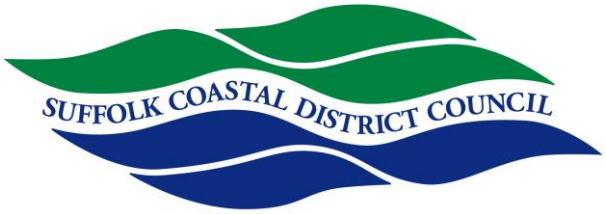

2016 Air Quality Annual Status Report (ASR)

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

December, 2016

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Executive Summary: Air Quality in Our Area

Air Quality in Suffolk Coastal

Clean air is important for our health and for the environment. Air pollution is associated with a number of adverse health impacts and is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2]. The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

The Local Air Quality Management (LAQM) system, as set out in Part IV of the Environment Act 1995, places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedances are considered likely, the local authority must declare an Air Quality Management Area (AQMA) and prepare an Action Plan setting out the measures it intends to put in place in pursuit of the objectives.

In order to fulfil our duties, Suffolk Coastal retains a part-time dedicated air quality officer within the Environmental Protection team – other members of the team also undertake air quality work. Planning applications are assessed for any required air quality input. We have been working in recent years to improve our links with Planning to try and ensure air quality is on the Council's agenda. Links and contacts have been forged, through the Suffolk Air Quality Group, with other Suffolk local authorities, Suffolk County Council (Highways and Public Health), Highways England, Public Health England and the Environment Agency.

Generally, the air quality in Suffolk Coastal District Council is very good and key pollutant levels are within the limits set by Government for the protection of human health. The main source of emissions, within the majority of the district, is road traffic which means that the main pollutants of concern in Suffolk Coastal are nitrogen dioxide and particulate matter. Within the town of Felixstowe, emissions from and associated with the Port of Felixstowe are also a large source of these two pollutants. There are, however, three small localised areas within the district where the national limits set for nitrogen dioxide (NO_2) are exceeded. As such, three AQMAs have been declared;

1) **Several houses on the road junction of Lime Kiln Quay Road, Thoroughfare and St. John's Street in Woodbridge (Woodbridge Junction).** This AQMA was declared in 2006, further details can be seen at https://uk-air.defra.gov.uk/aqma/details?aqma_id=528 An Action Plan was produced in conjunction with Suffolk County Council which includes 20 measures to reduce NO_2 concentrations at this junction. Studies have shown that emissions of NO_2 come from traffic using the junction - both queueing and moving vehicles. It has, however, proven very difficult to confirm using computer modelling what

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

the effectiveness of any 'on the ground' measures in the Action Plan would be. Confirmation of positive impacts of a measure is vital in order that funding can be secured by Suffolk County Council to put a scheme in place. In 2011 a queue detector system (MOVA) was installed in the traffic lights. This system has reduced the extremes of queueing at the junction but did not reduce the NO_2 concentrations in the AQMA.

Recent studies undertaken have shown that the topography of the junction itself is a major factor in the elevated levels seen. The layout of the junction is such that the wind speed is much lower than expected and the wind direction is slightly altered from the norm. The studies suggest that vehicle emissions are being 'funnelled' along Melton Hill away from the junction, and are then dispersed very slowly due to the low wind speeds and canyon like effect of the buildings on both sides. Interestingly, NO_2 concentrations within the AQMA have reduced in 2014 and 2015 but there have been no alterations in traffic flows or make-up and no additional schemes undertaken which would explain this reduction. 2014 and 2015 were, however, both very wet and windy years which may have acted to increase the dispersion of NO_2 away from the properties at the junction thus reducing the recorded concentrations.

In light of the findings of these recent studies it has become apparent that many of the options in the Action Plan prepared for this AQMA are unlikely to have any significant impact on NO_2 levels. The Action Plan is therefore currently being updated by the Steering Group to take account of these findings. The draft Action Plan will be put out for Public Consultation as soon as it is completed.

2) **The Dooley Inn, Ferry Lane, Felixstowe (a single property close to the Port of Felixstowe).** This AQMA was declared in 2009, further details can be seen at https://uk-air.defra.gov.uk/aqma/details?aqma_id=529. The Action Plan for this AQMA was finalised in 2012. Studies have shown that there are 2 main sources of NO_2 impacting on the AQMA – container handling operations on the Port of Felixstowe (including vehicles on roads within the Port boundary) and emissions from heavy duty vehicles on roads outside of the Port boundary. The Action Plan identified 13 measures to be undertaken, and a number of additional measures have also been implemented by the Port of Felixstowe. The Port has been committed to reducing its emissions and has undertaken a vast, and costly, amount of work covering both the main sources of emissions from its site and also from Dock Gate 2 roundabout near to the AQMA.

The emission reduction measures implemented have been so effective that NO_2 concentrations within the AQMA, and at other sites around the Port boundary, have

decreased since 2008. Results collected since 2012 show that concentrations within the AQMA are now below the Objective level and holding steady at 36-37µg/m^3. A Detailed Assessment of the AQMA undertaken in 2015 concluded that it should be revoked. The Department for Environment, Food and Rural Affairs (Defra) confirmed this course of action earlier this year. A full Public Consultation on the AQMA revocation finished on 30th June 2016, the results can be viewed at:
http://www.eastsuffolk.gov.uk/environment/environmental-protection/air-quality/air-quality-consultations/revocation-of-aqma-felixstowe/

The Revocation Order was made for this AQMA on 5th October 2016 and has been uploaded onto the Defra website. The Order has been publicised and a copy is available to view on the Council's website at
http://www.eastsuffolk.gov.uk/assets/Environment/Environmental-Protection/Air-Quality/Felixstowe/Revocation-Order-Felixstowe-05-10-16.pdf Following the making of the Revocation Order, assessment of air quality at this location will continue and the following will be undertaken:

- Monitoring for NO_2 will continue within the AQMA, at locations around the Port of Felixstowe, and along the A14 trunk road at Trimley and Felixstowe.
- Yearly reports containing the monitoring data will continue to be published on the council's website.
- Air Quality will continue to be considered in planning policy and future planning permissions.

3) **The four residential properties within Long Row, Main Road (A12) in Stratford St Andrew.** This AQMA was declared in 2014, further details can be seen at https://uk-air.defra.gov.uk/aqma/details?aqma_id=1036 A Further Assessment was produced in November 2015 which confirmed that vehicles driving on the A12 are the main source of emissions at this location, with 53% of emissions from lorries and buses, 39% from cars and 7% from light duty vehicles. Although 53% of emissions are from lorries and buses they only make up 6% of the traffic flow at this location. Studies undertaken as part of the Further Assessment concluded that a measure should be considered that lessens vehicle acceleration events in the southbound direction (travelling towards Woodbridge) without increasing acceleration in the northbound direction (travelling towards Lowestoft) – essentially allowing a more 'passive' style of driving. The Further assessment also discusses several options which could be considered in order to achieve this result. The Steering Group for this AQMA has been working to finalise the draft Action Plan for approval and Public Consultation and this should be completed by the end of 2016. Whilst the Action Plan is being finalised, work is underway by Suffolk County Council on the legal process for putting the first Action Plan measure in place.

Air Quality Monitoring

NO_2 is currently the only pollutant measured in the district. Measurement is undertaken using 2 different techniques – automatic analyser and diffusion tubes. The automatic analyser is situated at the Woodbridge Junction at the highest recording location. The analyser has been in situ since 2004 and provides detailed air quality information 24-hours a day within this AQMA. Measurements obtained from the analyser show that from 2007 to 2013 NO_2 concentrations at the junction were fairly stable fluctuating between 42 and 45 $\mu g/m^3$, however during 2014 they reduced to 39$\mu g/m^3$ and our most recent 2015 results show a further reduction to 35$\mu g/m^3$.

In 2015 there were 45 diffusion tube monitoring locations within the district in 9 areas; Felixstowe, Kesgrave, Melton, Woodbridge, Martlesham, Little Glemham, Farnham, Stratford St. Andrew and Saxmundham. The specific locations have been chosen following assessments of air quality (past, present and future predicted) and provide us with an indication of any changes at these sites over time.

The 2015 monitoring results show 2 relevant locations where NO_2 is above the objective level, and 1 where it is borderline (within 10% of the objective level - above 36$\mu g/m^3$). The sites above the objective level are both within the declared AQMA at Stratford St. Andrew and the borderline site is within the revoked AQMA at Felixstowe.

Table A.3 in Appendix A shows NO_2 diffusion tube results for the last 5 years across the district and the general trend is one of reduction at the majority of sites.

Actions to Improve Air Quality

There have been a number of actions undertaken during the last year within the district to help reduce air quality emissions and/or provide information to aid us with our air quality plans. Some of the actions are specific to our declared AQMAs and some are more general across the district, the main actions are listed below:

- Meteorological study undertaken within the Woodbridge AQMA to help determine whether there are unusual local conditions, and help us to decide what measures could be put in place to impact on air quality. This study was undertaken following results of air quality modelling which looked at the main 'on the ground' options for this junction. The study determined that the current Action Plan options would all have a negligible impact within the AQMA. The Action Plan therefore needs updating. The Met study concluded that the very nature of the built form and natural geography surrounding the junction has an influence on localised weather patterns. This has resulted in higher than predicted NO_2 concentrations at this road junction. One of the main effects appears to be entrainment of vehicle emissions from the junction in the direction of Melton Hill. The study also showed lower wind speeds at street level which would allow emissions to remain resident for longer periods. Emissions therefore tend to accumulate rather than disperse.
- A trial is being set up with Suffolk County Council (SCC) in Woodbridge to hold traffic further back from the current stop lines and therefore out of the AQMA. This trial is a

conclusion from the above Met study. The trial will initially be for 1 week to determine what influence this has on traffic within Woodbridge. Should the 1 week trial prove that this is feasible, we would be looking to run it for a longer period in order to gather air quality data and determine its effectiveness. The trial is likely to take place in January 2017.

- SCDC has begun working with local schools in Woodbridge to determine which, if any, put significant amounts of traffic through the AQMA. Further work will then be undertaken with any schools that have a significant impact on the junction.
- SCDC new Council Offices site – SCDC will be moving office to Melton in December 2016 and work has been underway to draw up a Travel Plan for the new site. One of its aims is to try and reduce the overall emissions at the junction associated with the current Council site following the move – so that the move will have a positive impact on air quality within the Woodbridge AQMA.
- Production of a Detailed Assessment confirming revocation of the AQMA in Felixstowe, followed by actual revocation of the Felixstowe AQMA Order on 5th October 2016.
- The Port of Felixstowe has undertaken a vast amount of work to effect emission reduction from its site to date. During the last year there have been a number of new projects and associated further emission reductions:

190m extension to berth 9 opened in 2015 with 3 giant electric-powered ship-to-shore gantry cranes delivered mid-2015. The Port has already converted 28 of its rubber-tyred gantry cranes from diesel to electric power and plans to increase this to 54 over the next 2-3 years. Once these are switched over this will see a 30% reduction in diesel use at the Port, and this in turn will provide emission reductions.

The extension to berth 9 has allowed the Port to berth several of the world's largest container ships at once. Due to the number of containers each ship can hold and improved technology giving cleaner emissions the amount of emissions to air per container will be reduced. In addition, The Port has received permission to deepen berths 6 and 7 at the Trinity terminal which will allow greater flexibility when berthing the large ships.

A new daily freight service has been introduced at the Port in 2016 increasing the number of daily services to 33. Felixstowe continues to set new records for the amount of freight handled by rail.

The Port has recently purchased 27 new Internal movement Vehicles (IMVs). They are the first of their type in Europe to be fitted with start/stop engine technology and the latest emission compliant Volvo engines. This is expected to deliver a 10% reduction in emissions compared with a conventional tractor unit.

The Port is also encouraging employees to switch to greener modes of transport to and from work where possible and higher numbers of staff are now cycling to work.

- A Further Assessment has been produced for the AQMA declared at Stratford St. Andrew which includes suggestion of measures to improve emissions in this location. The results have been used to produce a draft Action Plan which is currently being finalised for Public Consultation. In the interim, work is being undertaken with SCC to allow the first measure to be put in place as soon as possible.
- We have been working very hard this past year to improve our links and liaison with the Planning team and raise the profile of air quality within the Council as a whole. We are trying to ensure that all relevant planning applications are assessed for air quality and have been working specifically with a number of larger applications such as Sizewell C Power Station and several housing developments in the town of Leiston.
- We have been both individually, and as a member of the Suffolk Air Quality Group, working closely with SCC Highways Strategic Development and Public Health Teams to both improve our relationships and forge new links, again aiming to raise the profile of air quality within Suffolk. Work has begun on a project with SCC Public Health team to look at ways of reducing emissions of air pollution, particularly $PM_{2.5}$, across Suffolk.

Local Priorities and Challenges

Priorities

We have a number of priorities for the year ahead:

- ❖ to continue monitoring for NO_2 across the district
- ❖ Produce a draft Action Plan for the AQMA at Stratford St Andrew and put this out for Public Consultation
- ❖ Continue working to get the first Action Plan measure for Stratford St. Andrew in place as soon as possible.
- ❖ Produce an updated Action Plan for Woodbridge and put this out for Public Consultation.
- ❖ Undertake the 1-week trial at Woodbridge to move the stop lines back from the traffic lights in order to see whether a longer term trial is feasible
- ❖ Provide input into air quality assessments for Sizewell C planning application
- ❖ Provide air quality input into any planning application submitted for current SCDC Offices site on Melton Hill
- ❖ Continue to assess all relevant planning applications for air quality
- ❖ Implementation of the Travel Plan for the new Council Offices
- ❖ Improve the air quality pages on the Council's website
- ❖ Work to improve general air quality awareness internally within our organisation, externally with other organisations, and with the public.

Challenges

There are a number of challenges that we face in the year ahead:

- ❖ To ensure that the first Stratford St. Andrew Action Plan measure is put in place as soon as possible by SCC and determine its effectiveness.
- ❖ To ensure that the trial to move the stop lines back at the Woodbridge Junction does not impact detrimentally on any properties.

- To try and raise the profile of electric vehicles and aid/promote installation of electric vehicle charge points through the planning system.
- To determine a way forward with SCC Public Health regarding reducing emissions of $PM_{2.5}$ within the district
- Look for ways to gain an improvement in the amount of cycling and walking within the district

How to Get Involved

The main source of air pollution in the Suffolk Coastal district is as a result of increased traffic on our roads. Local residents could help us with the challenge that we face by trying to reduce car usage and drive in a more environmentally friendly manner where possible. Follow this simple checklist to ensure you minimise the impact of your driving:

- **Avoid using your car for shorter journeys** - cold engines create more pollution than fully warmed engines so try not to use your car for short trips. Walk, cycle or take the bus - you might even enjoy it!
- **Care for your car** - check tuning, tyre pressure and fuel consumption - regular servicing helps keep your car efficient and saves fuel.
- **Lighten up** - unnecessary weight increases fuel consumption. Roof racks add drag - an empty roof rack will cost you an extra 5% on fuel costs, a badly loaded roof rack could cost you an extra 30%. What do you have in your boot that you do not really need to carry at all times?
- **Drive gently** - racing starts and sudden stops increase fuel consumption - fast 'Grand Prix' style starts can use up to 60% more fuel than normal starts. Use higher gears when traffic conditions allow.
- **Steady your speed** - at around 50 mph emissions will be lowest, rising dramatically above 70 mph. Up to 30% more fuel is used travelling at 70 mph compared with 50 mph.
- **Switch off when stationary** - if stuck in traffic or stopping for more than a minute. Idling engines make sitting in jams even more unpleasant. Do not run the engine unnecessarily - drive off soon after starting.
- **Fuel efficiency** - When choosing a new car ask about fuel efficiency. A lot of new technologies and fuels claim to be green, or better for the environment. You can check the carbon dioxide emissions and fuel consumption of new cars on the http://carfueldata.direct.gov.uk/ . Most advertisements for new cars also give the carbon dioxide emission and this information will also be available at the showroom.
- **Alternative fuels** - Vehicles that run on alternative fuels are available: LPG (liquefied petroleum gas), electric or hybrid vehicles and there are grants available to help with purchase. Cleaner fuels are becoming more widely available and can save you money and reduce pollution. Look at the Government's http://www.energysavingtrust.org.uk/travel for more information. Details of local electric vehicle charging points can be found at www.zap-

map.com/live/ . The site also provides general information about owning an electric car. The Office for Low Emission Vehicles (OLEV) provide grants for the installation of domestic plugin-charging points and this also results in a deduction from the price of the vehicle at the point of sale by the dealership.

