be monitored.

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1 Introduction

TRL has been commissioned by Forest Heath District Council to produce a draft action plan for the Air Quality Management Area (AQMA) at Newmarket. This action plan has been developed in compliance with the requirements and recommendations outlined in Defra's Local Air Quality Management Policy[1] and Technical[2] Guidance (2009).

The report is structured as follows:

Section 2: Background – provides a brief description of the area and outlines the requirements of the Local Air Quality Management framework and contents of the action plan.

Section 3: Review of policies and documents – summarises key findings from relevant local documents (including the Local Transport Plan), planning documents and climate change policies.

Section 4: Recent monitoring data – overview of 2010 NO_2 concentrations in Newmarket.

Section 5: Source apportionment – reviews the findings of the Newmarket AQMA further assessment report to ensure potential action plan measures target the most important emission sources. Includes an initial investigation of the influence of traffic on specific event days on NO_2 concentrations.

Section 6: Required emission reduction – quantifies the reduction in emissions required for air quality concentrations within the existing AQMA to be compliant with the relevant objective value.

Section 7: Assessment of potential action plan measures – identifies a range of possible measures which could be used to target the key emission sources identified through the source apportionment exercise and highlights those which will be taken forwards for discussion.

Section 8: Action plan consultation – presents the outcome of discussions between Forest Heath District Council (FHDC) and relevant stakeholders.

Section 9: Final action plan measures – list of action plans to be implemented and proposed monitoring of the plan.

[1] http://www.defra.gov.uk/publications/files/pb13566-laqm-policy-guidance-part4-090302.pdf

[2] http://www.airqualityni.co.uk/documents/guidances/5090309_tech-guidance-laqm-tg-09.pdf

2 Background

2.1 Description of area

Forest Heath District Council (FHDC) is located within the county of Suffolk. The district covers 37,398 hectares and in 2009, the population of the district was 62,200. It is estimated that the district will grow by around 4,500 homes and 7,000 jobs by 2021. Most of the growth is expected to be in the major urban areas of Newmarket, Brandon and Mildenhall[3]. This action plan is focused on the market town of Newmarket, which has a population of approximately 15,000 (2001 census data)[4]. Major roads running through the town include the A1304 (High Street and Bury Road) and the A142 (Fordham Road). The A14 bypasses the town centre.

2.2 Local Air Quality Management

Local authorities in the United Kingdom have a statutory duty to review the air quality within their areas and assess concentrations of key air pollutants against the standards and objectives set out in the Air Quality (England) Regulations 2000[5] and the Air Quality (England) (Amendment) Regulations 2002[6]. The UK air quality objectives are summarised in Table A1, Appendix A .

Under Section 83 of the Environment Act 1995, local authorities are required to designate an Air Quality Management Area (AQMA) where air quality objectives are not being achieved or are not likely to be achieved within the relevant time period. Once an AQMA has been declared, Section 84 of the Environment Act 1995 requires the local authority to carry out an assessment and develop an action plan.

2.3 Air Quality Action Plans

Local Air Quality Management Policy Guidance[7] (LAQM PG 09) states that an air quality action plan must include:

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

[3] http://www.suffolk.gov.uk/TransportAndStreets/Policies/LocalTransportPlan.htm
[4] Office for National Statistics http://neighbourhood.statistics.gov.uk/
[5] http://www.legislation.gov.uk/uksi/2000/928/contents/made
[6] http://www.legislation.gov.uk/uksi/2002/3043/contents/made
[7] http://archive.defra.gov.uk/environment/quality/air/airquality/local/guidance/documents/laqm-policy-guidance-part4.pdf

This draft action plan has been produced in compliance with the requirements of LAQM PG 09 and includes: a summary of the most recent monitoring data, a review of the source apportionment exercise completed as part of the further assessment report; quantification of the required emission reduction; consideration of possible action plan measures, including a summary of the outcome of consultation with relevant stakeholders; timescales over which selected measures may be implemented and quantification of the expected impact of selected measures (where possible).

The measures in the action plan have been assessed to determine whether they would trigger a Strategic Environmental Assessment.

3 Review of policies and documents

This section provides a review of recent regional and local policies and documents relevant to air quality in Forest Heath.

3.1 Forest Heath District Council Air Quality Review and Assessment

Under the Local Air Quality Management (LAQM) regime, the council is required to carry out an ongoing process of air quality review and assessment. FHDC's LAQM 2004 annual progress report identified the need to carry out a Detailed Assessment (DA) at Fiveways roundabout on the A11 in Barton Mills for nitrogen dioxide (NO_2) and particulates (PM_{10}). The results of monitoring as part of the DA showed that an Air Quality Management Area (AQMA) did not have to be declared. A second DA was conducted based on the 2007 progress report for Newmarket town centre (FHDC, 2008) which led to an AQMA being declared for annual mean NO_2 for the High Street and Old Station Road around the Clocktower junction in 2009 (see Figure 1). Despite traffic management improvements to this junction, the subsequent Further Assessment (TRL, 2011) confirmed the boundaries of the AQMA.

3.2 Local Transport Plan

Suffolk County Council has responsibility for producing and implementing a Local Transport Plan (LTP) for the region. The 3rd LTP (LTP3) contains a four year plan from 2011-2014 outlining how the Council proposes to address the issues in the "short term" as part of a longer term 20 year strategy[8].

Newmarket is one of the key urban areas specified in the LTP3, for which the county council aim to prioritise investment. The aim for Newmarket is to "support sustainable growth in the town by improving and making more efficient use of the transport network". Measures will focus on congestion and air quality issues around the Clocktower junction. In the short term, the Council has funding of £450,000 for cycle route improvements, traffic management and improving crossings. In the longer term, the county council is considering actions such as:

- Working with the Highways Agency to tackle congestion at the A14/A142 junction
- Minimising car travel associated with new developments (e.g through travel plans, co-locating housing, schools and work)
- Improving the bus station and links to the train station
- Improving rail links including from Ely – Newmarket and Felixstowe – Nuneaton
- Giving priority to buses at busy junctions
- Providing better information to bus passengers (e.g. displays, texting timetables).

3.3 Local air quality strategy

Forest Heath has developed a local air quality strategy (FHDC, 2007) that demonstrates their commitment to improving air quality. The strategy aims to ensure that air quality is considered in wider policy areas (e.g. planning, energy efficiency, climate change, waste management and economic regeneration). The strategy also aims to raise the profile of air quality in the local community including with businesses and other authorities within Suffolk.

[8] http://www.suffolk.gov.uk/TransportAndStreets/Policies/LocalTransportPlan.htm

3.4 Planning policies

Forest Heath's Core Strategy Development Plan Document (DPD) was adopted by the Council on 12th May 2010, and forms part of the Local Development Framework (LDF)[9,10]. Policy CS4 in the strategy requires developers to consider the impact of new buildings on climate change and emissions. Specifically in relation to air quality, the Council is currently consulting on an Air Quality Supplementary Planning Guidance (SPG) with the Suffolk Environmental Protection Group.

3.5 Climate change policies

Forest Heath has signed the Nottingham Declaration on climate change which sets out their commitment to work with the local community and businesses to cut emissions and prepare for the impacts of climate change. The Council's LDF outlines their approach to sustainable development and aim towards zero carbon homes through policy CS4. The Council has also been involved in the Carbon Trust's Carbon Management Plan and is currently reviewing their Climate Change Strategy.

[9] http://www.forest-heath.gov.uk/downloads/file/60/core_strategy_development_plan

[10] The Core Strategy has recently had a legal challenge lodged with the order received in May 2011.

4 Recent monitoring data

Monitoring data for 2010 is presented in the Further Assessment (TRL, 2011) and is reported here for information purposes only. The Council undertook continuous monitoring for a short-term period during 2009 and 2010 using a chemiluminescent analyser at 61 High Street. They also operate a diffusion tube monitoring network at roadside and background locations in the town. The 2010 results are given in Table 1 and locations shown in Figure 1.

Table 1: 2010 NO_2 monitoring results.

Site ID	Site description	Site type	Height (m)	Easting	Northing	Data capture (% of calendar year)	NO_2 concentration ($\mu g/m^3$)
Analyser	61 High Street	R	3.3	564359.00	263385.00	65	36.6*
S27	Newmarket 51 Old Station Road	R	2.1	564710.00	263490.00	100	31.2
S28	Newmarket Sun Lane	B	3.0	564345.00	263340.00	100	22.9
S29	Newmarket 77 High Street (Curries)	R	3.0	564335.00	263342.00	83	37.1
S30	Newmarket Post Office, 134 High Street	R	3.0	564230.00	263275.00	83	**46.0**
S31	Newmarket Memorial Park	B	3.0	564140.00	263300.00	92	17.7
S35	Newmarket taxi rank, 74 High Street	R	3.2	564380.00	263400.00	100	**45.1**
S36	Newmarket Rutland Arms, 33 High Street	R	3.0	564467.98	263456.23	100	38.2
S37	Newmarket Clock tower, 12 High Street	R	3.0	564550.84	263549.13	75	**40.9**

R = roadside, B = background

*The short term data was adjusted by 1.18 based on data from background sites as described in the Further Assessment.

Forest Heath's nitrogen dioxide (NO_2) diffusion tubes are prepared and analysed by Harwell Scientific Services Ltd using the 50 percent triethanolamine (TEA) in acetone method. The bias adjustment factor applied to the 2010 data was taken from Defra's national bias adjustment spreadsheet[11]. For this laboratory, the value for 2010 was 0.85.

Table 1 shows that the annual mean NO_2 objective of 40 $\mu g/m^3$ was exceeded at 3 locations along the High Street. These monitoring sites are all roadside sites, and are not located on relevant properties.

[11] National bias adjustment factors http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

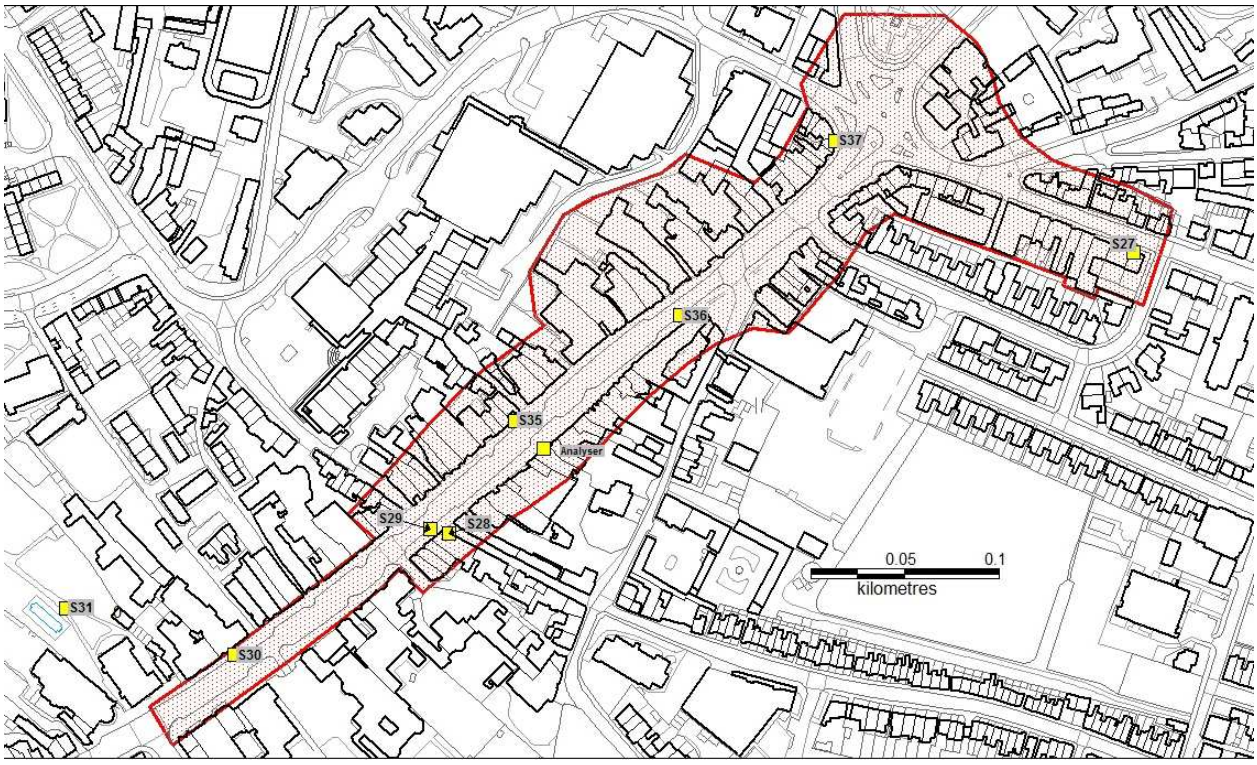

Figure 1: Location of monitoring sites in relation to AQMA (in red).

5 Source apportionment

FHDC's air quality Further Assessment for Newmarket (TRL, 2011) included a source apportionment study to estimate the contribution of sources to NO_x concentrations at each of the modelled receptors. A summary of the results at receptors is given in Figure 2 below.