- **Air conditioning** - these and other on board electrical devices increase fuel consumption - only use them when really necessary.
- **Share your journeys** - combine chores on one trip, go shopping with friends or a neighbour, take a colleague to work.
- **Car share** - a number of communities and local authorities are starting car share clubs. Find out more from the http://www.carplus.org.uk/. As part of Suffolk's commitment to reduce congestion and pollution, Suffolk County Council, Suffolk Chamber of Commerce and Suffolk ACRE are working in partnership in association with liftshare to set up https://suffolk.liftshare.com, which is managed by Suffolk ACRE.

Support is also available for businesses in the form of Suffolk County Council grants through a Travel Plan Grant Scheme. The scheme will offer businesses with up to 50% match funding towards the cost and installation of initiatives to support healthier and greener travel in the workplace. The grants have a maximum ceiling of £1000. For more information, and to apply, download an application form at www.greensuffolk.org/travel/travel-plan-support/business-support/ . In the past grants have been given to purchase pool bikes to cut down on short car journeys during the day, and for other facilities such as the creation of secure storage for bicycles.

For further information on national air quality, including the latest news, air pollution forecast, measured levels, interactive monitoring and general information about air pollution, consult the Defra website at http://www.uk-air.defra.gov.uk

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1 Local Air Quality Management

This report provides an overview of air quality in Suffolk Coastal during 2015. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Suffolk Coastal District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of the objectives.

A summary of AQMAs declared by Suffolk Coastal District Council can be found in Table 2.1 below. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=265

We have now revoked the Felixstowe AQMA (see monitoring section).

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
Woodbridge AQMA	NO_2 annual mean	Woodbridge	An area encompassing a number of properties near the junction of Lime Kiln Quay Road, Thoroughfare and St John's Street in Woodbridge.	http://aqma.defra.gov.uk/action-plans/SCDC%20AQAP%202011.pdf
Dooley Inn AQMA **REVOKED 04/10/16**	NO_2 annual mean	Felixstowe	An area encompassing the Dooley Inn Public House on Ferry Lane, Felixstowe.	http://aqma.defra.gov.uk/action-plans/final-aqap-felixstowe-v5-september-2012-for-defra-.pdf
Stratford St. Andrew AQMA	NO_2 annual mean	Stratford St Andrew	The four properties situated within 1-5 Long Row, Main Road (A12), in Stratford St Andrew.	Preparing to go out for Public Consultation on the draft Action Plan

2.2 Progress and Impact of Measures to address Air Quality in Suffolk Coastal District Council

Suffolk Coastal District Council has taken forward a number of measures during the current reporting year of 2016 in pursuit of improving local air quality. Details of all measures

completed, in progress or planned are set out in Table 2.2. More detail on these measures can be found in their respective Action Plans. Key completed measures are:

- Woodbridge - a feasibility study (measure 20) looking at key measures (3, 4, 5, 6 and 21) within the Action Plan for Woodbridge concluded that all would have negligible impact on air quality within the AQMA. The study recommended a 3-month Meteorological investigation to gather additional information and help identify measures (if any) to reduce NO_2 concentrations.

  The Meteorological study concluded that the very nature of the built form and natural geography surrounding the junction has an influence on localised weather patterns. This has resulted in an increase of emissions and concentrations at this road junction. One of the main effects appears to be entrainment of vehicle emissions from the junction towards Melton Hill. The study also showed lower wind speeds at street level which would allow emissions to remain resident for longer periods.

  Interestingly, NO_2 concentrations within the AQMA have reduced in 2014 and 2015 but there have been no alterations in traffic flows or make-up and no additional schemes undertaken which would explain this reduction. 2014 and 2015 were, however, both very wet and windy years which may have acted to increase the dispersion of NO_2 away from the properties at the junction thus reducing the recorded concentrations.

  In light of these findings it has become apparent that many of the options in the Action Plan prepared for this AQMA are unlikely to have any significant impact on NO_2 levels. The Action Plan is therefore currently being updated by the Steering Group to take account of these findings. The draft Action Plan will be put out for Public Consultation as soon as it is completed.
- Woodbridge - feasibility study (measure 20) identified one possible measure which could cause a reduction in NO_2 concentrations - holding traffic further back from the current stop lines and therefore out of the AQMA. A trial is being set up with Suffolk County Council, initially for 1 week, to determine what influence these alterations would have on traffic within Woodbridge. Should the 1 week trial prove that this is feasible, we would be looking to run it for a longer period in order to gather air quality data and determine its effectiveness.
- Woodbridge – SCDC Travel Plan (measure 15c) - SCDC will be moving office to Melton later this year and a Travel Plan has been drawn up for the new site.
- General – MOVA traffic signal technology installed at Melton crossroads (Measure 14). This is allowing the traffic flow through the junction to be maximised thereby reducing queue lengths.

Suffolk Coastal District Council expects the following measures to be completed over the course of the next reporting year:

- Production and consultation on the updated Action Plan for Woodbridge – this will provide a new focus for the future.
- 1-week trial at Woodbridge to move the stop lines back from the traffic lights – this will determine whether a longer term trial is feasible. The longer term trial is required in order to determine impacts on NO_2 concentrations within the AQMA.
- Update of the air quality pages on the Council's website – this will make access to air quality information easier and help to raise the profile.

- Investigations into impacts of local schools on the Woodbridge junction to determine any particular schools that require focussing on.
- Production of a new environmental policy for the Council to aid in reducing emissions during service delivery
- Inclusion of air quality where relevant in the Local Plan site specific allocations document.

Suffolk Coastal's priorities for the coming year are listed below, they are focused on completing/updating the Action Plans and undertaking the necessary Public Consultation for our 2 remaining AQMAs, together with completing the main measure within those plans for each location. We will continue to monitor NO_2 across the district, and input into the Planning system to try and protect the air quality within the current AQMAs together with trying to ensure that additional AQMAs are not created. Raising air quality awareness is also a priority for the Council during the coming year.

- ❖ to continue monitoring for NO_2 across the district
- ❖ Produce a draft Action Plan for the AQMA at Stratford St Andrew and put this out for Public Consultation
- ❖ Continue working to get the first Action Plan measure for Stratford St. Andrew in place as soon as possible.
- ❖ Produce an updated Action Plan for Woodbridge and put this out for Public Consultation.
- ❖ Undertake the 1-week trial at Woodbridge to move the stop lines back from the traffic lights in order to see whether a longer term trial is feasible
- ❖ Provide input into air quality assessments for Sizewell C planning application
- ❖ Provide air quality input into any planning application submitted for current SCDC Offices site on Melton Hill
- ❖ Continue to assess all relevant planning applications for air quality
- ❖ Implement the Travel Plan for the new Council Offices
- ❖ Improve the air quality pages on the Council's website
- ❖ Work to improve general air quality awareness internally within our organisation, externally with other organisations, and with the public.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
Woodbridge AQMA – we are currently in the process of updating the Action Plan for this AQMA											
1	Install queue detectors (MOVA) on traffic signals to reduce queuing at the junction	Traffic Management	UTC, Congestion management, traffic reduction	Suffolk County Council	2009	2011	Reduction in peak queue lengths	10%	Queue length survey 2009. MOVA not functional until June 2011. Post MOVA queue length survey 2013. Monitoring results 2010 – 2014 show NO_2 concentrations have fluctuated at the junction so MOVA has not caused a sustained reduction. No significant changes in traffic flow or % HDV reductions. **Measure to be removed from updated Action Plan as completed.**	2011 MOVA installed 2011. Completed peak queue length counts 2013 **Completed**	Additional studies undertaken suggest it is Meteorological conditions causing the fluctuating readings. Post MOVA queue survey shows average queue lengths have increased on all arms of the junction but that the extremes of queues have been reduced.
2	Install right hand turning lane at lights on Thoroughfare/ Melton Hill arm of junction	Traffic Management	Strategic highway improvements Re-prioritising road space away from cars, including Access management, Selective vehicle priority bus priority, high vehicle occupancy lane	Suffolk County Council	2011-2012	2013 (if Measure 1 not successful)	Reduction in peak queue lengths	5%	Preliminary design prepared - will move carriageway closer to Suffolk Place residential home - may increase emissions here therefore has not been progressed to date. **Measure to be retained in updated Action Plan as 'aspirational'**	2013 Not been progressed to date	This measure was investigated and there appeared not to be enough room at the junction. SCC has advised that this should be left in the Action Plan as it could be looked at again in more detail in the future if there are no other alternatives.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
3	Extension of restrictions to Thoroughfare (8am-6pm)	Traffic Management	Strategic highway improvements Re-prioritising road space away from cars, including Access management, Selective vehicle priority bus priority, high vehicle occupancy lane	Suffolk County Council Woodbridge Town Council	2013 -2014	2014 -2015	Reduction in peak queue lengths on Melton Hill	Recent air quality modelling shows max reduction of 0.1µg/m^3 in AQMA.	Feasibility study undertaken. Negligible impact on AQMA NO_2 conc. so no further work will be undertaken by SCDC on this measure. Woodbridge Town Council are investigating options for enforcing current Thoroughfare restrictions as they are not adhered to – this would have the similar impact. **Measure to remain in updated Action Plan as 'aspirational' for Woodbridge Town Council. Re-word to focus on enforcement of current Thoroughfare restrictions**	Originally 2014-2015 Now unknown possibly 2017 for Town Council to enforce restrictions	Feasibility study shows reduction of only 0.1µg/m^3 in AQMA = negligible. Shows increase in conc. on Lime Kiln Quay Road of 0.5µg/m^3
4	Remove ability to turn right from direction of Melton Hill	Traffic Management	Strategic highway improvements Re-prioritising road space away from cars, including Access management, Selective vehicle priority bus priority, high vehicle occupancy lane	Suffolk County Council	2013 -2014	2014 -2015	Reduction in peak queue lengths on Melton Hill	Recent air quality modelling shows max reduction of 0.1µg/m^3 in AQMA.	Recent feasibility study concluded negligible impact on AQMA NO_2 concentrations. **Measure to be removed from updated Action Plan**.	Originally 2014-2015 Now to be removed from updated Action Plan	Feasibility study shows reduction of only 0.1µg/m^3 in AQMA = negligible. Shows increase in conc. on Lime Kiln Quay Road of 0.5µg/m^3 .

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
5	Relocate the on street parking currently in Melton Hill to opposite side of road	Traffic Management	Other	Suffolk County Council	2012 -2013	2013	Reduction in peak queue lengths of traffic heading away from junction along Melton Hill	Originally estimated at 5% Recent air quality modelling shows negative impact on AQMA	Recent feasibility study showed negative impact on AQMA NO_2 conc. This measure will therefore not be undertaken. **Measure to be removed from an updated Action Plan**	Originally 2013 Now to be removed from updated Action Plan	Feasibility study shows an **increase** in NO_2 concentrations within the AQMA of 0.5µg/m^3.
6	Remove the on street parking currently in Melton Hill	Traffic Management	Other	Suffolk County Council	2012 -2013	2014	Reduction in peak queue lengths of traffic heading away from junction along Melton Hill	Originally estimated at 5% Recent air quality modelling shows max reduction of 0.1µg/m^3 in AQMA.	Recent feasibility study showed negligible impact on AQMA NO_2 conc. **Measure to be removed from updated Action Plan.**	Originally 2013-2014 Now to be removed from updated Action Plan	Feasibility study shows reduction of only 0.1µg/m^3 in AQMA = negligible.
7	Investigate Satellite Navigation (SatNav) system routes around town	Freight and Delivery Management	Other	SCDC	2010	2010	SatNav providers contacted. Peak queue lengths reduced.	1%	Most popular SatNav systems tested, Discussed with SCC who deal with SatNav providers. There are no real options or incentives for providers to alter their systems. **Measure to be removed from updated Action Plan as completed.**	2010 **Completed**	System testing showed some routes are via the junction but majority sent via the bypass. SCC has tried to liaise with SatNav companies in general but we do not have the buy-in locally to influence them.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
8	Bus operators to use cleanest fleet in Woodbridge – contact them to request.	Promoting low emission transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	SCDC	2010	2010	Number of Euro IV buses operating in Woodbridge.	2%	List of bus operators compiled, 3 largest providers contacted. Of companies contacted, all buses maintained regularly so no emission reductions to be gained. Cleanest fleet they own are used in main towns of Ipswich and Norwich. None willing to alter fleet as only very small service operating in Woodbridge. **Measure to be removed from updated Action Plan and replace with Clean Bus Technology Grant bid**	2011 completed original wave of contact.	Investigating a Clean Bus Technology Grant bid - whether larger providers would be interested in being part of a bid.
9	Demand Responsive Transport	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	Suffolk County Council	2009	2009	Increased bus patronage	2%	Scheme in place for the peninsula area (Hollesley, Bawdsey etc) as of 2009. Scheme doing really well and will be retained until at least 2016. DRT has been revamped (June 2016) to help reduce vehicle emissions further. **Measure to be removed from updated Action Plan as complete.**	2009 **Completed**	SCC has been able to provide patronage info for 2012/13 which shows that there were 8,425 individual passenger journeys using Demand Responsive Transport for the Wilford Area and 4,435 for the Alde Area. This will have a positive effect to reduce car usage in the area and hopefully at the junction. DRT is to be revamped - minibuses likely to be at least euro IV rated. Specifying in the contract that a smaller vehicle should be used if the passenger numbers are lower. Where possible the passengers to be linked to an existing bus service to reduce mileage.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
10	Simplified Ticket Scheme	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	Suffolk County Council	2013	2014	None available	1%	Working group set up 2009. The Endeavour Card went live in October 2013 for 16-19 year olds. Business case submitted to roll out adult's smart card – has not been successful. On-line top up facility has not been successful. First buses rolling out 'M tickets'. Discussions for the future regarding contactless payments. **Measure to be removed from updated Action Plan as complete.**	2015 **Completed**	Will have a positive effect to reduce cars using junction, but no real way to measure whether emission reduction target will be reached.
11	Improve accessibility to bus timetable	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	Suffolk County Council	2009	2009	None	1%	Website launched. New leaflets delivered. New style of timetable developed – more accessible and 'stick' style timetables - easier to read. Real time information rolled out in 2014/15 available for some services on smart phone apps. **Measure to be removed from updated Action Plan as complete.**	**2015 Completed**	Will have a positive effect to reduce cars using junction, but no real way to measure whether emission reduction target has been reached.
12	Turban Centre new bus station/ interchange	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	Suffolk County Council	2010 /2011	2012	Opening of new bus shelter.	2%	Design not agreed in time for budget cuts. Funding withdrawn. Bus shelters upgraded December 2012. **Measure to be removed from updated Action Plan.**	2012 **Completed**	May be some positive influence on bus patronage due to new bus shelters. Not possible to predict what reduction in emissions this may give.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
13	Procurement of bus contracts to include fleet upgrade	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	Suffolk County Council	2009	2009 2015	Quality assessment process in place. Buses to be Euro III standard	2%	Quality assessment process in place as of 2009. New Quality Scoring System Jan 2013. First Buses introduced newer buses to meet 2015 accessibility Regulations, mainly EURO III standard. First buses - major refurbishment-engines not upgraded but can carry more people and new style should encourage people onto buses. Average fleet age for First buses has reduced in June 2016 Replaced many older buses with newer. All vehicles now fitted with 'Drive Green' system for driver behaviour. **Measure to be removed from updated Action Plan as complete.**	2015 **Completed**	New low emission vehicles added to SCC's fleet are compliant for the London Low Emission Zone and the London 2012 Olympics. However, impacts on AQMA likely to be very small. Newer vehicles used by First Buses will have reduced emissions.
14	Car sharing scheme	Promoting Travel Alternatives	Workplace Travel Planning	SCDC	N/A	2010 and on-going	Increase in registered users of scheme	2%	No. site users: 2010 = 1,599. 2011 = 1,831. 2012 = 2,334 2013 = 2,338 2014 = 2,396 2016 = 2,556 SCDC website updated. Articles published. Nothing further undertaken. Steering Group decision to **remove from updated Action Plan**	**n/a**	Increased number of users can only have a positive effect.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
15a	Business Travel Plans	Promoting Travel Alternatives	Workplace Travel Plans	Suffolk County Council / SCDC	N/A	2010 - 2011	Businesses contacted. Number of Travel Plans adopted by businesses	2% for 15a,b and c combined	List of businesses in Woodbridge with > 20 employees sent to SCC to contact. SCC funding has now been cut and so this will no longer be possible. Working Group has discussed – unlikely to be progressed due to lack of funding. Commercial Travel Plans to be requested through the Planning System where possible. **Remove from Updated Action Plan**	**n/a**	Investigations show there are not really any large businesses within Woodbridge. Potential to adopt Travel Plans much smaller and any impact from them within Woodbridge also minimal.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
15b	School Travel Plans	Promoting Travel Alternatives	School Travel Plans	Suffolk County Council / SCDC	N/A	2010	Contact schools to remind them about Travel Plan. Contact Woodbridge School re adopting a Travel Plan.	2% for 15a,b and c combined	All schools in Woodbridge historically adopted a Travel Plan. May no longer be in use. Exception is Woodbridge School who may produce one in future – provided information about bus services they run and pupil locations. New footpath on Pytches Road and 30mph 'reduce your speed sign' for Woodbridge CPS users. Postcode plots to be undertaken to identify any schools which may put significant traffic through AQMA. These can then be targeted. Currently awaiting postcode plot breakdown. Postcode plots have not been able to be obtained from SCC to date. **Measure to be re-worded in updated Action Plan**		Will have a positive effect to reduce cars using junction, but no real way to measure whether emission reduction target will be reached. Woodbridge School has identified families who could use the AQMA junction to travel to school. Postcode plots will identify any schools which could potentially be putting significant traffic through the AQMA due to the locations of their students. Specific schools could then be targeted for further work. **Investigate whether any schools have a significant impact on the AQMA junction and work with those to look at reducing car usage.**