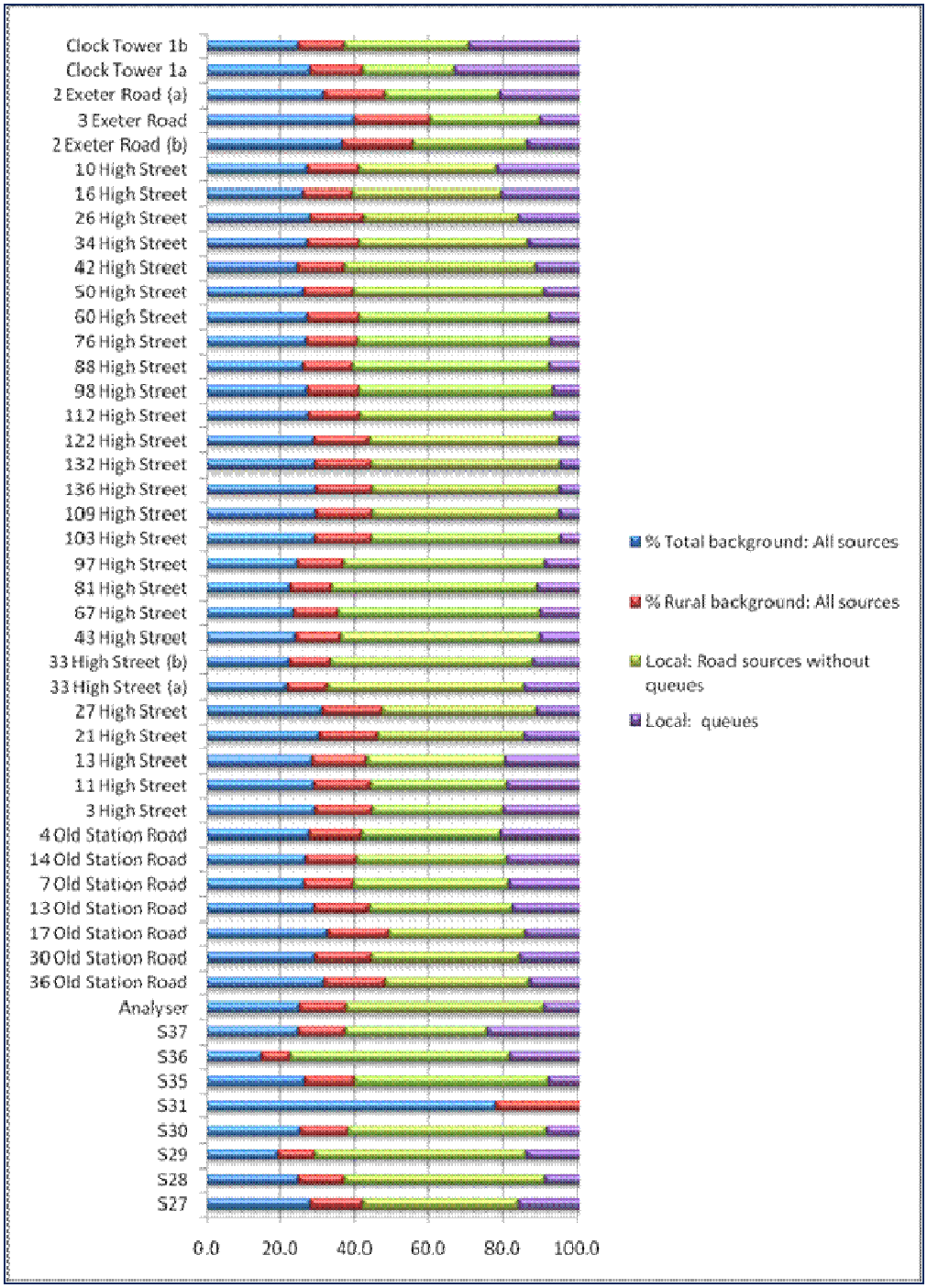

Figure 2: Source Apportionment: Percentage NO_X contribution from background, road and queuing traffic sources.

The findings from this exercise showed that the contribution from local roads is the most significant source of NO_x concentration at many of the modelled receptors (up to 70 percent at some receptors

along the High Street). Of the different vehicle types, the greatest contribution came from HGVs and cars. For example, at 33 High Street, Heavy Goods Vehicles (HGVs) were predicted to contribute 43 percent and cars 22 percent of NO_x concentrations from road traffic. The measures considered as part of this action plan have taken account of these findings and focus on traffic emissions, specifically ways to reduce congestion and queuing and to tackle HGVs and buses.

Levels of traffic flow along certain roads in Newmarket may be substantially increased on certain days each year in response to Newmarket race days, when there may be an increase in HGV traffic (such as Horseboxes) and following major traffic incidents on the A14 as vehicles divert through the town. An initial assessment of NO_2 concentrations at the automatic monitoring site (using meteorological data from Mildenhall) was carried out to determine if there was a relationship between days with such incidents and high levels of pollution. Table 2 provides examples of days with high pollution where there was a particular incident or event. These days generally have South – South West wind directions and low wind speed. Appendix B provides further details of this assessment.

Table 2: Examples of incidents on days with elevated NO_2 concentrations

Selected date	Event	Daily mean NO_2 concentration ($\mu g/m^3$)	Daily mean wind speed (m/s)	Daily mean wind direction (degrees)
28/4/2010	Diversion through Newmarket following incident on A14	57.2	3.9	185 (S)
13/5/2010	Spring weekend racing	54.2	1.5	184 (S)
14/5/2010	Spring weekend racing	90.5	3.3	194 (SSW)
15/5/2010	Spring weekend racing	47.2	3.0	267 (W)
29/5/2010	Spring Bank holiday racing	34.8	4.2	189 (S)
7/7/2010	July festival racing	34.8	5.1	223 (SW)
8/7/2010	July festival racing	36.5	3.1	218 (SW)
9/7/2010	July festival racing	36.0	2.9	218 (SW)
6/8/2010	Summer Saturday racing	45.1	4.2	197 (S)

This initial assessment provides some evidence that there is a correlation between increased traffic flows and higher pollution, on days with poor dispersion conditions. It is therefore suggested that traffic surveys are conducted to better understand traffic flows during race days. This is proposed as one of the action plan measures, as detailed in Section 7.

6 Required emission reduction

This section estimates the degree of improvement needed in order for the NO_2 annual mean objective to be achieved at relevant receptors in the AQMA with the highest modelled NO_2 concentrations.

The modelling undertaken as part of the Further Assessment (TRL, 2011) showed that the highest modelled NO_2 concentrations in 2010 were predicted at receptors located at 33 High Street (Rutland Arms Hotel) and 81 High Street. Table 3 shows that to meet the 40 µg/m^3 objective this relates to a maximum reduction of four percent. However, in terms of describing the reduction in emissions required, it is more useful to consider the reductions in local NO_x emissions. This has been calculated in line with Box 7.2 (amended by the FAQ) in LAQM.TG(09) (Defra, 2009). The results are in Table 3.

Table 3: Required reduction in road NO_x to meet annual mean NO_2 objective at selected receptors.

Receptor	Concentration (µg/m^3)						Road NO_x reduction required for compliance
	Modelled NO_2 (µg/m^3)	NO_2 reduction required (µg/m^3)	Modelled Road NO_x (µg/m^3)	Background NO_x (µg/m^3)	Total NO_x (µg/m^3)	Road NO_x reduction required (µg/m^3)	
33 High St (a)	41.7	1.7	67.9	18.85	86.75	4.85	7%
33 High St (b)	41.0	1	65.9	18.85	84.75	2.85	4%
81 High St	40.7	0.7	65.1	18.85	83.95	2.05	3%

Using Defra's NO_x – NO_2 calculator tool[12], the road NO_x concentration that is required to give a NO_2 concentration of 40µg/m^3 is 63.05 µg/m^3. Therefore the required reductions in road emissions to meet the objective would be seven percent at 33 High Street (a), four percent at 33 High St (b) and three percent at 81 High Street in 2010. These reductions are considered to be relatively small in the context of developing an action plan for Newmarket. Modelling as part of the Further Assessment also showed that the objective is likely to be met by 2012 without any interventions at these receptors (TRL, 2011). However, this prediction should be treated with caution as measured NO2 concentrations have not been declining in line with forecasts based on future emissions from the vehicle fleet.

[12] http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html

7 Assessment of potential action plan measures

7.1 Benchmarking

This section summarises the findings of relevant action plans that have been produced for other town centres of a similar size to Newmarket. The aim of this is to identify examples of good practice and potential measures that could be transferred to Newmarket.

Tewkesbury Borough Council recently consulted on its action plan for the AQMA in the High Street. The action plan recommended two main measures, the first to reduce overall traffic levels by five percent and the second to remove all HGVs greater than 7.5 tonnes in weight. Alternative options such as limiting parking, putting in a bypass, and pedestrianisation were rejected as they were either too costly or not considered to be effective[13].

In Sussex, the town of Lewes has narrow roads which lead to congestion and high NO_x emissions. Measures considered in its recent action plan considered changing the priority of vehicles at traffic signals to reduce queuing, looking at 20 mph zones, bus priority schemes, parking charges and banning freight travel through the town (Lewes District Council, 2009).

Newton Abbott town centre in Teignbridge suffers from a number of air quality hotspots and has properties close to the roadside. The revised action plan considered measures such as Freight Quality Partnerships (FQP), urban consolidation centres outside town to manage deliveries, banning HGVs from the town centre, SCOOT and traffic light signalling changes, better co-ordination of roadworks and redevelopment of the town centre (Teignbridge District Council, 2010).

7.2 Overview of potential measures

This section provides a list of all potential action plan measures that may be suitable for the Newmarket AQMA. The measures focus on the key sources highlighted in the source apportionment exercise and include those already considered by FHDC in the LTP3 and those mentioned through discussions with FHDC's Environmental Health Practitioners, Defra's guidance on good practice and experience from measures introduced in other town centre AQMAs were also taken into account when developing these potential measures.[14]

1. General traffic management measures

1.1 Introduce no-idling zones (e.g. in parking bays along the High Street) with a particular focus on buses, coaches, taxis and delivery vehicles.
1.2 Manage traffic flows approaching Newmarket during traffic incidents on the A14
1.3 Better coordination of traffic signals on the High Street (e.g. through SCOOT system)

2. Traffic management measures focusing on freight vehicles

2.1 Develop a freight goods exchange on the outskirts of Newmarket
2.2 Restrict certain heavy vehicle types accessing Old Station Road and the High Street.
2.3 Impose goods delivery curfews at certain times of the day in the town centre
2.4 Improve signage for goods delivery vehicles accessing Newmarket

[13] http://minutes.tewkesbury.gov.uk/mgConvert2PDF.aspx?ID=11445

[14] http://laqm.defra.gov.uk/action-planning/measures/

3. Traffic management measures focusing on buses

3.1 Re-route buses away from the High Street
3.2 Optimise boarding/alighting times on existing bus services operating on the High Street (e.g. through ticket-less buses).
3.3 Dedicated bus lane running south to north along the High Street
3.4 Give priority to buses at busy junctions

4. Parking restrictions

4.1 Introduce controlled parking restrictions on Old station Road.
4.2 Operate controlled parking restrictions within bays along the High Street
4.3 Introduce on street emission-based parking charges

5. Behaviour

5.1 Carry out an air quality awareness campaign targeting local businesses and residences

6. Planning policy

6.1 Identify Section 106 planning gain opportunities to balance any future air quality impact caused by local development.
6.2 Implement recent air quality SPG for relevant planning applications

7. Modal switch

7.1 Promote cycling and cycle network as part of LTP3 – e.g. distributing leaflets at bike parks, cycle lanes in the town centre
7.2 Encourage walking into Newmarket town centre through walking network and improved pedestrian facilities
7.3 Improve the bus station and links to the train station
7.4 Improve information availability of live bus timetables (e.g. through text services, interactive displays, website)
7.5 Improve rail links from Ely – Newmarket and Felixstowe – Nuneaton

8. Alternative fuels and cleaner fleet

8.1 Install electric vehicle charging points in locations such as in town centre car parks

9. Additional monitoring/surveys

9.1 Implement annual traffic surveys along High Street/Old Station Road
9.2 Carry out automatic vehicle number plate (ANPR) surveys.
9.3 Carry out roadside origin/destination travel surveys to establish levels of local and through traffic
9.4 Conduct traffic surveys to determine influence of race days on traffic
9.5 Continue diffusion tube air quality monitoring. Consider monitoring at façades of properties instead of roadside where feasible.

7.3 Prioritisation of measures

These measures were ranked in terms of their potential costs and indicative benefits to NO_x concentrations according to the rating system in Table 4. Material costs are presented in the table, but these do not take into account affordability, which is a material condition.

Table 4: Cost-benefit analysis rating system.

Cost			**Benefit**		
Amount	Description	Rating	Potential reduction in AQMA NO_x concentrations ($\mu g/m^3$)	Description	Rating
None	Neutral	4	0	Neutral	1
Up to £20,000	Low	3	< 0.5	Low	2
£20,000-200,000	Medium	2	0.5 – 2.0	Medium	3
Greater than £200,000	High	1	>2.0	High	4

Table 5 highlights the rating of each measure and those with a higher overall rating (above 3) could be considered to be priority actions to take forward to consultation. These are outlined below:

1.1 Introduce no-idling zones (e.g. in parking bays along the High Street and around the railway station) with a particular focus on buses, coaches, taxis and delivery vehicles.

1.2 Manage traffic flows approaching Newmarket during traffic incidents on the A14

1.3 Better coordination of traffic signals on the High Street (e.g. through SCOOT system)

2.1 The restriction of certain heavy vehicle types accessing Old Station Road and the High Street.

2.2 Develop a freight goods exchange on the outskirts of Newmarket

3.2 Optimise boarding/alighting times on existing bus services operating on the High Street.

3.3 Dedicated bus lane running south to north along the High Street

3.4 Giving priority to buses at busy junctions

4.1 Introduce controlled parking restrictions on Old Station Road

4.2 Operate controlled parking restrictions within bays along the High Street

6.1 Identify Section 106 planning gain opportunities to balance any future air quality impact caused by local development

6.2 Implement recent air quality SPG for relevant planning applications

7.1 Promote cycling and cycle network as part of LTP3 – e.g. distributing leaflets at bike parks, cycle lanes in the town centre

7.2 Encourage walking into Newmarket town centre through walking network and improved pedestrian facilities

7.3 Improve information availability of live bus timetables (e.g. through text services, interactive displays, website)

7.4 Improve the bus station and links to the train station

7.5 Improve to rail links from Ely – Newmarket and Felixstowe – Nuneaton

9.1 Implement annual traffic surveys along High Street/Old Station Road

9.2 Carry out automatic vehicle number plate (ANPR) surveys.

9.3 Carry out roadside origin/destination travel surveys to establish levels of local verses through traffic

9.4 Conduct traffic surveys to determine influence of race days on traffic.

9.5 Continue diffusion tube air quality monitoring. Consider monitoring at façades of properties instead of roadside where feasible.