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
15c	Travel Plan for the District Council Offices	Business Travel Plans	Promoting Travel Alternatives	SCDC	N/A	2009	Travel Plan adopted Key actions completed	2% for 15a,b and c combined	Travel Plan adopted 2009 Key actions complete 2010. The Council will move offices to Melton. The current site will be used for housing. Investigations beginning - try to ensure overall impact on the junction is positive. Traffic survey of Council Offices undertaken to determine impact on AQMA. Travel Plan drafted for new Council Offices to reduce emissions from Council employees. **Measure to be carried forward into updated Action Plan**	2010 **Completed**	The Council offices are to be moved to Melton. We need to determine what the Council's future impact would be on the AQMA together with impacts from the new use of our current site for housing.
16	Promotion of cycling and walking in Woodbridge			Suffolk County Council	2010	2011/ 2012	None currently	1%	Cycling and walking reviewed. New footpath on Pytches Road and 30mph lit sign to calm traffic and aid walking to school. 5 new cycle racks behind Café Nero and 3 on Market Hill. Sandy Lane cycle scheme implemented. SCC to investigate drawing up a list of possible schemes. Funding could be sought from the Community Infrastructure Levy (CIL). Nothing further progressed by SCC. **Measure will be kept in updated Action Plan as 'aspirational'**	**2015** Draw up a list of schemes	Cycle rack increases and Sandy Lane cycle scheme can only have a positive impact to increase the number of people cycling and reduce the number of vehicles on the road. If we have a list of potential schemes any funding which can be accessed (via Planning system or other) can then be used.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
17	Integration with Planning System	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	SCDC	2010/ 2011	2011	Produce Supplementary Planning Document for Suffolk and consult	1%	Document produced and consultation undertaken. Document finalised. Not adopted formally but historically used as guidance for planning applications. Has now been superseded by EPUK 'Land-Use Planning & Development Control: Planning For Air Quality' No planning applications received related to this AQMA where S106 funding would be appropriate. Working Group joined by members of Planning. Working to more fully integrate with Planning **Updated Action Plan will retain a measure for assessment of planning applications**	2012 / 2013 **Completed SPD**	Document will ensure air quality reports are produced for planning applications when they require one. Unsure how we can measure emission reductions due to this unless application is closely associated with AQMA. Assess as and when relevant application(s) received. S106 and Community Infra-structure Levy (CIL) funding on-going
18	Raise air quality awareness	Public Information	Via the internet and Via Other	SCDC	N/A	On-going	Promotion of air quality and reports on website	N/A	Articles published in local magazines and papers. Air quality reports on the SCDC website. **Updated Action Plan to retain this measure**	On-going	No emission reduction targets possible for this measure although it can only have a positive effect To try and reduce car usage and emissions in the AQMA.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
19	Monitor air quality			SCDC	N/A	On-going	Continue monitoring	N/A	Monitoring on-going. This is not really an Action Plan measure as such. **Remove from updated Action Plan**	n/a	Monitoring is main way to inform us whether Measures are being successful.
20	Undertake identified feasibility studies			SCDC / Suffolk County Council	N/A	2013	Feasibility studies for measures 3, 4, 5, 6 and 21 undertaken	N/A	Feasibility studies for measures 3, 4, 5, 6 and 21 completed. Study indicates that Measure 5 will have a negative impact within the AQMA, Measures 3,4, 6 and 21 will have negligible impact within the AQMA. Recommendations are to site a weather station for 3 months to monitor wind speed and direction, and to also trial holding back the traffic from the lights (and the AQMA) on both Melton Hill and Lime Kiln Quay Rd. Weather station investigations completed 2015/16. **Traffic trial to be included in updated Action Plan.**	**2013/2014 feasibility study completed** **Remove this measure from updated Action Plan**	Feasibility study indicates that Measure 5 will have a negative impact within the AQMA, Measures 3,4, 6 and 21 will have negligible impact within the AQMA. None of the measures will therefore be put forward for completion.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
21	Remove the ability of traffic to go straight on from Melton Hill to Thoroughfare	Traffic Management	Strategic highway improvements Re-prioritising road space away from cars, including Access management, Selective vehicle priority bus priority, high vehicle occupancy lane	Suffolk County Council	2013-2014	2014-2015	Reduction in peak queue lengths on Melton Hill.	Recent air quality modelling shows max reduction of 0.1µg/m^3 in AQMA.	Feasibility study undertaken. Negligible impact on AQMA NO_2 conc. so no further work will be undertaken by SCDC on this measure. Woodbridge Town Council are investigating options for enforcing current Thoroughfare restrictions as they are not adhered to – this would have the similar impact. **Measure to remain in updated Action Plan as 'aspirational' for Woodbridge Town Council. Re-word to focus on enforcement of current Thoroughfare restrictions**	Originally 2014-2015 Now unknown possibly 2017 for Town Council to enforce restrictions	Feasibility study shows reduction of only 0.1µg/m^3 in AQMA = negligible. Shows increase in conc. on Lime Kiln Quay Road of 0.5µg/m^3
Felixstowe AQMA - This AQMA was recently revoked on 5th October 2016. We have decided to include updates on the Action Plan in this year's report for completeness.											
1a	Air Quality Awareness Campaign targeting local businesses using major roads in the area *e.g.* the A14.	Public Information	Other	SCDC	To be considered if the NO_2 conc. increases back above the objectives	n/a	Measured concentrations at The Dooley Inn PH	n/a	Air quality consultations continue to increase awareness in the area amongst businesses and members of the public. Concentrations at the Dooley Inn public House have been below the Objective since 2012.	n/a currently	This measure will only be undertaken if NO_2 concentrations in the AQMA increase above the objectives

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1b	Implement an Environmental Management System (EMS) at the Port. Reduction of emissions from the Port. Incudes employee and tenant education in best practice covering emissions reduction.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Port of Felixstowe	2005	2007-2011	No direct indicator Continued certification to ISO 14001	n/a	EMS Implemented and certified to Port Environmental Review System (PERS) in 2006. EMS certified to ISO14001 from 2011. Delivered training on EMS and individual responsibilities to approx. 200 employees in 2011/12. All new employees given Environmental awareness training. Energy Management system also implemented (EnMS) and certified to ISO 50001	**Completed** and now on-going	-
2a	Engage National / EU / international governments to develop policies which influence port activities to improve air quality.	Policy Guidance and Development Control	Other Policy	SCDC	To be considered if the NO_2 conc. rises back above objectives	n/a	No direct indicator	n/a	None Concentrations at the Dooley Inn public House have been below the Objective since 2012.	n/a currently	Port of Felixstowe agreed; acknowledged that all ports should consider adopting a strategy to overcome competition issues.
2b	Develop a Port action plan which considers the net effect of emissions from processes over a longer term (five year) timescale.	Policy Guidance and Development Control	Low Emissions Strategy	Port of Felixstowe	-	2011 and on-going	Emissions monitoring of NO_2 and SO_2 at the Port (including CO_2 emissions)	n/a	Estimates from the Port's five year carbon reduction plan is an annual reduction of approximately 4000 tonnes CO_2. Plan reviewed annually and now part of energy management system, (EnMS). Plan will be evaluated and re-drawn for a further 5 year period in 2019.	**Completed** and on-going	NO_2 concentrations monitored since 2007 and SO_2 since 2009 at a number of locations, Significant and sustained improvements in this time.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
2c	Identify Section 106 planning gain opportunities to balance any future air quality impact caused by local development.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	SCDC	On-going	On-going	Uptake/ implementation of Section 106 agreements.	n/a	There have been no Planning applications in the area where S106 agreement could be implemented Air quality incorporated into 'shopping list' for Community Infrastructure Levy (CIL). Bids can then be made in the future for air quality projects relating to AQMAs.	On-going	Potential to mitigate increase in emissions. Measures might involve providing sustainable transport options.
3a	Evaluate and implement efficient power technologies (e.g. hybrid-electric) for cargo handling equipment (rubber tyre gantry (RTG) cranes) and internal movement vehicles (IMVs) in the Port.	Promoting low emission plant	Other measure for low emissions fuels for stationary and mobile sources	Port of Felixstowe	On-going	On-going	Power use at the Port	n/a	The Port has purchased 22 ECO-RTGs – 40% reduction in fuel use and therefore emissions. The Port has converted two sections of the Trinity Terminal to accommodate four fully electric RTGs. In 2014 the first 4 diesel/electric RTGs were converted to electric (ERTG) - trial successful. Infrastructure now in place and the programme of electric RTG conversions has continued with 28 in place as of October 2016. The expectation is for a further 6 to be electrified by the end of 2016. The Port plans to increase the numbers in use up to 54 (out of a total of 85) by 2020.	On-going Plan to convert more RTGs over the coming years up to 2020	To mitigate the increase in electricity demand the Port has been progressing energy efficiency projects and renewable energy generation (Solar PV) and are now able to generate 0.5MW of energy from solar power. Once all 54 RTGs are switched over from diesel to electric this will see a 30% reduction in diesel use at the Port.
3b	Retro-fitting fuel saving controls to existing RTG cranes in the Port.	Promoting low emission plant	Other measure for low emissions fuels for stationary and mobile sources	Port of Felixstowe	2011	2011	Power use at the Port	n/a	The Port has carried out retro-fitting of RTGs – and a total of 41 RTGs have had these systems fitted.	**Completed**	Reduction in fuel use of approximately 25% compared to original RTGs.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
3c	Investigate feasibility to convert IMVs in the Port from diesel fuel to liquefied natural gas (LNG).	Promoting low emission plant	Other measure for low emissions fuels for stationary and mobile sources	Port of Felixstowe	On-going	On-going	No direct indicator	n/a	Port has investigated this option. There are issues with net emission savings owing to the practicalities of storing LNG. Using LNG as a primary fuel would require significant investment in infrastructure for gas storage and distribution and would also need to be manned 24/7. At present there are no plans to convert to LNG/CNG but the Port continues to monitor developments	On-going	Possible reductions in NO_X, PM_{10} and CO_2. Difficult to quantity.
3d	Adopt NO_X abatement technologies on IMVs in the Port.	Promoting Low Emission Transport	Company Vehicle Procurement – Prioritising uptake of low emission vehicles	Port of Felixstowe	2010	2011 (ongoing replace-ment plan)	Emissions monitoring of NO_2 and SO_2 at the Port (including CO_2 emissions)	n/a	Originally the Port was going to fit Adblue (selective catalytic reduction) to its IMVs. The focus has changed slightly and instead new IMVs have been purchased to replace the older ones. 34 were replaced in 2011/2012, 22 in 2014 and 27 in 2016. The Port plans to replace a further 28 in 2017. This totals 111 of the 260 units in use on the Port. All new IMVs utilise Adblue as part of exhaust gas recirculation technology and currently comply to Euro IIIa emissions standards. The most recent IMVs purchased (27 in 2016) are fitted with start/stop technology.	On-going	Replacement IMVs comply with Euro IIIa emission standards instead of Euro I standards = reduced emissions. The recently purchased 27 IMVs are fitted with start/stop engine technology and the latest emission compliant Volvo engines. Expected to deliver a 10% reduction in emissions compared with a conventional tractor unit

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
4	Use of a vehicle booking system (VBS) to manage access to the Port.	Freight and Delivery	Delivery and Service Plans	Port of Felixstowe	-	-	Traffic flows (HGVs).	n/a	System implemented, all vehicles now book a time slot to arrive. If they arrive out of their time slot, they are not allowed on to the Port and required to re-book. Strictly enforced.	**Completed** Continues to reduce peak traffic flows	At night (midnight to 7am) can arrive anytime - encourages more deliveries during this quieter period. Traffic flows in and around the Port have changed significantly reducing peak HGV flows.
5a	A state of the art review of air pollution mitigation options being considered in UK, European and non-European ports.	Policy Guidance and Development Control	Low Emissions Strategy	SCDC	2012	2013	No direct indicator Report completed	n/a	TRL commissioned to produce report. Report produced, sent to the Port of Felixstowe and their comments received and detailed in 2013 Progress Report	**Completed**	Comments from the Port of Felixstowe regarding each option confirmed that some are being undertaken and researched already and others are not currently viable. Noted for the future if needed.
5b	Vehicle number plate surveys	Policy Guidance and Development Control	Low Emissions Strategy	SCDC	2011	2011/12	No direct indicator. Can assist in quantifying the impact from articulated HGVs over time if repeated	n/a	Report commissioned and produced 2011/12. Results show activity from the goods yard does not appear to be affecting air quality concentrations at the Dooley Inn to any greater extent than previously thought. Confirms findings of our earlier reports.	**Completed**	-
5c	Developing a Supplementary Planning Document (SPD) – Air Quality.	Policy Guidance and Development Control	Air quality Planning and Policy Guidance	SCDC	2010/11	2012	No direct indicator	N/A	Report completed in 2012, not formally adopted by SCDC but was being used as guidance. Now superseded by EPUK 'Land-Use Planning & Development Control: Planning For Air Quality'. Improved links with Planning to ensure all relevant applications assessed for air quality implications.	**Completed**	Planning control mechanism to appraise potential air quality impacts of proposed development, especially within or near to existing AQMAs.
General measures across the District											

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Redesign and update the air quality section on the Council Website	Public information	Via the internet	Waveney and SCDC	2016	2017	Updated Web page	Unknown	Working party set up to look at website	2017	Discussions have been held that identified this measure as a priority
2	Greener travel information	Public Information	Via the internet	Suffolk County Council	-	Complete	Number of hits	Unknown	Ongoing	On-going	Public information on greener travel. http://www.greensuffolk.org/travel/ Advice on personal, workplace and school Travel Planning
3	Reducing the emissions of the Councils during service delivery via the environmental policy	Control	Sustainable Procurement guidance	Waveney and SCDC	2016	2017	New document to be drafted with the additional focus placed on reducing NO_2 and $PM_{2.5}$ emissions	Unknown	Input from air quality officer and initial meeting with the Council's Sustainability Officer. First draft of document produced.	2017	To ensure that WDC and SCDC show community leadership as well as taking positive steps to reduce emissions
4	Air quality included in the SCDC Local Plan - Site Specific Allocations	Policy Guidance and Development	Air Quality Planning and Policy Guidance	SCDC	2016	2017	Air quality considered in relevant planning applications	Unknown	Consulted on Site Specific Allocation document and recommendations suggested. Public Hearing completed. Proposed Main Modification consultation being undertaken.	2017	To ensure that developments are appropriate and the air quality impacts are adequately assessed.
5	Home working policy	Promoting Travel Alternatives	Encourage/ Facilitate home - working	SCDC	-	On-going	Home –working policy produced	Unknown	Policy in place	**Completed**	Policy in place and the Councils are currently exploring technology options to allow more people to work from home.
6	Promotion of travel alternatives in the Local Plan	Promoting Travel alternatives	Promotion of walking and cycling	SCDC	n/a	n/a	Inclusion in the local plan	Unknown	Local Plan adopted in 2013.	n/a	Includes Strategic Policy SP11 – accessibility to promote the use of travel alternatives and also Development Management Policy DM20 on Travel Plans for developments.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
7	Promotion of travel alternatives for staff	Promoting Travel Alternatives	Promotion of cycling and walking	SCDC	N/A	N/A	Council promotes cycling and walking as a positive alternative form of travel for its staff	Unknown	Staff have been encouraged to use cycles for a number of years.	On-going	New Riduna Park building will have following facilities: Covered cycle parking/racks for 40 bikes, shower/changing/drying facilities. 2 pool biked will be provided initially to see what the usage is like.
8	Travel Plan for new Council Offices at Riduna Park	Promoting Travel Alternatives	Travel plans	SCDC	2016	On-going	Reduction in vehicle trips	Unknown	Final Travel Plan in place ready for the Council Offices move in late November/ early December 2016.	**2016 Completed**	Aim of the plan is to reduce commuting by single occupancy car journey by 10% by 2017, reduce car use for business mileage, and reduce impact from site on Woodbridge AQMA and within Melton. Promoting a car sharing scheme before we occupy the site. Investing in tele and video conferencing facilities to try and reduce mileage. Working from home encouraged. Travel alternatives promoted. Priority parking scheme ready to be implemented should the need arise.
9	Provision of Electric Vehicle charge points and Electric pool vehicle at Riduna Park (new Council Offices)	Promoting Low Emission Transport	Other	SCDC	2016	2017	Use of electric pool car and charge points	Unknown	Currently under construction	On-going	Charging infrastructure to be provided for 2 vehicles and 1 electric pool car to be provided.