8 Action plan consultation

FHDC undertook a process of statutory consultation on the draft action plan during 2012. The local authority hosted a steering group meeting to discuss the options for Newmarket, as given in Table 5,

The outcomes of this meeting for each option are presented in the table and those measures that were considered practicable to be included for implementation in the final action plan are given in Table 6.

A list of the steering group meeting attendees are given below.

- Suffolk County Council - Noise and AQ Manager & Assistant Area Manager
- Suffolk Police
- Suffolk Fire and Rescue
- Forest Heath Local Planning Authority
- Forest Heath Environmental Services - SD Officer, Scientific Officer & Principal EHO
- Health Protection Agency
- TRL Ltd (air quality consultant)
- Newmarket Town Council
- Save Historic Newmarket Action Group
- The Jockey Club
- West Suffolk NHS
- Local business forums
- Forest Heath Economic Development Services
- Highways Agency
- Forest Heath Senior Policy Officer

Table 5: Ranking of potential measures.

Option		Responsibility	Cost rating	Benefit rating	Cost/Benefit rating	Emission reducing effects	Comment	Indicative timescale	Outcome of consultation
1	**Traffic management**								
1.1	No-idling zone with a particular focus on stationary buses, coaches, taxis and delivery vehicles.	FHDC	3	2	6	The benefits of 'no idling zones' are marginal and subject to seasonal variation. However, any reduction in emissions regardless of the magnitude should be pursued.	Council may need Police and Community Support Officers to gain the powers of issuing Penalty Charge Notices (PCNs) to vehicles idling. This measure could focus on stationary parked vehicles.	2015	Will need the Police to enforce provision. Minimal resident and business disruption. Possible completion date 2015.
1.2	Manage traffic flows approaching Newmarket during traffic incidents on the A14	FHDC & HA	1	3	3	Could have quite a large impact on emissions reductions if traffic flows could be pulsed into Newmarket. The idea would be to hold traffic in locations where pollution dispersion is potentially greatest.	This type of approach has been piloted in Leicester City. Although having the desired effect in the City, air quality was adversely affected within the holding area. Options for locations of holding areas were very limited in Leicester. It is acknowledged that the A14 is a designated *emergence route* which may have implications for the application of specific measures.	2015	Not regarded as being practicable due to traffic disruptions and managing incident. The A14 is also a designated emergency route which could be compromised.
1.3	Better coordination of traffic signals on	FHDC	2	3	6	Uncoordinated signals generally increase levels of	Very expensive to implement but can be	2015	Measure has already been implemented.

Option		Responsibility	Cost rating	Benefit rating	Cost/Benefit rating	Emission reducing effects	Comment	Indicative timescale	Outcome of consultation
	the High Street					stop/start traffic activity which increases emissions. By coordinating the signals using Urban traffic Management Controls improvements in emissions and fuel consumption can be gained.	configured to the benefit of pedestrians as well as the traffic. To be effective this measure may need signals to be installed at the top of the High Street.		Minimum resident and business disruption. Possible completion date 2015.
2	**Freight management**								
2.1	The restriction of certain heavy vehicle types accessing Old Station Road and the High Street.	FHDC (possibly HA)	2	3	6	Potential for emissions reductions within the AQMA but this will depend on what vehicles are restricted and the response from operators in terms of exchanging goods to be delivered using compliant vehicle types.	Traffic restriction orders (TROs) would apply. Old Station Road is part of the relief road network in the event of major incidents on the A14. Hence, TROs may be difficult to implement on Old Station Road and perhaps Fordham Road. There may also be implications if restrictions affected the types of vehicles used to transport race horses.	2015	Not regarded as being practicable due to enforcing the restriction and the disruption to businesses. Fordham Road and the High Street are designated emergency routes which could be compromised.
2.2	Develop a goods exchange on the outskirts of Newmarket.	FHDC	1	3	3	Would allow the coordination of goods into Newmarket to be more effectively managed	Could be assisted in association with the local Freight Quality Partnership group. To be	2015	Not regarded as being practicable due to managing the initiative and cost to

Option		Responsibility	Cost rating	Benefit rating	Cost/Benefit rating	Emission reducing effects	Comment	Indicative timescale	Outcome of consultation
						leading to more efficient practices (including using alternative vehicles options) and reduced fuel consumptions.	effective the measure may require developing a low emissions zone in the centre of Newmarket. The measure has the risk of causing anti competitive practices if not effectively managed.		business.
2.3	Goods delivery curfews	FHDC	2	1	2	Quite low in terms of reducing total emissions but would allow the spreading of emissions across the day and so reduce the contribution at peak periods.	Would need the cooperation of business and some form of policing (possibly the issuing of PCNs). May increase noise disturbance during evening periods.	2015	Not regarded as being practicable due to enforcement and cost benefit .
2.4	Improved signage for goods delivery vehicles accessing Newmarket	FHDC	2	1	2	More efficient deliveries can lead to a decrease in emissions by reducing so called 'lost vehicle miles' caused by operators either looking for suitable parking bays or having problems finding delivery points.	This would involve an understanding of issues concerning local goods delivery operators and whether strategic signage could help to improve the situation.	2015	Not regarded as being a significant problem.
3	**Bus management**								
3.1	Re-route buses away from the High Street	FHDC	1	2	2	Routing buses to by-pass the High Street to terminate at the bus		2013	Not regarded as being practicable alternative around

Option		Responsibility	Cost rating	Benefit rating	Cost/Benefit rating	Emission reducing effects	Comment	Indicative timescale	Outcome of consultation
						station. Emissions reductions on the High street would be marginal and there could be a risk of increasing emissions along alternative routes.			Newmarket but may be reviewed at a future date.
3.2	Optimise boarding/alighting times on existing bus services operating on the High Street.	FHDC	2	2	4	Has the potential to decrease emissions from buses and other road traffic by improving the boarding efficiency of passengers accessing services. This option could lead to reductions in congestion and journey times.	This would involve assessing the efficiency of existing bus services including a review of any barriers/constraints to making improvements at bus stops and interchanges. Could also include introducing display messaging and texting.	2013	Not regarded as being a major issue but may be reviewed at a future date.
3.3	Dedicated bus/taxi lane running south to north along the High Street	FHDC	1	3	3	Could have quite a large impact on reducing emissions given the reduction in overall traffic activity	Generally traffic allowed to flow in the opposite direction. Could allow other vehicles to use the bus lane (taxis, delivery vehicles). May be an issue of displaced traffic having to use alternative routes (e.g. S-N route left from High St to Hamilton Road, right turn on to the Rows, Rowley Drive on to Fred	2013	Not regarded as being practicable due to enforcement. There is doubt about how much of the time it would be used. There were further concerns regarding the possible disruption to business due to delivery times.