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10	Electric Vehicle charge point provision request placed on relevant Planning Consents	Promoting Low Emission Transport	Other	SCDC	2016	2016/17	Number of applicants installing electric vehicle charging points.	Unknown	Electric Vehicle charge point provision request placed on all new residential planning applications.	On-going	Aim is to encourage developers to consider mitigation for emission increases.
11	Construction Dust mitigation condition recommended for relevant Planning Consents	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	SCDC	2016	2016	Number of dust complaints received	Unknown	It is recommended to the planning Department for all relevant planning applications that a Construction Dust Condition is included in the consent	On-going	Aim to increase awareness of construction dust issues for smaller developments. Larger developments will have more awareness of this issue – Conditions will help to focus their mitigation.
12	Suffolk Car share	Alternatives to private vehicle use	Car and lift sharing schemes	Suffolk County Council	-	Completed	Annual increase in users of the site	Unknown	We have been promoting this site as part of the Woodbridge Action Plan since 2010. No. site users: 2010 = 1,599. 2011 = 1,831. 2012 = 2,334 2013 = 2,338 2014 = 2,396 2016 = 2,556 Review number of users in 12 months	On-going	www.suffolkcarshare.com Free web based contact data base.
13	Suffolk Walking Strategy	Promoting Travel Alternatives	Promotion of walking	Suffolk County Council	-	On-going	Reverse the trend of walking less 10% fall in walking between 2003 and 2012 in Suffolk Increase in number of people walking and cycling - DTi Local Area Walking and Cycling Statistics	Unknown	77% of the population of Suffolk are walking at least once a week for a minimum duration of 10 minutes (0.4% above the national average – DFT 2012/13))	2020	Review outcomes at the end of the period

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14	Suffolk Cycling Strategy	Promoting Travel Alternatives	Promotion of cycling	Suffolk County Council	-	2015	Suffolk Delivery Plan	n/a	Cycle towns review complete And the 2015 Suffolk a year of cycling programme launched March 2015 promoting events throughout Suffolk	n/a	Subject to periodic review.
15	MOVA traffic signal technology installed at several junctions within the district	Traffic Management	UTC, Congestion management traffic reduction	Suffolk County Council	N/A	2015	Reduction in traffic congestion	n/a	MOVA system installed to maximise the flow of traffic through these junction.	Complete	MOVA installed at the following junctions: 1. Melton crossroads 2. Beach Station and Langer Road, Felixstowe 3. Garrison Rd and High Rd West, Felixstowe 4. Church St, High St, Chantry Rd and South Entrance

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The Suffolk Air Quality Group, of which Suffolk Coastal District Council is a member, has engaged Suffolk County Council (SCC) Public Health and Protection in order to move forward together with regard to $PM_{2.5}$. A meeting with the SCC Consultant in Public Health in September 2016 allowed discussions to begin. SCC will be pulling together Suffolk wide information on items that will impact on $PM_{2.5}$ by reducing the use of motor vehicles, such as cycling and walking. This is with a view to identify areas where improvements are needed so that we can focus our efforts. This will not only assist with air quality but also with the more general health agenda – getting people to take more exercise. Details of progress will be included in future ASR's.

Officers from Suffolk Coastal and Waveney District Councils (East Suffolk) have, in addition, met with the Suffolk Health and Wellbeing Board representative to improve general knowledge with regard to air quality and begin to forge links for the future.

The Suffolk Air Quality Group also aims to consider the use of planning conditions to require measures to control emissions of Particulate Matter during demolition and construction. Actions will be reported in future ASRs.

Suffolk Coastal District Council is taking the following more specific measures to address $PM_{2.5}$:

- Action Plan measures for the Woodbridge AQMA set out in table 2.2 will aid to reduce $PM_{2.5}$ emissions, in addition to NO_2, within Woodbridge. Measures can be split into 2 groups those that will impact at a local level;
  Measure 3 – traffic restrictions to Thoroughfare will aid to reduce congestion at this junction
  Measure 15b – School travel, identify schools that contribute to emissions at the junction and work with them to reduce car usage
  Measure 15c – Travel Plan for the District Council offices
  Measure 16 – Promotion of walking and cycling in Woodbridge
  Measure 21 – reconfigure the junction to reduce queuing traffic

  and those that will impact more widely, often across the entire district;
  Measure 15c – Travel Plan for the District Council offices
  Measure 17 – Better integration of air quality in the Planning system
  Measure 18 – raising air quality awareness through better website, press releases, publicity.

- Emission reduction measures being undertaken by the Port of Felixstowe, set out in Table 2.2, both within the Action Plan and in addition to it will aid to reduce emissions of $PM_{2.5}$. The following actions will give reductions within the vicinity of the Port and also along the main access routes both locally and further afield (A14 trunk road);
  Measure 1b – Environmental management System in use at the Port
  Measure 2b – Port Action Plan to consider emissions over the long term
  Measure 3a – Efficient power technologies fitted to Rubber-Tyred Gantry cranes (RTGs) – ECO-RTGs and electric RTGs now in use
  Measure 3b – Retro-fitting of RTGs to reduce emissions
  Measure 3d – Abatement technologies fitted to Internal Movement Vehicles
  Measure 4 – Vehicle Booking System implemented to reduce local congestion

- There are a number of measures (included within the general measures section of Table 2.2) specific to the District Council which will reduce $PM_{2.5}$ emissions both locally to the current and new Council Offices and more widely across the district;
  Measure 1 – redesign and update air quality on the Council website
  Measure 3 – reducing the emissions of the Council during service delivery
  Measure 5 – Home Working Policy
  Measure 7 – promotion of travel alternatives for staff
  Measure 8 – Travel Plan for the new Council offices in Melton
  Measure 9 – Provision of electric vehicle charging points and electric pool vehicle at the new Council offices.

- Reductions in $PM_{2.5}$ emissions are also targeted by the following measures related to Planning within the District Council;
  Measure 4 – air quality has been included in the Local plan site specific allocations consultation looking at future development sites.
  Measure 6 – the Local Plan promotes travel alternatives for the district which aims to reduce emissions from motor vehicle use.
  Measure 10 – Electric vehicle charge point provision request is being placed on all new residential planning applications
  Measure 11 – Construction dust mitigation condition is being recommended for all relevant planning consents

- The Suffolk Walking and Cycling strategies produced by Suffolk County Council (measures 13 and 14 within Table 2.2), the provision of Greener Travel Information (measure 2) and the Suffolk car and lift sharing scheme (measure 12) aim to increase the number of people walking, cycling and using greener travel methods within the district. This has strong links with the Public Health Outcomes Framework in terms of improving the health and wellbeing of the population as well as improving local air quality.

- The County Council has installed traffic signal technology (MOVA) at a number of busy and congested roads junctions within the district (Measure 15) and there are plans for further junctions to be fitted with this system also. Traffic signal technology will allow a junction to operate in the most efficient way thereby reducing congestion

and vehicle idling and therefore emissions of both Oxides of Nitrogen (NOx) and Particulate Matter.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with the Objectives.

Suffolk Coastal District Council undertook automatic (continuous) monitoring at 1 site in Woodbridge during 2015. Table A.1 in Appendix A shows the details of the site.

A map showing the location of the monitoring site is provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Suffolk Coastal District Council undertook non-automatic (passive) monitoring of NO_2 at 49 sites during 2015. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for "annualisation" and bias. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2015 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

The results from the continuous analyser, located at a relevant receptor within the Woodbridge AQMA, shows the 2015 annual mean NO_2 concentration at 35µg/m^3 to be within the objective for the second year running. The 1-hour objective is set at 200µg/m^3 not to be exceeded more than 18 times per year. During 2015 there were 5 exceedances of 200µg/m^3 recorded, which is within the objective level.

The results from diffusion tube monitoring show that there are 5 sites across the district with annual mean concentrations above the objective level of 40µg/m^3 in 2015. Three of these sites in Felixstowe (FLX 33, 34 and 37) are not located at relevant receptors - they are in place to determine concentration gradients along Ferry Lane and there is therefore no need to consider them further. The remaining 2 sites above the objective level are at relevant receptor locations and both are located within the AQMA declared at Stratford St. Andrew.

There is 1 site which is classed as 'borderline' (any site above 36µg/m^3 and therefore close to, but not above, the objective). This is at a relevant receptor location within the AQMA at Felixstowe.

Monitoring results at locations within the declared AQMA at Felixstowe have been within the objective level for 4 years now. A Detailed Assessment undertaken in 2015 concluded that the AQMA should be revoked. Defra confirmed this course of action earlier in 2016. A full Public Consultation on the AQMA revocation finished on 30th June 2016, the results of which can be viewed at
http://www.eastsuffolk.gov.uk/environment/environmental-protection/air-quality/air-quality-consultations/revocation-of-aqma-felixstowe/
The Revocation Order was made on 5th October 2016 and has been publicised.

There are no instances of the annual mean exceeding 60µg/m^3 in 2015 in the Suffolk Coastal district and therefore the risk of exceeding the 1-hour objective at any locations is very low.

3.2.2 Particulate Matter (PM_{10})

PM_{10} is not monitored within the Suffolk Coastal district.

3.2.3 Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ is not monitored within the Suffolk Coastal district.

3.2.4 Sulphur Dioxide (SO_2)

SO_2 is not monitored within the Babergh or Mid Suffolk districts.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
WBG	Woodbridge	Kerbside	627596	249261	NO_2	Y	Chemiluminescent	0	1	2.6

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
FLX 12	Felixstowe 12	Roadside	630363	234890	NO_2	N	0	5	N	2.3
FLX 14	Felixstowe 14	Industrial Site	628604	232847	NO_2	N	0	n/a	N	2
FLX 17	Felixstowe 17	Roadside	628817	236323	NO_2	N	0	31	N	2
FLX 20	Felixstowe 20	Industrial / Roadside	628669	233979	NO_2	N	10	54	N	2
FLX 21	Felixstowe 21	Urban Background	629253	234431	NO_2	N	n/a	n/a	N	2.3
FLX 22	Felixstowe 22	Industrial	629172	233446	NO_2	N	0	n/a	N	1.8
FLX 23	Felixstowe 23	Roadside	628542	236592	NO_2	N	0	25	N	2
FLX 24	Felixstowe 24	Roadside	628358	234634	NO_2	N	2.5	32	N	2.5
FLX 26 a,b,c	Felixstowe 26	Industrial / Roadside	627959	234246	NO_2	N	0	13	N	3.4

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
FLX 27 a,b,c	Felixstowe 27	Industrial / Roadside	627960	234238	NO_2	N	0	23	N	2.8
FLX 29	Felixstowe 29	Industrial	628712	232892	NO_2	N	0	n/a	N	2
FLX 31	Felixstowe 31	Industrial	628640	232795	NO_2	N	0	n/a	N	2
FLX 32 a,b,c	Felixstowe 32	Industrial	627971	234242	NO_2	N	0	18	N	2
FLX 33	Felixstowe 33	Roadside	627884	234238	NO_2	N	n/a	5	N	1.75
FLX 34	Felixstowe 34	Industrial / Roadside	627934	234257	NO_2	N	n/a	3	N	1.9
FLX 35	Felixstowe 35	Industrial / Roadside	627959	234258	NO_2	N	10	3	N	1.8
FLX 36	Felixstowe 36	Industrial / Roadside	627989	234279	NO_2	N	n/a	3	N	1.9
FLX 37	Felixstowe 37	Industrial / Roadside	628012	234272	NO_2	N	n/a	3.5	N	1.65
FLX 38	Felixstowe 38	Industrial / Roadside	628130	234280	NO_2	N	n/a	1.5	N	1.65

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
FLX 39	Felixstowe 39	Roadside	628760	236071	NO_2	N	0	11	N	1.6
MEL 5	Melton 5	Roadside	628614	250417	NO_2	N	1	3.6	N	1.9
MEL 7	Melton 7	Roadside	628180	250483	NO_2	N	0	0.3	N	1.7
KSG 9	Kesgrave 9	Roadside	621680	245796	NO_2	N	27	2.6	N	1.9
WBG 1 a,b,c	Woodbridge 1	Kerbside	627596	249261	NO_2	Y	0	1.3	Y	2.4
WBG 3	Woodbridge 3	Urban Background	626997	248488	NO_2	N	n/a	n/a	N	1.9
WBG 5	Woodbridge 5	Roadside	627604	249243	NO_2	N	0	2.5	N	2.3
WBG 6	Woodbridge 6	Roadside	627593	249255	NO_2	Y	0	2	N	2.2
WBG 8	Woodbridge 8	Roadside	627601	249283	NO_2	Y	0	3	N	2.4
WBG 10	Woodbridge 10	Roadside	627570	249240	NO_2	N	1	2	N	2.1

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
WBG 12	Woodbridge 12	Roadside	627664	249203	NO_2	N	0	5	N	1.8
WBG 13	Woodbridge 13	Roadside	627585	249239	NO_2	N	5	2.5	N	1.9
WBG 15	Woodbridge 15	Roadside	627590	249249	NO_2	Y	0	2	N	2.5
WBG 17	Woodbridge 17	Roadside	627614	249271	NO_2	N	0	7	N	1.9
WBG 18	Woodbridge 18	Roadside	627627	249339	NO_2	N	0	1.5	N	2.2
WBG 20	Woodbridge 20	Roadside	627604	249295	NO_2	Y	0	1.5	N	1.5
WBG 22	Woodbridge 22	Roadside	627633	249233	NO_2	N	0	8	N	1.2
WBG 23	Woodbridge 23	Kerbside	627562	249235	NO_2	N	1	1	N	2.1
MRT 1 a,b,c	Martlesham 1	Roadside	624633	245447	NO_2	N	0	21	N	1.7
MRT 2	Martlesham 2	Roadside	624499	245777	NO_2	N	0	65	N	1.6

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
LGM 1	Little Glemham 1	Roadside	634203	258820	NO_2	N	0	19	N	1.45
FAR 1	Farnham 1	Roadside	636273	260134	NO_2	N	0	3	N	1.75
FAR 2 a,b,c	Farnham 2	Roadside	636274	260120	NO_2	N	0	2	N	1.90
STA 1 a,b,c	Stratford St. Andrew 1	Roadside	635753	260002	NO_2	Y	0	2	N	1.60
STA 2	Stratford St. Andrew 2	Roadside	635732	259995	NO_2	N	n/a	1.7	N	1.80
STA 6	Stratford St. Andrew 6	Roadside	635794	260042	NO_2	N	0	7	N	1.30
STA 7	Stratford St Andrew 7	Roadside	635736	259984	NO_2	N	14	1.9	N	1.65

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
STA 8	Stratford St Andrew 8	Roadside	635743	259992	NO_2	Y	0	2	N	1.6
SAX 1	Saxmundham 1	Roadside	638683	263014	NO_2	N	0	1	N	1.8

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential 0property).

(2) N/A if not applicable.0

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2011	2012	2013	2014	2015
WBG	Kerbside	Automatic	96.3	96.3	**42**	**44**	**42**	39	35
FLX 12	Roadside	Diffusion Tube	100	100	33	30	28	25	26
FLX 14	Industrial Site	Diffusion Tube	100	100	25	25	25	22	23
FLX 17	Roadside	Diffusion Tube	100	100	28	24	25	23	22
FLX 20	Industrial / Roadside	Diffusion Tube	100	100	26	23	22	21	22
FLX 21	Urban Background	Diffusion Tube	100	100	25	22	22	19	21
FLX 22	Industrial	Diffusion Tube	100	100	25	23	22	20	21
FLX 23	Roadside	Diffusion Tube	100	100	29	26	28	27	26
FLX 24	Roadside	Diffusion Tube	100	100	31	28	28	27	26
FLX 26 a,b,c	Industrial / Roadside	Diffusion Tube	100	100	**40**	36	37	36	37
FLX 27 a,b,c	Industrial / Roadside	Diffusion Tube	100	100	36	33	32	32	31
FLX 29	Industrial	Diffusion Tube	100	100	25	23	22	20	22
FLX 31	Industrial	Diffusion Tube	100	100	27	26	25	23	26
FLX 32 a,b,c	Industrial	Diffusion Tube	100	100	37	34	32	29	32
FLX 33	Roadside	Diffusion Tube	100	100	**66**	**60**	**58**	**55**	**54**

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2011	2012	2013	2014	2015
FLX 34	Industrial / Roadside	Diffusion Tube	100	100	**51**	**46**	**42**	**45**	**42**
FLX 35	Industrial / Roadside	Diffusion Tube	92	92	**48**	**44**	**41**	**43**	39
FLX 36	Industrial / Roadside	Diffusion Tube	100	100	**41**	37	36	36	~
FLX 37	Industrial / Roadside	Diffusion Tube	100	100	**48**	**43**	**41**	**42**	**41**
FLX 38	Industrial / Roadside	Diffusion Tube	100	100	39	34	32	33	~
FLX 39	Roadside	Diffusion Tube	100	100	~	~	21	28	23
MEL 5	Roadside	Diffusion Tube	100	100	31	31	29	28	27
MEL 7	Roadside	Diffusion tube	100	100	~	~	~	~	25
KSG 9	Roadside	Diffusion Tube	100	100	34	31	28	29	28
WBG 1 a,b,c	Kerbside	Diffusion Tube	100	100	**42**	**44**	**41**	39	36
WBG 3	Urban Background	Diffusion Tube	100	100	16	15	14	13	12
WBG 5	Roadside	Diffusion Tube	100	100	25	26	26	22	20
WBG 6	Roadside	Diffusion Tube	100	100	37	**40**	38	35	33
WBG 8	Roadside	Diffusion Tube	100	100	38	**43**	30	33	31
WBG 10	Roadside	Diffusion Tube	100	100	31	31	30	29	26
WBG 12	Roadside	Diffusion Tube	83	83	24	25	23	21	21
WBG 13	Roadside	Diffusion Tube	100	100	33	36	35	31	29
WBG 15	Roadside	Diffusion Tube	100	100	39	**42**	**41**	37	33
WBG 17	Roadside	Diffusion Tube	100	100	28	28	27	25	23

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
WBG 18	Roadside	Diffusion Tube	100	100	32	34	35	34	27
WBG 20	Roadside	Diffusion Tube	100	100	~	~	31	32	30
WBG 22	Roadside	Diffusion Tube	100	100	21	22	22	20	16
WBG 23	Kerbside	Diffusion Tube	100	100	28	26	25	25	23
MRT 1 a,b,c	Roadside	Diffusion Tube	100	100	24	21	21	22	24
MRT 2	Roadside	Diffusion Tube	100	100	~	~	~	16	~
LGM 1 a,b,c	Roadside	Diffusion Tube	100	100	17	14	15	14	13
FAR 1 a,b,c	Roadside	Diffusion Tube	100	100	29	26	29	27	24
FAR 2 a,b,c	Roadside	Diffusion Tube	100	100	33	31	31	29	30
STA 1 a,b,c	Roadside	Diffusion Tube	100	100	**43**	**42**	**41**	**42**	**43**
STA 2	Roadside	Diffusion Tube	100	100	~	~	27	25	28
STA 6	Roadside	Diffusion Tube	100	100	~	~	24	23	24
STA 7	Roadside	Diffusion Tube	100	100	~	~	34	30	34
STA 8	Roadside	Diffusion Tube	100	100	~	~	~	~	**44**
SAX 1	Roadside	Diffusion Tube	92	92	~	~	~	27	29

Notes: Exceedances of the NO_2 annual mean objective of $40\mu g/m^3$ are shown in **bold**.

NO_2 annual means exceeding $60\mu g/m^3$, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2011	2012	2013	2014	2015
WBG	Roadside	Automatic	96.3	96.3	0	1	0	0	5

Notes: Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 90%, the 99.8th percentile of 1-hour means is provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2015

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
FLX 12	41.6	37.6	31.6	28.4	26.4	26.8	29.9	25.8	28.4	34.2	46.4	29.1	32.2	26
FLX 14	43.6	29.2	26.9	27.1	25.4	23.6	26.7	24.2	30.4	32.7	31.5	22.9	28.7	23
FLX 17	33.9	30.8	29.2	25.4	23.4	22.5	21.4	25.6	26.7	29.5	29.9	27.6	27.2	22
FLX 20	38.1	31.7	31.1	18.7	24	21.6	22.2	25.2	24.3	23.9	35.7	28.5	27.1	22
FLX 21	36.5	36.6	26.1	24.4	20.1	18.6	19.9	21.2	23.6	24.3	33.4	25.8	25.9	21
FLX 22	37.8	33.2	28.7	24.7	20.6	19.4	21.8	21	24.8	23.6	31.4	22.8	25.8	21
FLX 23	31.2	31.3	38.8	39.5	26.6	27.9	21.0	28.8	38.7	41.8	27.6	25.1	31.5	26
FLX 24	47.7	42.7	33.6	30.2	30.9	20.2	30.3	24.2	30.2	33.7	39.6	25.3	32.4	26
FLX 26a	62.6	42.3	54.1	45	43.6	41.0	39.7	43	42.7	48.3	48.6	36.9	see mean	~
FLX 26b	56.6	55	57.6	46	46.2	42.4	41.6	39.3	41.7	39.8	50.4	29.1	see mean	~
FLX 26c	59.5	48.4	47.5	46.2	41	44.3	41.3	42.8	42.3	37.7	46.9	40.4	see mean	~
FLX 26 a,b,c - mean	59.6	48.6	53.1	45.7	43.6	42.6	40.9	41.7	42.2	41.9	48.6	35.5	45.3	37
FLX 27a	41.9	44.4	44.1	31.3	36.7	31.4	35.4	34.4	31.7	39.5	40.9	36.1	see mean	~
FLX 27b	48.6	44.2	40.4	36.1	36.9	34.9	35.6	34.2	33.8	40.8	42.8	36.6	see mean	~
FLX 27c	50.5	46	44.4	38.4	38	31	33.5	34.5	36.0	36.1	42.8	38.5	see mean	~
FLX 27 a,b,c- mean	47.0	44.9	43.0	35.3	37.2	32.4	34.8	34.4	33.8	38.8	42.2	37.1	38.4	31
FLX 29	38.3	30.4	23.7	53.4	22.9	22	23.2	18.6	25.0	27.9	25.4	14.6	27.1	22
FLX 31	42.7	36.6	32.3	57.9	25.5	24.7	26.2	23.7	28.6	32.1	33.3	23.2	32.2	26
FLX 32a	49.3	45.8	45.3	57	36.3	30.2	32.5	36.2	37.6	42.5	42.2	31	see mean	~
FLX 32b	52.2	46.1	45.1	44.8	30.5	30.2	34.8	35.3	36.4	42.1	45.5	28.7	see mean	~
FLX 32c	55	48.3	44.0	31.7	33.7	31.2	34.2	38.8	36.7	45.4	43.6	35.1	see mean	~
FLX 32 a,b,c-mean	52.2	46.7	44.8	44.5	33.5	30.5	33.8	36.8	36.9	43.3	43.8	31.6	39.9	32

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
FLX 33	86.6	73.7	74.0	23	59.2	54.1	67.3	66	71.1	80.1	77.1	60.5	66.1	**54**
FLX 34	61.2	60.2	63.4	31.8	47	48	44.2	58.7	45.8	61	55.5	44.3	51.8	**42**
FLX 35	62.3	61.9	54.7	39.7	37.5	34.3	41.9	47.6		52.2	49	50.8	48.4	39
FLX 37	68.9	59	64.5	40	45.9	39.1	57.2	48.2	26.1	50	62.2	52.7	51.2	**41**
FLX 39	30.2	29.9	31.2	33.9	25.9	24.1	24.2	29.8	15.1	29.3	32.5	32	28.2	23
KSG 9	44.7	32.6	34.6	32	31.3	28.3	31.3	28.0	32.5	33.9	47.2	39.9	34.7	28
WBG 1a	51.3	53.5	46.2	59.6	41.9	42	37.8	41.9	46.9	49.6	43.6	38.8	see mean	~
WBG 1b	57.8	52.3	47			43.5	41.3	34.6	43.8	46.5	51.1	47.2	see mean	~
WBG 1c	54.6	51.8	41.5	48.2	45.2	42.1	42.6	37.7	45.4	48.4	48.5	38.7	see mean	~
WBG 1 a,b,c - mean	54.6	52.5	44.9	53.9	43.6	42.5	40.6	38.1	45.4	48.2	47.7	41.6	46.1	36
WBG 3	22.6	20.8	17.3	12.8	10.6	8.7	10.7	12.4	14.5	16.9	20.7	18.4	15.5	12
WBG 5	25.7	31.5	21.7	29	21.8	25.2	15.7	24.2	25.0	30.2	28.6	26.5	25.4	20
WBG 6	51.8	42.8	45.2	34.2	36.2	33.9	38.0	35.7	43.1	44.8	53.6	36.4	41.3	33
WBG 8	42.6	37.8	39.4	41.2	36.6	29	36.9	36	41.9	43	41.9	38.7	38.8	31
WBG 10	38.2	40.1	34.2	37.8	29.7	28.1	25.1	33.4	29.8	36.7	30.1	27.1	32.5	26
WBG 12	35.8	34.9			22.8	19.9	21.4	21.1	23.5	21.2	29.4	30.3	26.0	21
WBG 13	43	40.1	41.9	39.8	33.7	34.8	30.2	30.9	38.6	40.9	36	30.8	36.7	29
WBG 15	51.3	44.8	48.3	44.0	35.4	36.7	38.5	35.7	44.4	47.3	37.9	37.1	41.8	33
WBG 17	31.8	31.8	26	29.4	25.6	23.9	22.0	32.4	27.8	28.6	30.9	31.9	28.5	23
WBG 18	31.6	41.3	28	41.6	31	24.8	21.6	37.2	38.9	44.8	36.8	39.5	34.8	27
WBG 20	51.8	47.9	40.5	30.7	32.4	28.5	34.3	31	33.0	39.7	43.9	40.6	37.9	30
WBG 22	28.4	29.9	12.4	21.1	16.3	15.1	17.2	16.2	21.5	28.2	23	14.9	20.4	16
WBG 23	36.1	31.8	30.2	29.0	25.1	23.5	24.2	25.8	31.2	27.1	35.5	35.6	29.6	23
MEL 5	42.4	42.1	30.8	32.8	35.6	30.5	29	30.7	31.2	28.6	37.1	35.1	33.8	27
MEL 7	36.8	35.4	27.2	31.4	28.0	24.1	22	30.1	25.2	29.4	36.2	37.6	30.3	25
MRT 1a	34.7	32.2	34.3	33.5	28.3	22.5	22.5	26.7	28.4	30.9	32.2	30.4	see mean	~
MRT 1b	36.7	31.7	28.7	33.8	27.1	23.3	20.8	26.8	29.7	30.3	28.9	25.4	see mean	~

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
MRT 1a,b mean	35.7	32.0	31.5	33.7	27.7	22.9	21.7	26.8	29.1	30.6	30.6	27.9	29.2	24
LGM 1	16.3	11.9	17.3	23.1	10.5	13.1	10	17.2	16.0	22.7	16.5	17.4	16.0	13
FAR 1	35.5	34.1	35.1	21.9	29.3	24.9	27.0	28.5	34.3	38.2	30.4	22.9	30.2	24
FAR 2a	42.6	38.1	33.0	34.8	35.1	28.4	34.2	37.6	36.6	36.5	38.1	31.2	see mean	~
FAR 2b	44.1	38.8	39.5	34.1	28.6	47.1	33.6	35.3	37.9	42.5	38.7	33.4	see mean	~
FAR 2c	41.1	38.3	37.4	42.4	33.4	29.3	34.1	39.5	39.1	44.9	36.8	32.6	see mean	~
FAR 2a,b,c- mean	42.6	38.4	36.6	37.1	32.4	34.9	34.0	37.5	37.9	41.3	37.9	32.4	36.9	30
STA 1a	41.8	55.9	52.8	59.8	49.8	39.1	49	53.9	45.2	50.4	54.1	50.1	see mean	~
STA 1b	51.2	52	70.4	55.2	50.7	36.7	49.9	61.5	54.1	54.2	57.2	50.7	see mean	~
STA 1c	50.5	53.6	61.2	62.9	54.3	44.9	51.6	57.4	48.6	54.7	58.5	45.8	see mean	~
STA 1a,b,c- mean	47.8	53.8	61.5	59.3	51.6	40.2	50.2	57.6	49.3	53.1	56.6	48.9	52.5	**43**
STA 2	38.4	36.9	40.4	27.4	30.2	25.5	28.7	39.6	33.1	33.7	44.2	37.7	34.7	28
STA 6	30	29.7	30.5	36	27	23.9	24.6	33.9	31.9	33.5	30.4	25.3	29.7	24
STA 7	44.8	43.2	36.1	46.7	39.2	41.7	47.8	44.8	53.7	43.3	41.9	27.8	42.6	34
STA 8	50.2	53.2	57.5	64.3	54.6	45.2	50.6	63.7	49.8	51.4	59.1	57.7	54.8	**44**

(1) See Appendix C for details on bias adjustment

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

QA/QC Data

NO_2 Diffusion Tube Bias Adjustment Factors

The analytical laboratory used for supply and analysis of NO_2 diffusion tubes is Environmental Scientifics Group (ESG) based in Didcot. The monitoring is undertaken using Palmes passive diffusion tubes exposed on a monthly basis. The tubes are prepared by spiking acetone:triethanloamine (TEA) (50:50) onto the grids prior to the tubes being assembled. The tubes are then desorbed with distilled water and the extract analysed using a segmented flow auto-analyser with ultraviolet detection. The laboratory is formally accredited under the United Kingdom Accreditation Scheme (UKAS).

Combined "national" bias adjustment factors for UK diffusion tube laboratories, based upon Local Authority co-location studies throughout the UK, are provided on behalf of Defra and the Devolved Administrations. A database of these bias adjustment factors is available at http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html. The national bias adjustment factor given for ESG, Didcot in 2015, in the March 2015 edition of 'National Spreadsheet of Bias Adjustment Factors' was 0.81, using results from 21 different studies.

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/16

Follow the steps below in the correct order to show the results of relevant co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2016
LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method	Year[2]	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[4]	Bias Adjustment Factor (A) (Cm/Dm)
ESG Didcot	50% TEA in acetone	2015	R	Dumfries and Galloway Council	12	35	30	14.6%	G	**0.87**
ESG Didcot	50% TEA in acetone	2015	B	Gravesham Borough Council	12	40	30	34.1%	G	**0.75**
ESG Didcot	50% TEA in acetone	2015	B	Gravesham Borough Council	12	30	23	29.8%	P	**0.77**
ESG Didcot	50% TEA in acetone	2015	UI	North Lincolnshire	11	24	18	36.5%	P	**0.73**
ESG Didcot	50% TEA in acetone	2015	R	Swale BC	11	38	32	19.3%	P	**0.84**
ESG Didcot	50% TEA in acetone	2015	R	Swale BC	10	48	39	21.0%	G	**0.83**
ESG Didcot	50% TEA in acetone	2015	R	Swale Borough Council	11	40	34	19.7%	P	**0.84**
ESG Didcot	50% TEA in acetone	2015	R	Wrexham County Borough Council	12	19	19	0.6%	G	**0.99**
ESG Didcot	50% TEA in acetone	2015	UC	Cardiff Council	10	26	26	1.6%	G	**0.98**
ESG Didcot	50% TEA in acetone	2015	KS	Marylebone Road Intercomparison	12	104	81	27.9%	G	**0.78**
ESG Didcot	50% TEA in acetone	2015	R	Vale of White Horse District Council	11	34	29	15.7%	G	**0.86**
ESG Didcot	50% TEA in acetone	2015	UI	Stockton on Tees	12	24	18	29.4%	G	**0.77**
ESG Didcot	50% TEA in acetone	2015	R	Stockton on Tees	12	17	14	21.5%	G	**0.82**
ESG Didcot	50% TEA in acetone	2015	KS	Suffolk Coastal DC	12	44	35	26.0%	P	**0.79**
ESG Didcot	50% TEA in acetone	2015	SU	Thanet District Council	9	17	15	10.6%	G	**0.90**
ESG Didcot	50% TEA in acetone	2015	R	Thanet District Council	12	27	23	17.8%	G	**0.85**
ESG Didcot	50% TEA in acetone	2015	B	Medway Council	12	21	12	77.3%	G	**0.56**
ESG Didcot	50% TEA in acetone	2015	R	Medway Council	11	32	23	42.6%	G	**0.70**
ESG Didcot	50% TEA in acetone	2015	R	North East Lincolnshire Council	10	34	28	21.2%	P	**0.83**
ESG Didcot	50% TEA in acetone	2015	R	North East Lincolnshire Council	11	39	28	38.6%	G	**0.72**
ESG Didcot	50% TEA in acetone	2015	R	North East Lincolnshire Council	11	55	47	16.2%	G	**0.86**
ESG Didcot	50% TEA in acetone	2015		**Overall Factor[3] (21 studies)**				**Use**		**0.81**

Factor from Local Co-location Studies (if available)

There is a kerbside automatic monitoring site recording NO_2 concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. The site is approximately 1 metre from the kerb and 14 metres from the traffic lights at the junction. This area of the junction is very narrow and enclosed by tall buildings, creating a canyon effect.