Option		Responsibility	Cost rating	Benefit rating	Cost/Benefit rating	Emission reducing effects	Comment	Indicative timescale	Outcome of consultation
							Archer Way towards the Clock Tower. There could also be a disbenefit if older buses with high emissions were used on the route.		
3.4	Giving priority to buses at busy junctions	FHDC/SCC	2	2	4	Any reduction in emissions will be marginal and largely dependent on how this priority affects the movement of other road users traversing the junction.	This option does have other wider benefits including improving service efficiency..	2013	Has been identified by Suffolk County for possible action. May be reviewed at a future date.
4	**Parking restrictions**								
4.1	Parking restrictions on Old Station Road	FHDC	2	3	6	Potential to decrease emissions if stop/start traffic activity can be reduced.	This option is designed to improve traffic throughput by removing parked vehicles by installing double yellow lines. May be contentious for local residents, although there is a nearby car park which could be used.	2012	Minimum resident and business disruption. Possible completion date 2013.
4.2	Parking restrictions within bays along the High Street	FHDC	2	3	6	Potential to decrease emissions by reducing parking manoeuvres and	Could cause problems with local traders and provision would need to	2012	Minimum resident and business disruption. Possible

Option		Responsibility	Cost rating	Benefit rating	Cost/Benefit rating	Emission reducing effects	Comment	Indicative timescale	Outcome of consultation
						subsequent cold starting emissions.	be made for disabled access. Given the current tree planting campaign on the High Street this option could allow further enhancements to the current public realm. This would also help when considering more stringent options in the future. Current parking restrictions on the High Street are 2 hours maximum, double yellow lines.		completion date 2013.
4.3	Emission-based parking charges (on-street)	FHDC	1	2	2	Potential to decrease emissions depending on the criteria set for permits.	Has the potential to influence procurement of low emission vehicles by local residents and traders.	2012	Not regarded as being practicable due to the enforcement but may be reviewed at a future date.
5		**Behaviour**							
5.1	Carry out an air quality awareness campaign targeting local businesses and residences	FHDC	4	2	8	Potential to encourage more benign travel options and efficient driving behaviour at all times irrespective of poor air quality events.	This places the ownership of the air quality issue on local residents when the issue is shared with through traffic where the options	2012	No resident or business disruption. Possible completion date 2013.

Option		Responsibility	Cost rating	Benefit rating	Cost/Benefit rating	Emission reducing effects	Comment	Indicative timescale	Outcome of consultation
							are limited.		
6		**Planning policy**							
6.1	Identify Section 106 planning gain opportunities to balance any future air quality impact caused by local development.	FHDC	4	2	8	Potential to mitigate any increase in emissions through various measures. These might involve providing sustainable transport options to and from developments into New Market. It could also include installing long term air quality monitoring stations.	Planning obligations aim to balance the extra pressure from development, with improvements to the surrounding area, in order that a development makes a positive contribution to the local area. Could also include long terms traffic surveys (see option 9)	2012	Cost incurred through new developments. Possible completion date 2013.
6.2	Full adoption of the recent air quality SPG for relevant planning applications	FHDC	4	2	8	Establishes a formal planning control mechanism to appraise the potential air quality impacts of proposed development, especially within or near to existing AQMAs.	Its role is to provide advice to practitioners and developers on what may or may not be acceptable given current air quality issues.	2012	Cost incurred through new developments. Possible completion date 2013.
7		**Modal switch**							
7.1	Promote cycling and cycle network	FHDC/SCC	3	2	6	Potential to reduce emissions depending on the level of modal shift.	Funding in LTP3 to improve cycle route. Creating new routes/network would be longer term.	2012	The project was regarded as being costly. May review at a future date.

Option		Responsibility	Cost rating	Benefit rating	Cost/Benefit rating	Emission reducing effects	Comment	Indicative timescale	Outcome of consultation
7.2	Encouraging walking into Newmarket town centre	FHDC	3	2	6	Potential to reduce emissions depending on the level of modal shift.		2012	No resident or business disruption. Possible completion date 2013.
7.3	Improve information availability of live bus timetables (e.g. through text services, interactive displays, website)	FHDC/Bus operators	1	2	2	Potential decrease associated with increase in bus occupancy and reduced car travel.	Different levels of service through to simply improvements to website to interactive displays at bus stops (e.g. the StarTrack system).	2013	This measure is already being investigated by Suffolk County Council.
7.4	Improve the bus station and links to the train station	FHDC/Bus operator?	1	2	3	Potential decrease in emissions depending on what exactly is being improved upon and what affect this may have on promoting modal shift. Greater benefits if new buses/alternative fuel buses were used.		2013	Considered to be too expensive.
7.5	Improve to rail links from Ely – Newmarket and Felixstowe – Nuneaton	FHDC/SCC/Rail provider	1	2	3	Potential decrease in emissions depending on levels on new passengers using the services and how this translates into traffic reductions in Newmarket.		Not known	Not progressed.
8		**Alternative fuels and cleaner fleet**							
8.1	Installation of electric	FHDC	2	2	4	Potential to decrease	Given the current rise in	2013	Concerns regarding

Option		Responsibility	Cost rating	Benefit rating	Cost/Benefit rating	Emission reducing effects	Comment	Indicative timescale	Outcome of consultation
	vehicle charging points					direct emissions from passenger cars.	the take up of electric vehicles owing to a reduction in capital cost and the increase in road fuels it makes sense for the Council to provide charging points. The Council should be seen to encourage the up-take of all renewables given the Council's obligation to meeting CO2 targets etc.		the evidence to support the proposal. Not progressed.
9		**Additional montioring/surveys**							
9.1	Annual ATC surveys	FHDC	3	1	3	No air emissions benefits, but benefits in terms of improved data to assist the Council in their LAQM work to better model impacts.	These surveys are relatively low cost and would provide more reliable information and long term trends	2012	This measure is already being investigated by Suffolk County Council.
9.2	ANPR surveys	FHDC	3	1	3	The survey will assist the Council in gaining a clear understanding of the nature of the vehicle fleet, in particular the age and type of heavy goods vehicles at specific locations. This allows tailored options to be developed to target the	An evidence-based option to increase the knowledge base. These studies can help to provide a more in depth understanding of emissions profiles and can help explain peaks in air quality monitoring data, for example.	2012	This measure is already being investigated by Suffolk County Council.