The bias adjustment factor was calculated using the Precision and Accuracy Spreadsheet available for download from http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html .

Based on 12 months for which there was a valid diffusion tube mean.
Automatic analyser annual mean (2015) = 35 µg m^{-3} with 96% data capture.
Triplicate diffusion tube mean (2015) = 44 µg m^{-3} with a mean precision (expressed as the coefficient of variation) of 16.
Bias adjustment factor (2014) = 0.79 based on 12 months' data.

Discussion of Choice of Factor to Use

Historically, the local bias adjustment factor obtained from the Woodbridge co-location study has been used to adjust annual mean NO_2 concentrations from diffusion tube sites within Woodbridge only. This location is unusual, being a street canyon: it is considered representative of the other diffusion tube monitoring sites within Woodbridge, but not of diffusion tube locations elsewhere within the district. **The 2015 bias adjustment factor of 0.79 obtained at Woodbridge has been applied to the other sites within Woodbridge only.**

All diffusion tube monitoring sites elsewhere on the district have been adjusted for bias using the combined or "national" bias adjustment factor of 0.81 from the March 2016 version of the National Diffusion Tube Bias Adjustment Factor Spreadsheet.

QA/QC of automatic monitoring

NO_2 concentrations were monitored by ozone chemiluminescence. Quality assurance of the data from the continuous monitoring station was carried out by Ricardo-AEA following the same procedures used for sites within the Government's Automatic Urban and Rural Network. Calibrations were undertaken fortnightly by a Council Officer, the procedures adopted for the calibrations were modelled on those developed by AEA Energy & Environment for use in the national monitoring networks. The calibrations were undertaken using certified calibration gas provided by BOC with traceability to National Metrology Standards obtained via regular UKAS Quality Control Audits carried out by Ricardo-AEA. The audits provide a range of information that is utilised within the data management process for the data sets.

Audit tests are undertaken once a year by Ricardo-AEA. They include accredited audit zero and span calibrations, linearity, NO_x converter efficiency, flow and leak checks as well as checks of the instruments sampling system. Data presented in this report have been fully ratified by Ricardo-AEA.

The data set was screened, scaled and validated using all available routine site calibrations, audit results and service engineer records. This was an ongoing process with checks made daily to ensure high data capture is achieved. A final process of data ratification ensures that the data provide the most accurate record of the pollution concentrations across the measurement period. The data management process adopted is that evolved and implemented by Ricardo-AEA within the data management programme of the AURN UK national monitoring network. This process is expected to deliver data sets that meet the EU Data Quality Objective of a measurement uncertainty of better than 15%.

QA/QC of diffusion tube monitoring

The analysis of NO_2 diffusion tubes by Environmental Scientifics Group, Didcot meets the guidelines set out in Defra's 'Diffusion tubes for Ambient NO_2 Monitoring: Practical Guidance'. They participate in the Workplace Analysis Scheme for Proficiency (WASP) for analysis of diffusion tubes.

This is an independent proficiency testing study designed to assess the analytical performance of laboratories supplying diffusion tubes to Local Authorities for use in the context of air quality management. Defra advise that diffusion tubes should only be obtained from laboratories demonstrating a WASP classification of 'Satisfactory'.

A statistical Z-score test is used to identify any deviation of participant results from reference results. The results indicated in the latest Defra WASP Summary show that in 2015 Environmental Services Group achieved a Z-score within the required limits of the 'Satisfactory' classification (see table below).

WASP Rankings

Z –Score	Classification
<2	Satisfactory
2-3	Questionable
>3	Unsatisfactory laboratory result

Processes regulated under the Environmental Permitting Regulations 2010 by Suffolk Coastal District Council in 2016

There are no new Permitted Processes within the district since the 2015 Updating and Screening Assessment.

Name and address of authorised process	Authority issuing authorisation (Public Register file reference – where applicable)	Grid reference for process	Installation Activity Section number and Process Guidance (PG) note under which process is authorised	Process description
Cemex Readymix East Anglia Sinks Pit, Kesgrave	Suffolk Coastal District Council (EPA 07)	62288 24636	Production of Cement and Lime Section 3.1	The blending of cement in bulk
Cemex Readymix East Anglia Theberton Airfield, Leiston	Suffolk Coastal District Council (EPA 08)	64134 26438	Production of Cement and Lime Section 3.1	The blending of cement in bulk
Shell Garage A12 Northbound (Woodbridge), 715 Grove Road, Woodbridge	Suffolk Coastal District Council (EPA 38)	62598 24951	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station
Shell Garage A12 Southbound (Woodbridge) 805 Grove Road, Woodbridge	Suffolk Coastal District Council (EPA 39)	62605 24950	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station
Haynings Service Station Saxmundham Road, Framlingham	Suffolk Coastal District Council (EPA 40)	62885 26349	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station
WM Morrisons Plc Grange Farm Avenue, Cavendish Park Estate, Felixstowe	Suffolk Coastal District Council (EPA 42)	62863 23477	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station
Solar Garage High Road West, Felixstowe	Suffolk Coastal District Council (EPA 44)	63034 23520	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station
Sainsbury's Supermarkets Ltd Felixstowe Road, Purdis Farm	Suffolk Coastal District Council (EPA 45)	62015 24235	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station
Martlesham Heath Services Service Area, Anson Road, Martlesham Heath	Suffolk Coastal District Council (EPA 47)	62466 24586	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station

Name and address of authorised process	Authority issuing authorisation (Public Register file reference – where applicable)	Grid reference for process	Installation Activity Section number and Process Guidance (PG) note under which process is authorised	Process description
Motor Fuel Company Felixstowe Dock Service Area Anzani Avenue, Felixstowe	Suffolk Coastal District Council (EPA 49)	62798 23451	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station
Tesco Stores Ltd Anson Road, Martlesham Heath	Suffolk Coastal District Council (EPA 50)	62473 24592	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station
Stratford Service Station A12 Main Road, Stratford St Andrew	Suffolk Coastal District Council (EPA 52)	63578 26007	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station
L. B. Shotter & Sons Waterloo Avenue, Leiston	Suffolk Coastal District Council (EPA 55)	64377 26260	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station
John Grose Melton Road, Melton	Suffolk Coastal District Council (EPA 56)	62785 24987	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station
A. G. Potter Ltd. Station Road, Framlingham	Suffolk Coastal District Council (EPA 58)	62852 26285	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station
Smith & Wesby (Sax) Limited Service Station, Main Road, A12, Darsham	Suffolk Coastal District Council (EPA 62)	64061 26980	Gasification, Liquefaction and Refining Activities Section 1.2	Unloading of petrol into storage tanks at a Service Station
Brett Concrete Limited Waldringfield Quarry, Martlesham Heath	Suffolk Coastal District Council (PPC 01)	62568 24485	Production of Cement and Lime Section 3.1	The blending of cement in bulk
Eurovia Roadstone Foxhall Four Quarry, Foxhall Road Brightwell	Suffolk Coastal District Council (PPC 06)	62446 24375	Other Mineral Activities Section 3.5e	Coating road stone with tar or bitumen
L F Geater & Sons Ltd West End Nurseries, Westward Ho, Leiston	Suffolk Coastal District Council (PPC 07)	64380 26321	Combustion Activity Section 1.1	Straw Burning between 0.4 and 3 MW

Name and address of authorised process	Authority issuing authorisation (Public Register file reference – where applicable)	Grid reference for process	Installation Activity Section number and Process Guidance (PG) note under which process is authorised	Process description
Hazlewood Hand Laundry Aldeburgh Road, Aldringham, Leiston	Suffolk Coastal District Council (PPC 08)	64471 26033	Solvent Activity SED Directive Section 7	Dry Cleaning
West End Dry Cleaners Unit 12, Undercliff Road West, Felixstowe	Suffolk Coastal District Council (PPC 11)	62969 23411	Solvent Activity SED Directive Section 7	Dry Cleaning
Kesgrave Dry Cleaners Unit 3 Tesco Store, Ropes Drive, Kesgrave, Ipswich	Suffolk Coastal District Council (PPC 12)	62196 24538	Solvent Activity SED Directive Section 7	Dry Cleaning
Castle Cleaners 10A Church Street, Framlingham	Suffolk Coastal District Council (PPC 13)	62860 26353	Solvent Activity SED Directive Section 7	Dry Cleaning
Clappits Plant Ltd Clappits Pit, Woodbridge Road, Newbourne	Suffolk Coastal District Council (PPC 14)	62741 24381	Other Mineral Activities Section 3.5	Crushing, grinding or size reduction of bricks, tiles or concrete (mobile)
V W Anticks 2-4 The Forge, Bredfield	Suffolk Coastal District Council (PPC 15)	62661 25218	Combustion Activity Section 1.1	Waste Oil Burner; less than 0.4MW
East Suffolk Crematorium Ltd., Seven Hills Crematorium, Nacton	Suffolk Coastal District Council (EPR 01)	62300 24130	Incineration Activity Section 5.1	Cremation of human remains
Clarkes Demolition Ltd. Chapel Works, Waldringfield, IP12 4PT	Suffolk Coastal District Council (EPR 04)	62741 24380	Other Mineral Activities Section 3.5	Crushing, grinding or size reduction of bricks, tiles or concrete (mobile)
Tippers R Us Ltd. Sinks Pit, Main Road, Kesgrave IP5 2PE	Suffolk Coastal District Council (EPR 05)	62298 24644	Other Mineral Activities Section 3.5	Crushing, grinding or size reduction of bricks, tiles or concrete (mobile)

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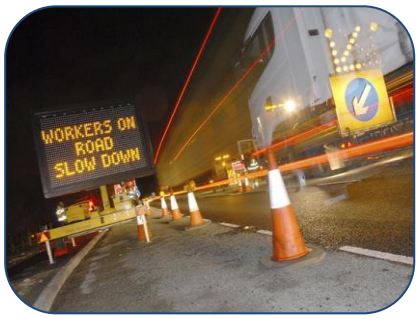


CLIENT PROJECT REPORT CPR2229

Woodbridge - Air quality modelling using local weather data

Savage A., Turpin K

Prepared for: Suffolk Coastal District Council, Environmental Protection

Project Ref:

Quality approved:

Anna Savage (Project Manager)

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This report has been amended and issued as follows:

Version	Date	Description	Editor	Technical Referee
1	20/1/2016	First Draft	AS	KT
2	09/3/2016	Second Draft with client comments	AS	KT
3	4/5/2016	Final report	AS	KT

Contents

1 Study Background

In 2006, as part of their requirements under Local Air Quality Management (LAQM), Suffolk Coastal District Council (SCDC) declared an Air Quality Management Area (AQMA) for exceedances of the annual average nitrogen dioxide (NO_2) objective in the town of Woodbridge. The AQMA was declared for a row of properties on Melton Hill, close to the junction with Lime Kiln Quay Road, St John's Street and The Thoroughfare (see Figure 1). The local authority currently monitors NO_2 concentrations at several diffusion tube sites around the junction and at one kerbside automatic monitoring site on Melton Hill within the AQMA. The local authority's final action plan for the AQMA was published in 2011 (SCDC, 2011). The action plan contains 20 measures aimed at improving air quality which include specific measures for the road junction such as installing queue detectors on traffic lights, extending restrictions to vehicular access to The Thoroughfare, remove the right turn from Melton Hill to St John's Street and removing on-street car parking on Melton Hill. Wider measures across the town include initiatives to improve bus emissions, car sharing schemes and promotion of travel plans. The local authority is now considering what other measures can be put in place to further improve concentrations in the AQMA and is looking to update and revise the action plan in 2016.

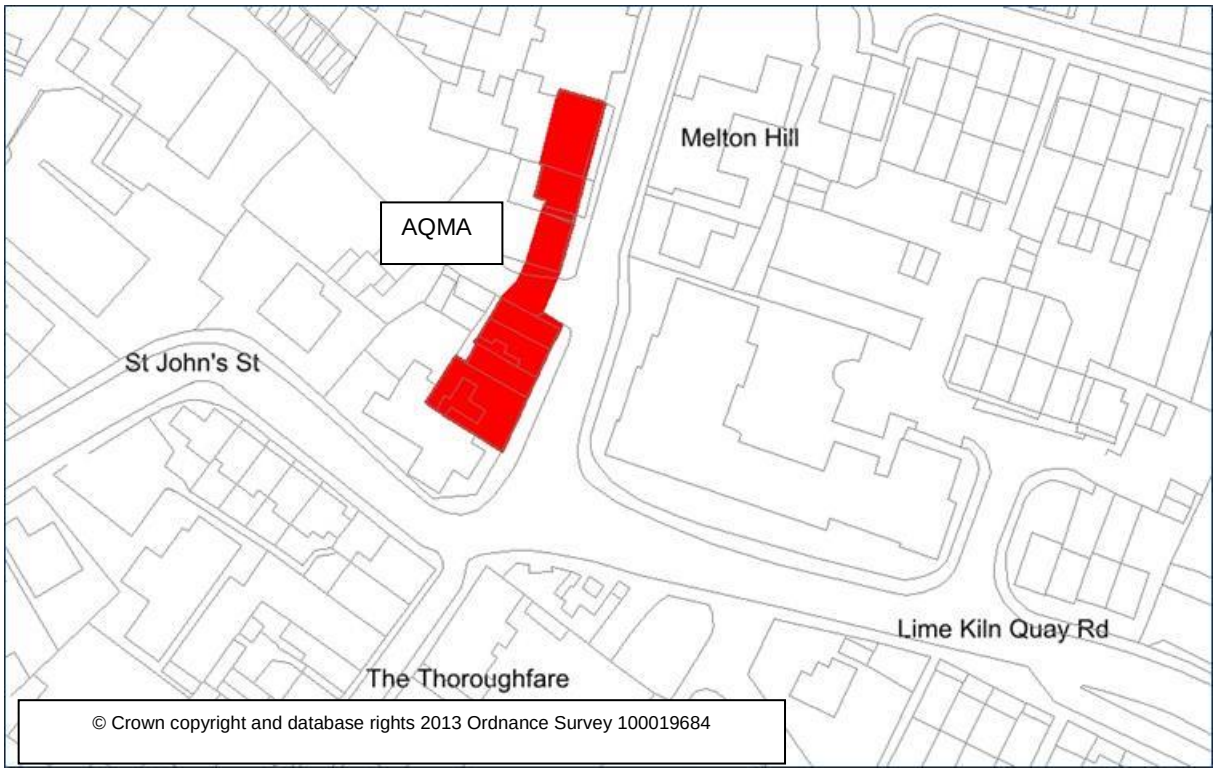

Figure 1: Boundary of Woodbridge AQMA.

In 2014, TRL conducted a detailed modelling assessment of emissions at this junction derived from instantaneous driving cycle (DC) surveys (Savage and Turpin, 2014). The impact of several scenarios on emissions was modelled, including banning the right turn from Melton Hill into St John's Street and access to The Thoroughfare. The results showed that the maximum reduction in NO_2 concentrations due to vehicle emissions was found to be 0.1 µg/m^3 at monitoring sites on Melton Hill and St John's Street. Conversely, road NO_2 concentrations were predicted to increase at the monitoring sites in Lime Kiln Quay Road by up to 0.5 µg/m^3. This was because it was assumed that all those vehicles that previously turned right from Melton Hill to St John's Street or down The Thoroughfare now had to travel along Lime Kiln Quay Road.

The study found that the modelling could not fully understand the NO_2 concentrations measured at the automatic monitoring site. Modelled emissions from the road traffic source across the junction substantially underestimated these concentrations by an average factor of five. Following a number of detailed investigations, it was concluded that perhaps the meteorological conditions at the site were not being represented appropriately. Sensitivity testing of the meteorological data file concluded that

by modifying the meteorological impacts, the performance of the model could be improved by up to 60 percent. It was concluded therefore that a greater understanding of localised weather conditions would assist in understanding the relationships between the emissions source contribution from the road and this monitoring site. This better understanding would help inform the Council on what new measures could be introduced in a revised action plan and what could potentially be achieved.
The study recommended that the Council could install a meteorological station at the automatic monitoring site for a period of three months to investigate this relationship further. Two readings would be required, one at 2.6m and the other at 10m (just above roof line). The two sets of weather data could then be examined to find out if the weather conditions at the junction:

a) differed somewhat to the regional profiles applied in previous modelling exercises and
b) were favourable for emissions entrainment.

This report provides the results of this additional work to conduct air quality monitoring using the local weather data. All other model assumptions and model set up were unchanged from the original assessment.

2 Meteorological Monitoring

Two masts were installed to measure meteorological parameters, specifically wind speed and direction. These masts were as close to the site of the automatic analyser on Melton Hill as possible. One site was set up with the meteorological monitoring equipment at approximately the same height as the analyser's inlet (just over 2 metres) and the other was set up at the back of the building at 9 metres, i.e. above the building height (see Figure 2).

Figure 2: Wind speed and direction masts, Melton Hill (2 metre and 9 metre masts)

The two sites recorded data during a four month period from 24th July to 20th November 2015 which was were logged at 15 minute intervals. The datasets were analysed and are presented as wind roses in Figure 3 and Figure 4. In contrast the weather data from the nearest national meteorological site at Wattisham, which was used in the original modelling study is shown in Figure 5.

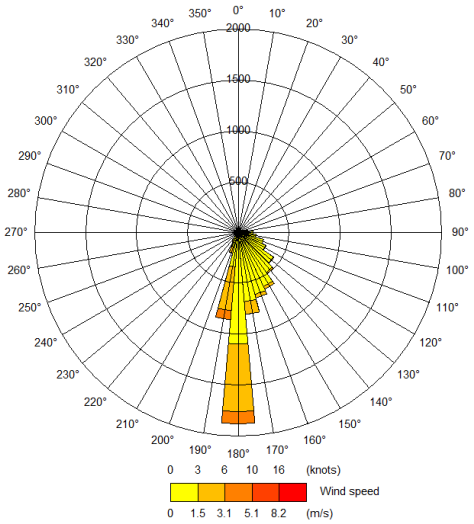

Figure 3. Wind speed and direction at roadside (2 metres) in 15 minute intervals (part year 2015)

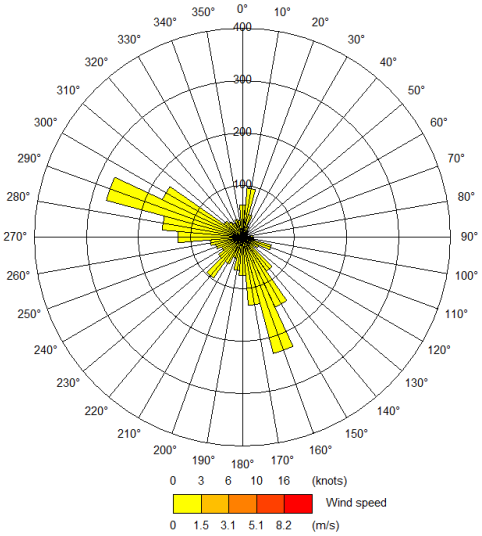

Figure 4. Wind speed and direction at 9 metres in 15 minute intervals (part year 2015)

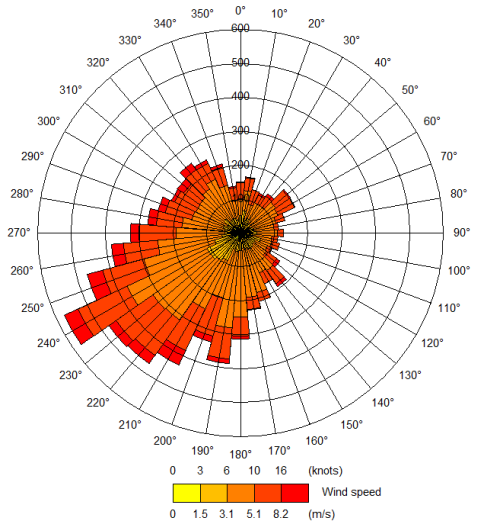

Figure 5: Wind speed and direction at Wattisham meteorological site in 60 minute intervals, 2012

Table 1 shows the average wind speed and direction recorded at the monitoring sites. The table clearly shows some significant differences between the average statistics.

Table 1: Average wind speed and direction at Woodbridge in comparison to local met sites.

Site	Average wind speed (m/s)	Average wind direction (degrees)
9 metre	0.2	282
Roadside 2 metre	1.0	171
RAF Wattisham	5	206

The data illustrated in the wind roses show that at Wattisham, the wind blows predominantly from the West by Southwest directions. However, at the local Woodbridge monitoring sites, the predominant wind direction is somewhat different. Due to the shielding from the buildings, the wind direction affecting the roadside measurements is predominantly from the South (Figure 3). Wind speed above the buildings is characteristically lower than that at roadside level and it is likely that the slightly higher wind speed at roadside level would tend to push more of the emissions from the junction towards the monitoring site.

3 Pollution Modelling

Using the local meteorological data collected in 2015, the ADMS dispersion model was re-run at the monitoring sites (see Figure 6), firstly taking meteorological data from the roadside 2 metre monitoring site and secondly taking meteorological data from the 9m monitoring site. Any gaps were filled in with the average statistics over the period for each site (from Table 1).

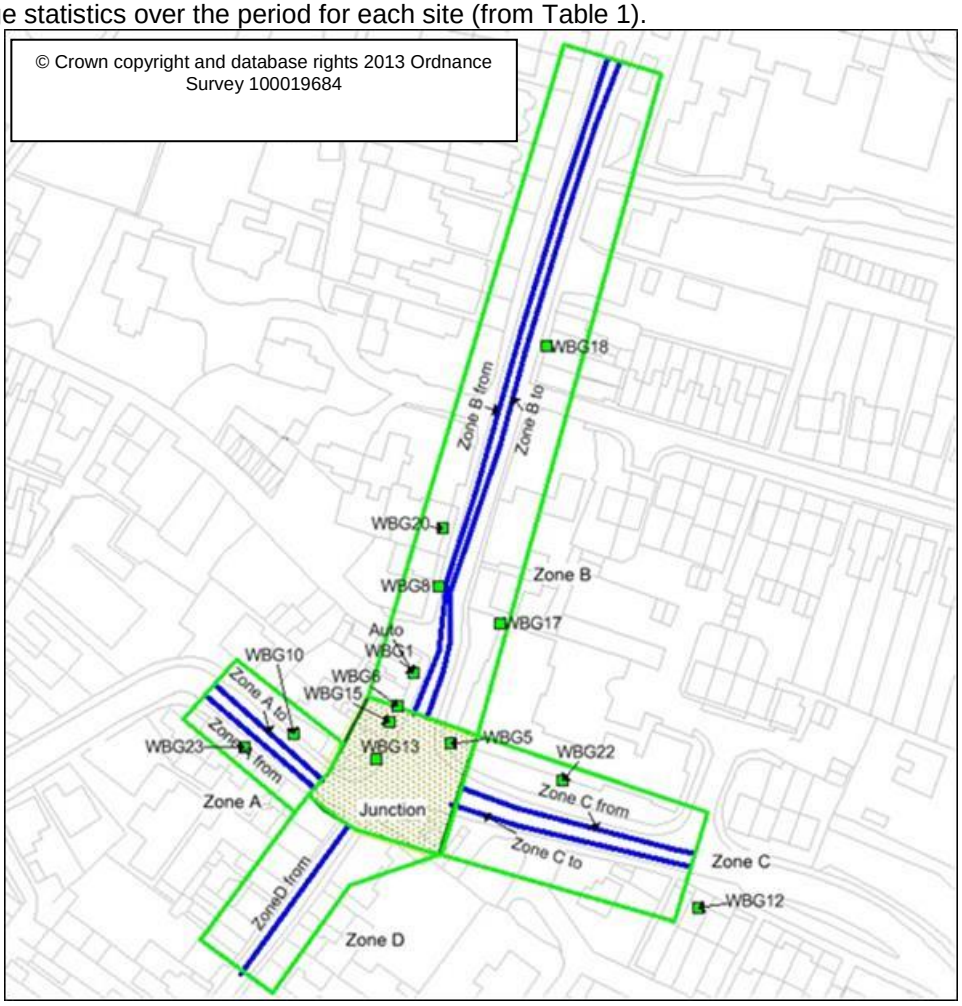

Figure 6: Location of monitoring sites in relation to modelled sources

The modelled NO_x concentrations from the road source are provided in Table 2. These results were compared with the road NO_x concentrations calculated from the monitoring sites using Defra's NO_x–NO_2 tool and with the results from the original modelling assessment (Savage and Turpin, 2014). These results show that the modelled concentrations using the data from the roadside 2 metre meteorological site are much closer to the measured road NO_x values. The model still under-predicted measured concentrations at most monitoring sites but not to the same extent as in the original assessment. Comparing the modelled and measured outputs, an adjustment factor of 1.3106 (i.e. under predicting by 31%) was applied to the modelled values before converting the values to modelled NO_2 concentrations. This magnitude of adjustment is considered to be reasonable according to Defra's technical guidance (Defra, 2009). The final adjusted modelled annual mean NO_2 concentrations using the roadside 2 metre meteorological data are given in Table 3 compared to measured concentrations at the monitoring sites (based on the 2012 data from the original modelling assessment).

Table 2: Modelled road NO_x concentrations compared to measured concentrations

Site	x	y	Annual mean road NO_x concentrations			
			Measured[4]	Original[5] met	Roadside 2m met	9m met
WBG1	627595	249260	66.4	8.6	42.5	11.7
WBG5	627604	249243	22.4	7.0	23.0	23.5
WBG6	627591	249252	55.7	6.9	22.9	12.1
WBG8	627601	249281	63.6	12.5	57.5	18.4
WBG10	627566	249245	33.6	8.2	31.2	28.5
WBG13	627586	249239	45.5	7.1	18.6	19.8
WBG15	627589	249248	60.9	5.9	18.1	13.5
WBG17	627616	249272	26.8	6.8	10.8	26.4
WBG18	627627	249339	40.7	11.2	22.0	43.8
WBG22	627631	249234	13.9	6.4	26.7	20.3
WBG23	627554	249242	22.4	3.5	4.7	6.1
Auto	627595	249260	66.4	8.0	39.6	11

Table 3: Modelled annual mean NO_2 concentrations compared to 2012 measured concentrations using the 2015 met data from the 2 metre mast.

Site	x	y	Annual mean NO_2 concentrations		Difference (%)
			Modelled	Measured	
WBG1	627595	249260	**42.3**	**44**	-4%
WBG5	627604	249243	30.9	26	16%
WBG6	627591	249252	30.9	**40**	-30%
WBG8	627601	249281	**49.9**	**43**	14%
WBG10	627566	249245	35.9	31	14%
WBG13	627586	249239	28.1	36	-28%
WBG15	627589	249248	27.8	42	-51%
WBG17	627616	249272	22.9	28	-22%
WBG18	627627	249339	30.3	34	-12%
WBG22	627631	249234	33.2	22	34%
WBG23	627554	249242	18.5	26	-40%
Auto	627595	249260	**40.7**	**44**	-8%

*Exceedances of the annual mean objective in bold

Overall, the modelling results showed that the model over-estimated concentrations at a number of sites (e.g. WBG8, WBG10, WBG22) and under predicted at other sites (e.g. WBG1 and WBG18). It is noted that the modelled concentrations at the automatic monitoring site on Melton Hill were found to exceed the objective, in line with the measured concentrations.

Following Defra's guidance (Defra, 2009), the majority of results should be within 25% of the measured concentrations to provide confidence in the model results. In this study, 7 of these 12 monitoring sites were within 25% of the measured concentration, 2 within 30% and 3 were above 30%. Therefore, overall these results are considered to have a reasonable agreement. Of the 3 results that have a difference greater than 30%, site WBG15 has the largest difference of 50%. This site is located on Melton Hill close to the junction which was represented by an area source in the model rather than an individual road link. It is therefore likely that emissions were under-estimated at this site.

[4] Measured NO_2 converted to road NO_x concentrations using Defra's NOx-NO_2 calculator
[5] Wattisham meteorological data, 2012

4 Discussion and Conclusions

4.1 Discussion of Results

The concentration of any pollutant at any given receptor point is dependent upon a number of factors, namely the magnitude of emission sources, weather conditions, topography and finally any mechanical influences on dispersion generated by vehicle movement (i.e. where traffic is the predominant source of emissions). With respect to minimising the impact of road traffic emissions the only effective mitigation strategy is to affect the source of emission or in some cases affect the physical topography.

The modelling work conducted at the Woodbridge junction to date suggests that local topography has an effect on the regional weather profile. In other words, the very nature of the built form and natural geography surrounding the junction has an influence on localised weather patterns. This has resulted in an increase of emissions and concentrations at this road junction in Woodbridge. One of the main effects would appear to be the entrainment of vehicle emissions from the junction up Melton Hill. It would also appear that the lower wind speeds recorded at the temporary meteorological monitors would allow emissions to remain resident for longer periods. Emissions would therefore tend to accumulate rather than disperse.

Since the original assessment was conducted (Savage and Turpin, 2014), concentrations at the automatic monitoring site have declined slightly and were just below the objective in 2014. However, as concentrations fluctuate from year to year and traffic levels remain similar, the objective may be exceeded in future years. Over time, emissions from the vehicle fleet will reduce as vehicles are renewed which means that it is highly likely that air quality will start to improve. However, the time horizon upon which benefits begin to show up at the monitoring sites is difficult to predict. Under these circumstances and the fact that localised weather patterns are tending to entrain the emission source onto sensitive locations within the AQMA it is necessary to consider a solution to deal with the concentrations now as part of a revised action plan for Woodbridge.

4.2 Recommendations

Given that modifying the topography around this junction will not be possible, the only practical solution to improve air quality in the Woodbridge AQMA and meet the annual mean NO_2 objective at this location is to somehow reduce the vehicle emission source.

From the original assessment, it was noted that the traffic flow would need to be reduced by approximately 25% to reduce annual average road NO_2 concentrations by 1 $\mu g/m^3$ at the automatic monitoring site (assuming the same split between heavy and light duty vehicles). What this means in practical terms is that a measure would be needed to reduce the traffic that is directly affecting concentrations at the AQMA (the "resident" traffic) by 25%, rather than reducing overall throughput across the junction by 25%. This distinction is fundamentally important because it would be politically impossible to reduce the throughput by this amount without a comprehensive transport strategy which effectively encouraged modal shift. Nonetheless, reductions in the order of this magnitude will be required to meet the air quality objective.

One solution that could potentially achieve this would be to holding the traffic back at the traffic lights, on Melton Hill (southbound) and Lime Kiln Quay Road (westbound). To test the impact of this on the AQMA as part of their action plan development, the Council could consider installing temporary traffic lights approximately 30 metres back on Lime Kiln Quay Road and 40 metres back on Melton Hill for a six month period of time (e.g. starting in January and ending in June to account for seasonal variation). This would

allow the traffic to be pulsed through the junction in either direction under free flow conditions with low positive acceleration events. In other words, only one direction is active at any one time. It is expected that this measure would reduce emissions close to the AQMA due to the changes in driving style but would not increase the time it took drivers to travel across the junction.