Option		Responsibility	Cost rating	Benefit rating	Cost/Benefit rating	Emission reducing effects	Comment	Indicative timescale	Outcome of consultation
						more polluting vehicle types operating in the vicinity of the High Street and Old Station Road.			
9.3	Roadside origin/destination travel surveys to establish levels of local verses through traffic	FHDC	3	1	3	The survey will aim to establish the proportion of vehicles which are local to Newmarket as opposed to those passing through.	This type of survey provides supporting evidence for effective targeting of options.	2012	Expensive and not sure of the need.
9.4	Surveys to assess impact of race days	FHDC	3	1	3	This survey would establish what impact Newmarket race days had on traffic congestion and whether this is significant over the year.	This would help target measures if found to be an issue.	2012	This measure is already being investigated by Suffolk County Council.
9.5	Maintain air quality monitoring	FHDC	3	1	3	Long term data sets to assess trends and impacts of action plan measures. Monitoring on facades of properties rather than roadside would better estimate public exposure.	Useful quantitative data to be used an indicator of progress.	2012	No resident or business disruption. Possible completion date 2012.

9 Final action plan measures

9.1 Measures to be implemented

The consultation phase described in Section 8 did not identify any new or amended measures. Several of the measures were determined to be either too expensive, not practical or not a major issues at present (as outlined in Table 5).

The list of measures included in the final action plan is summarised in Table 6 Information on planned timescales for implementation and relevant indicators are also provided.

Table 6: Action plan measures to be implemented.

Number	Measure	Cost-benefit score	Implementation timescale	Proposed indicator
1.1	No-idling zone	6	2015	Number of complaints and recorded incidences of idling vehicles
1.3	Better coordination of traffic signals on the High Street	6	2015	Changes in traffic flow and speed
4.1	Parking restrictions on Old Station Road	6	2013	Changes in traffic flow and speed
4.2	Parking restrictions within bays along the High street	6	2013	Changes in traffic flow and speed
5.1	Air Quality Awareness Campaign	8	2013	N/A
6.1	Identify Section 106 planning gains	8	2013	Uptake of s106 agreements.
6.2	Adoption of Air Quality SPG	8	2013	Number of applications requiring an air quality assessment.
7.2	Walking Initiative	6	2013	Increase in number of people walking
9.5	Maintain air quality monitoring	3	2012	Changes in measured NO_2 concentrations and progress towards meeting annual mean objective

9.2 Implementation of the action plan

The measures to take forward will be funded from existing budgets or from money from Section 106 agreements if relevant. Progress on the implementation of measures will be provided to Defra on an annual basis as part of FHDC's LAQM review and assessment duties. Table 6 provides proposed

indicators to monitor the progress of each measure where applicable. For example, results from ad hoc traffic surveys, which may be conducted by Suffolk County Council could be used to assess the effectiveness of implementing measures such as better co-ordination of traffic signals and parking restrictions.

9.3 Air quality monitoring

FHDC will continue to monitor air quality within and adjacent to the Newmarket AQMA. The results of the monitoring programme will be used to review the long-term trends in concentrations, to assess the impact of implementing the action plan and progress towards meeting the annual mean NO_2 objective.

References

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TRL (2011). Newmarket Air Quality Further Assessment. Savage, A., Turpin, K, Price J. Client Project Report CPR 1729.

Appendix A UK Air Quality Standards and Objectives

A.1 UK Air Quality Standards and Objectives

Pollutant	Objective	Compliance date
NO_2	Hourly mean concentration should not exceed 200 µg/m^3 more than 18 times a year. Annual mean concentration should not exceed 40 µg/m^3.	31 December 2005
Particulate matter, expressed as PM_{10}	24-hour mean concentration should not exceed 50 µg/m^3 more than 35 times a year. Annual mean concentration should not exceed 40 µg/m^3.	31 December 2004 31 December 2005
Benzene	Running annual mean concentration should not exceed 16.25 µg/m^3.	31 December 2003
	England & Wales: Annual mean concentration should not exceed 5 µg/m^3.	31 December 2010
1,3-butadiene	Running annual mean concentration should not exceed 2.25 µg/m^3.	31 December 2003
CO	Maximum daily running 8-hour mean concentration should not exceed 10 mg/m^3.	31 December 2003
PAHs	Annual mean concentration of B(a)P should not exceed 0.25 ng/m^3	31 December 2010
Lead (Pb)	Annual mean concentration should not exceed 0.5 µg/m/^{3}. Annual mean concentration should not exceed 0.25 µg/m^3.	31 December 2004 31 December 2008
SO_2	Hourly mean of 350 µg/m^3 not to be exceeded more than 24 times a year. 24-hour mean of 125 µg/m^3 not to be exceeded more than 3 times a year. 15-min mean of 266 µg/m^3 not to be exceeded more than 35 times a year.	31 December 2004 31 December 2004 31 December 2005

Appendix B Calendar plots of NO_2 concentrations

The Openair software[15] was used to illustrate days of high pollution, using the calendar plot function for the Newmarket air quality monitoring site and Wicken Fen background monitoring site[16] respectively for 2010 (see Figures B1 and B2). These plots provide a simple visualisation of average NO_2 concentrations for each day. The plots have also been annotated to illustrate the angle of wind direction scaled by wind speed (the longer the arrow the higher the wind speed) on each day.

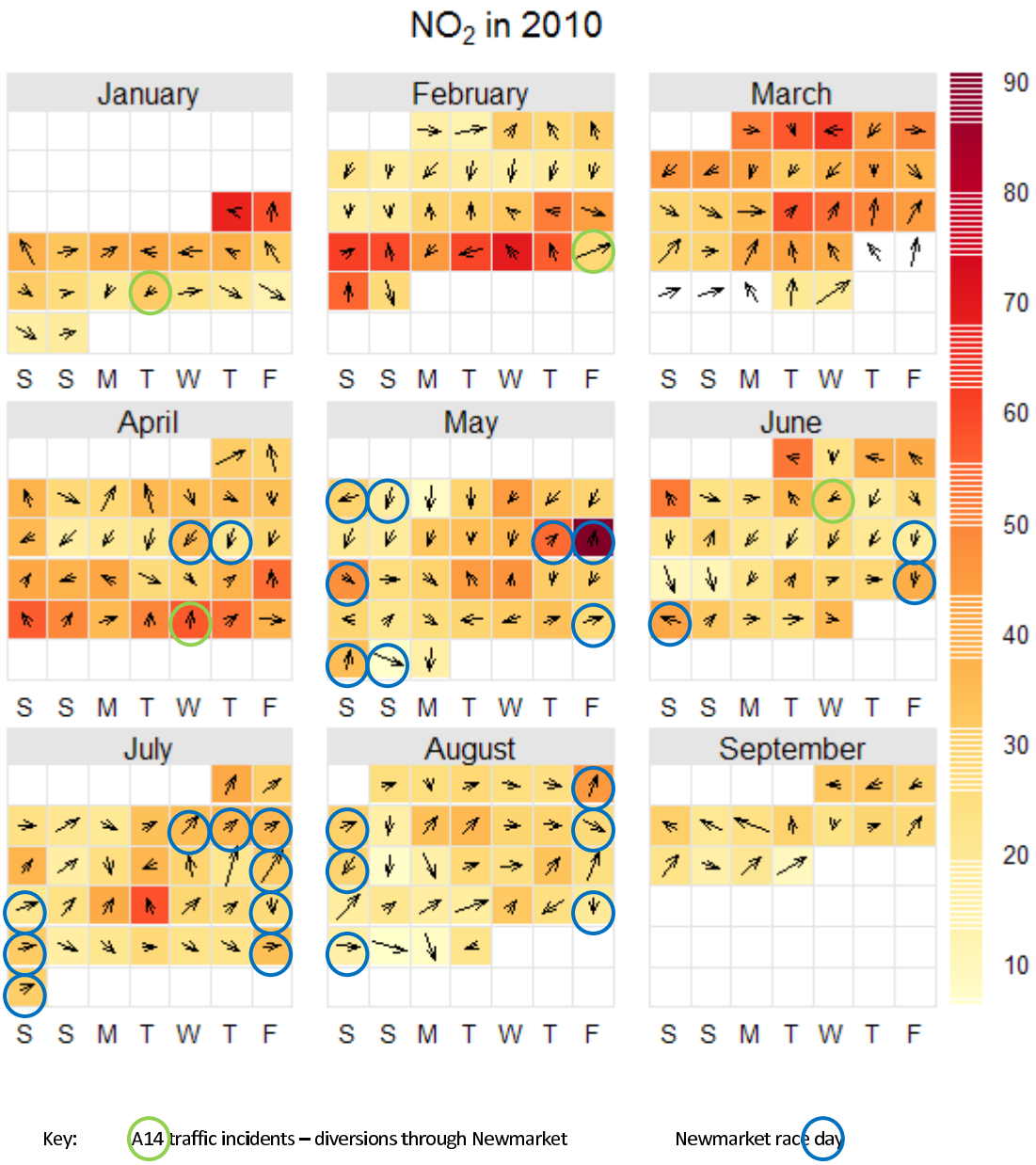

Figure B1. Daily mean NO_2 concentrations shown with wind direction and speed (indicated by length of arrow), Newmarket High Street.

[15] http://www.openair-project.org/

[16] http://uk-air.defra.gov.uk/data/

In Figure B1, the days where there were traffic incidents (green circles) and Newmarket race days (blue circles) are also illustrated. Some of these days have been described in Section 5, which illustrates that there are a few days of the year where high pollution episodes correspond with a race day or traffic incident. This is most notably seen on 13-14th May and 28th April. Typically it is found that high pollution levels on these days are associated with low wind speed (less than 5 m/s) and wind directions between 180-270 degrees (i.e. S-SW). On days with wind speed above 6 m/s (e.g. on May 30th and 16th July), even with elevated traffic, NO_2 concentrations remain low.

Figure B2 illustrates the NO_2 concentrations at a local background site in order to provide a comparison with concentrations at Newmarket. There are noticeably elevated concentrations at the background site in the winter months and some days during the spring and summer where concentrations are slightly elevated, but not to the extent seen on certain days in Newmarket.

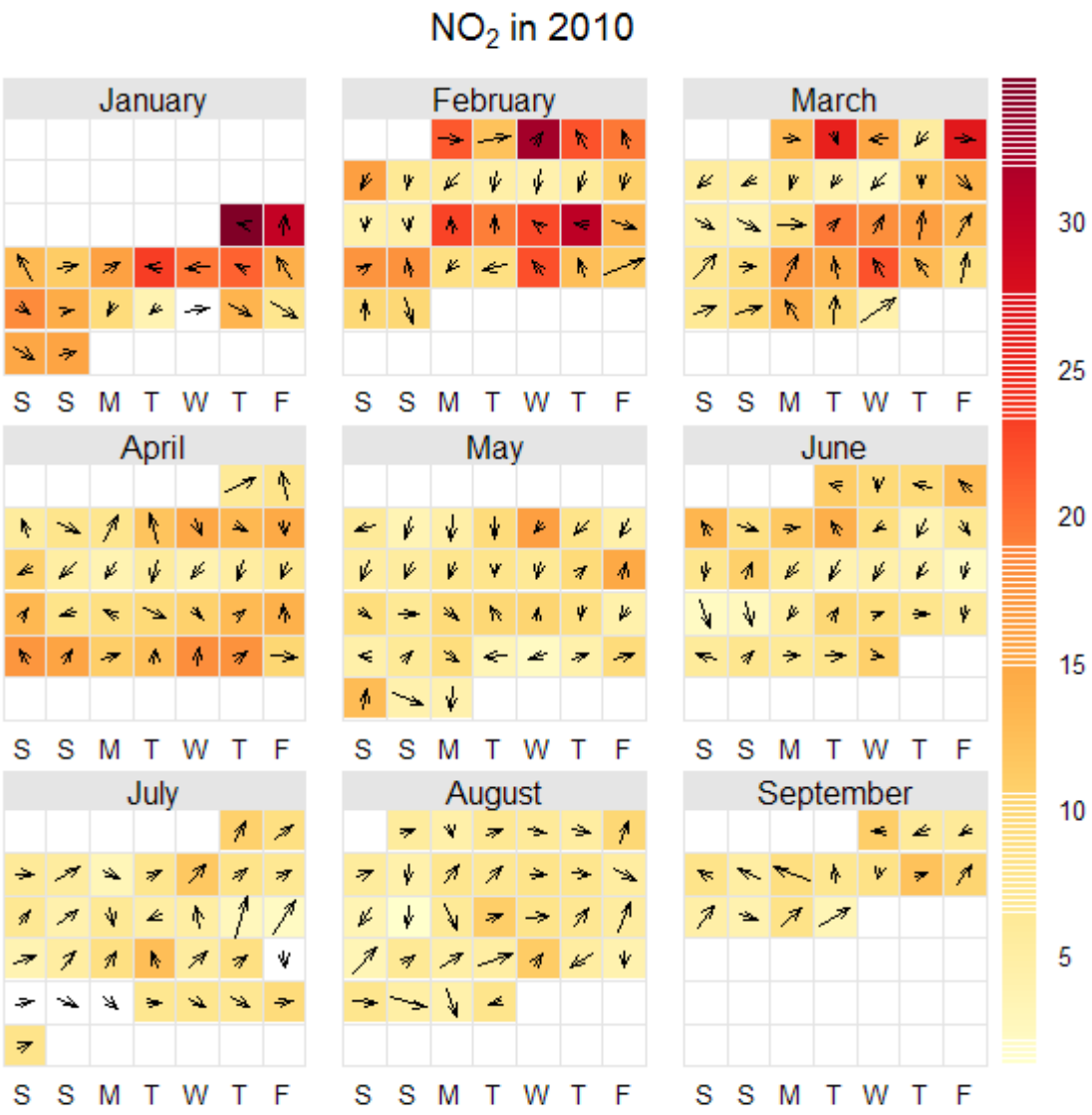

Figure B2. Daily mean NO_2 concentrations shown with wind direction and speed (indicated by length of arrow), Wicken Fen, background monitoring site.