There are concerns that this type of measure could increase concentrations at properties on the eastern side of Melton Hill, specifically 104, 106, 108, 110 Thoroughfare, as these would be close to where traffic would be held up and queue lengths could potentially increase due to the additional time taken for each green light cycle – there may also be the possibility of a fourth green light cycle needing to be introduced to allow traffic to exit from Sun Lane. The monitoring site closest to these properties (WBG18) measured annual mean NO_2 concentrations below the objective (i.e. 34 µg/m^3 in 2014). However, if this traffic system was put in place, then the Council should closely monitor concentrations at these properties to make sure levels do not increase to above the objective. Investigation of any other impacts that could occur from implementation of this measure would also be required.
Increased traffic noise could be experienced by properties not previously exposed (104, 106, 108 and 110 Thoroughfare in particular), and traffic congestion may occur in new locations along Melton Hill, Lime Kiln Quay Road and St John's Street and possibly elsewhere in Woodbridge due to the increased time taken for each green signal causing much longer queues at the junction.
A further measure that could also be considered when developing the revised action plan could be to consider a single carriageway layout. In this situation, traffic would be taken further away from the sensitive receptors in the AQMA. It is also possible that this centralised layout would improve dispersion on Melton Hill. This would also have other benefits including slight reductions in road traffic noise and vibration at the sensitive properties and improve overall well-being of pedestrians having pathways tripling in width. In fact the whole area around the junction would benefit from this type of measure.
The impact of these measures could be monitored over time by analysing long term changes in measured concentrations at the Woodbridge monitoring sites and to conduct future modelling studies post-implementation. It is recommended the Council consider installing a 2 metre wind direction and speed mast at the site of the automatic analyser on Melton Hill. On the basis of the results in this study, these data should be used instead of regional meteorological data to support any future modelling as part of the Council's LAQM requirements or in air quality assessments required for planning applications in Woodbridge.

References

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

Savage, A. and Turpin, K. (2014). Woodbridge Emissions Assessment. RPN 2881, April 2014.

Suffolk Coastal District Council (2011). Air Quality Action Plan for the Woodbridge Junction, February 2011.

Detailed Assessment
Air Quality Management Area declared at The Dooley Inn PH, Ferry Lane, Felixstowe

November 2015

Prepared by Transport Research Laboratory under contract to Suffolk Coastal District Council.

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Date	25th November 2015

This is a Detailed Assessment for the Air Quality Management Area (AQMA) declared at The Dooley Inn, Ferry Lane, Felixstowe. The Detailed Assessment has been produced by Transport Research Laboratory under contract to Suffolk Coastal District Council to determine whether revocation of the AQMA is required.

The Detailed Assessment recommends that the Felixstowe AQMA should be revoked. Suffolk Coastal District Council agrees with these findings.

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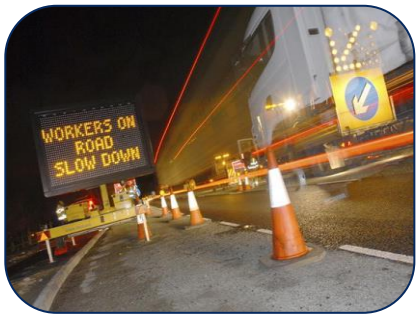


CLIENT PROJECT REPORT CPR2113

Felixstowe Air Quality Detailed Assessment

Savage, A.

Prepared for: Suffolk Coastal District Council

Project Ref:

Quality approved:

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Kevin Turpin (Technical Referee)

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Contents amendment record

This report has been amended and issued as follows:

Version	Date	Description	Editor	Technical Referee
1	Aug 2015	First draft for client comment	AS	TB
2	Oct 2015	Final report for submission to Defra	AS	KT

Executive Summary

This detailed assessment report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in Part IV of the Environment Act 1995 [1], the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 [2] and the relevant Policy and Technical Guidance documents [3&4].

This detailed assessment focuses on the Felixstowe Air Quality Management Area (AQMA) which was declared in 2009 due to exceedences of the air quality objective for annual mean nitrogen dioxide (NO_2) at the Dooley Inn public house, Ferry Lane. Relevant exposure for the annual mean objective exists for three people living above the pub. Since this declaration, measured annual mean concentrations have declined in the AQMA. This detailed assessment therefore aims to demonstrate with confidence that the air quality objective is now met within the Felixstowe AQMA and that there are unlikely to be any exceedences in the future. The local authority considers that there is no longer any risk to health due to air quality exceedences.

The detailed assessment provides evidence from local and national monitoring sites that there has been a downward trend in NO_2 concentrations over the last three to five years. There have been no measured exceedences of the air quality objective in the Felixstowe AQMA since 2011 and based on the trend data and ongoing work to control the key sources of emissions, it is expected that this downward trend in NO_2 concentrations will continue. The detailed assessment demonstrates that annual mean NO_2 concentrations decrease with increasing distance from the sources associated with the port and Dock Gate 2 and are below the objective at residential properties.

Since the publication of the final air quality action plan in 2012, there has been an increase in port throughput. However, the local authority and Port of Felixstowe have been proactive in working together to implement measures to reduce emissions from activities on the port and emissions from heavy duty vehicles (HDVs) accessing the port – the two major source contributions to emissions. These measures include:

- Use of more smaller, more efficient and electric Rubber Tyred Gantry (RTG) cranes to replace the existing larger diesel cranes;
- Purchase of newer internal movement vehicles fitted with selective catalytic reduction to meet newer emission standards;
- Reduction of emissions from HDV traffic using the port via Dock Gate 2 through better management of arrivals, increased use of rail for freight movements and increased used of Dock Gate 1 which is further away from relevant receptors.
- Improvements to shipping including increasing the berth sizes to allow larger, more efficient ships to use the port and investigating the potential for ships to run on liquefied natural gas in berth rather than diesel.

Information on a number of proposed business developments in the area are also given in the detailed asssessment. Although these developments may increase the number of HDVs in the area, it is expected that there will not lead to a significant future increase in annual mean NO_2 concentrations.

The detailed assessment recommends that the Felixstowe AQMA should be revoked. Suffolk Costal District Council agrees with this recommendation and will consult with Defra and other statutory bodies regarding this decision.

Contents

5 Purpose and Background of the Report

5.1 Purpose of Detailed Assessment

This detailed assessment report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in Part IV of the Environment Act 1995 [1], the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 [2] and the relevant Policy and Technical Guidance documents [3&4]. As part of the LAQM process, all local authorities have a statutory obligation to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedances are considered likely, the local authority must then declare an AQMA and prepare an Air Quality Action Plan setting out the measures it intends to put in place in pursuit of the objectives.

This detailed assessment focuses on the Felixstowe Air Quality Management Area (AQMA) which was declared in 2009. The report aims to demonstrate with confidence that the air quality objective to meet 40 µg/m^3 for annual mean nitrogen dioxide (NO_2) is now met within the Felixstowe AQMA and there are unlikely to be any exceedences in the future. The report concludes that the local authority can now revoke the AQMA order as there is no longer any risk to health due to air quality exceedences.

5.2 Background to Local Air Quality Management in Felixstowe

Suffolk Coastal District Council has completed five rounds of air quality review and assessment and has recently submitted their 2015 Updating and Screening Assessment (USA) report as part of Round 6.

During the third round, their 2006 USA report identified a potential risk of exceedence of the air quality objectives for nitrogen dioxide (NO_2), fine particulates (PM_{10}) and sulphur dioxide (SO_2) resulting from emissions from activities on and associated with the Port of Felixstowe. Following completion of a Detailed Assessment in 2008 for Adastral Close and Ferry Lane in Felixstowe, an AQMA was declared on 1 May 2009 for exceedence of the annual mean NO_2 objective concentration in the vicinity of the Dooley Inn Public House on Ferry Lane, Felixstowe. The AQMA boundary is shown in Figure 7, indicated by the hatched area in the centre of the figure. Relevant exposure to concentrations above the objective is limited to three people living in two flats above the Dooley Inn.

The local authority conducted a Further Assessment [5] and produced a Draft Air Quality Action Plan in 2010 for the Felixstowe AQMA. Source apportionment found that the main NO_x contribution was from emissions from container handling and vehicle activities in the Port, together with emissions from Heavy Duty Vehicles (HDVs) on roads outside the Port boundary. The final Action Plan was completed in 2012 [6].

As part of the fifth round of review and assessment, the 2014 annual progress report concluded that the annual mean NO_2 concentrations had been below the objective within the AQMA for the last two years [7]. This trend was continued in 2014, and the recent 2015 USA report identified that this objective had been met for three years [8]. The Port of Felixstowe has introduced a number of measures which have led to a significant reduction in NO_x emissions. The USA report therefore concluded that a detailed

assessment would be undertaken to determine whether the Felixstowe AQMA can be revoked.

6 Monitoring Data

6.1 Site Details

Suffolk Coastal District Council monitor at a large number of diffusion tube sites within their district. The diffusion tube sites that are located closest to the Felixstowe AQMA are indicated in Figure 7 and Table 4. Data from these sites are provided in Section 2.1 with a discussion of trends presented in Section 3 of the report.

There are nine monitoring locations operated by the local authority in the vicinity of the AQMA. Three of these sites have triplicate diffusion tubes (FLX 26, 27 and 32) and are located within the AQMA itself. A further six sites (FLX 33, 34, 35, 36, 37 and 38) are not located at relevant receptors (i.e. residential properties) – see Figure 7. The local authority installed these additional sites in 2011 to help them determine NO_2 levels in the locality of the declared AQMA and to provide additional information on local sources of NO_x emissions close to the Dooley Inn. As well as the local authority sites, there are nine diffusion tube sites within the port boundary, which are run by the Port of Felixstowe. A map of all the monitoring sites is given in Appendix A.

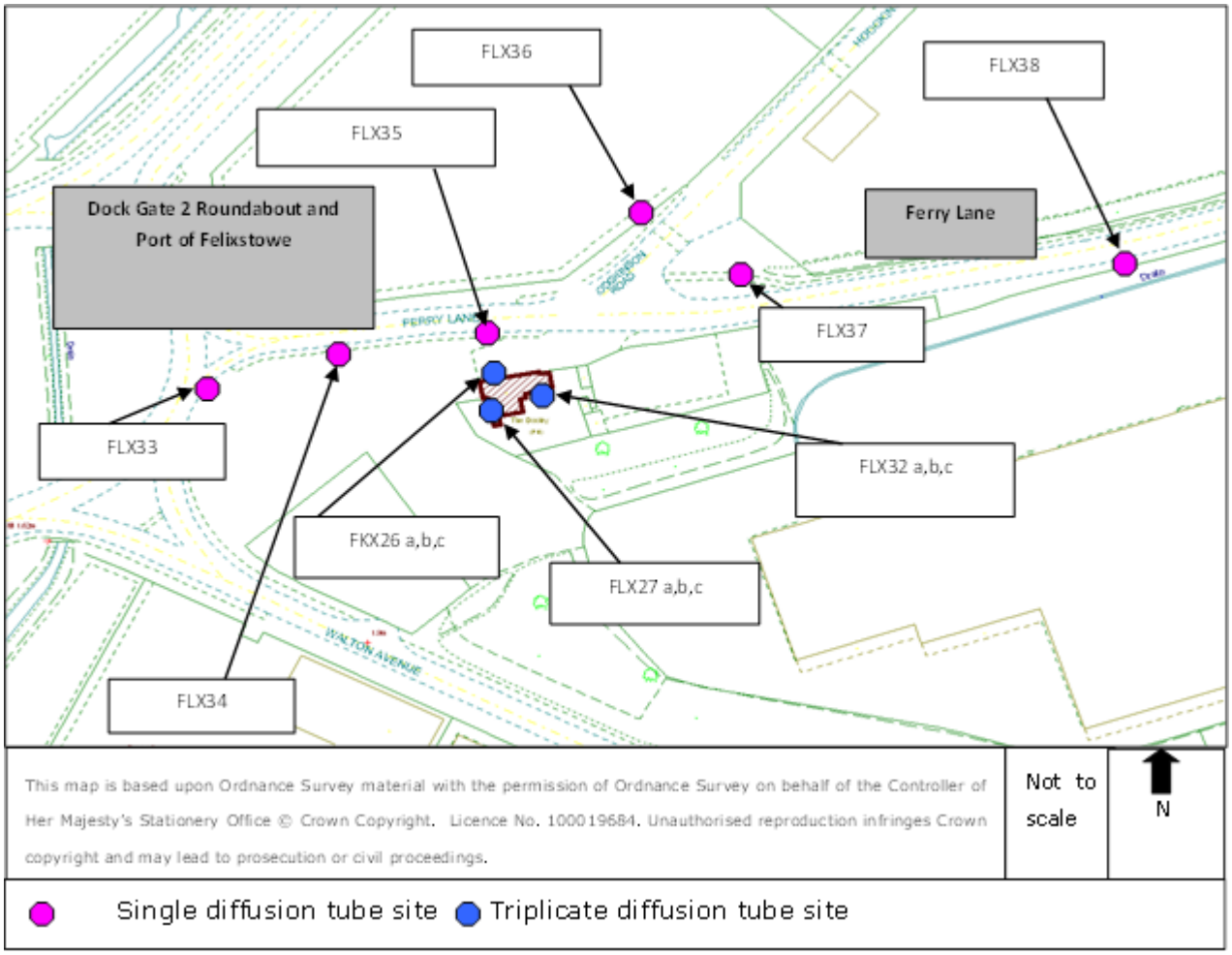


Figure 7: Diffusion tube locations in relation to Felixstowe AQMA at Dooley Inn, Ferry Lane

Table 4: Details of local authority diffusion tube monitoring sites in the Port of Felixstowe

Site ID	Site name	Site type	In AQMA?	X OS grid reference	Y OS grid reference	Distance to kerb of nearest road (m) - roundabout	Distance to relevant exposure (m)	Does the site represent Worst Case Exposure?
FLX21	4 Kingsfleet Road, Trimley St. Mary (Urban Background)	Urban background	No	629253	234431	N/A	N/A	n/a
FLX26 a,b,c	Front of The Dooley Inn at first floor window height	Industrial/ roadside	Yes	627959	234246	75	0	Y
FLX27 a,b,c	Side of The Dooley Inn facing the Port of Felixstowe	Industrial/ roadside	Yes	627960	234238	75	0	Y
FLX32 a,b,c	Guttering at rear of Dooley Inn facing the rear garden	Industrial	Yes	627971	234242	75	0	Y
FLX33	Dock Gate 2 Roundabout.	Roadside	No	627884	234238	5	N/A	Y
FLX34	Ferry Lane, Midway between roundabout and Dooley Inn.	Industrial/ roadside	No	627934	234257	25	N/A	Y
FLX35	Dooley Inn signpost at front.	Industrial/ roadside	No	627959	234258	77	N/A	Y
FLX36	Street Sign in Hodgkinson Road.	Industrial/ roadside	No	627989	234279	110	N/A	Y
FLX37	Lamp post at Ferry Lane on corner of Hodgkinson Rd	Industrial/ roadside	No	628012	234272	133	N/A	Y
FLX38	Lamp post on Ferry Lane, past Hodgkinson Rd.	Industrial/ roadside	No	628130	234280	220	N/A	Y

6.2 Monitoring data

Annual mean NO_2 concentrations from the diffusion tubes have been bias adjusted according to the relevant laboratory and preparation method. The local authority and Port of Felixstowe use different methods for the diffusion tubes, so a different bias adjustment factor has been applied (see Appendix B for further details).

Table 5 provides the annual mean concentrations measured at the nine local authority sites close to the AQMA for the period 2008-2014. Data from the urban background site in Felixstowe (FLX21) are also given as a comparison as this site is not affected by emissions associated with the port.

Table 5: Long term annual mean NO_2 concentrations at diffusion tube sites in the vicinity of the Felixstowe AQMA

Site ID	Within AQMA?	Annual mean concentration bias adjusted (µg/m³) *(Adjustment factor used for 2014 = 0.81)*						
		2008	2009	2010	2011	2012	2013	2014*
FLX21	No	27	25	24	25	22	22	19
FLX26 a,b,c	**Yes**	**42**	**45**	**43**	**40**	36	37	36
FLX27 a,b,c	**Yes**	36	38	33	36	33	32	32
FLX32 a,b,c	**Yes**	~	~	~	37	34	32	29
FLX33	No	~	~	~	**66**	**60**	**58**	**55**
FLX34	No	~	~	~	**51**	**46**	**42**	**45**
FLX35	No	~	~	~	**48**	**44**	**41**	**43**
FLX36	No	~	~	~	41	37	36	36
FLX37	No	~	~	~	**48**	**43**	**41**	**42**
FLX38	No	~	~	~	39	34	32	33

*All diffusion tubes had a 100% data capture rate in 2014 except for FLX33 which had a 92% data capture rate.

Data from the diffusion tube sites run by the Port of Felixstowe on the port itself are given in **Table 6**. A map of these sites is given in Appendix A.

Table 6: Long term annual mean NO_2 concentrations at diffusion tube sites on the Port of Felixstowe

Site ID	Within AQMA?	Annual mean concentration bias adjusted (µg/m³) *(Adjustment factor used for 2014 = 0.91)*							
		2007	2008	2009	2010	2011	2012	2013	2014
2 (Mallard House)	No	**50**	**47**	**46**	**47**	**45**	**42**	38	39.8
3 (Stores Car Park)	No	**49**	**48**	**43**	**45**	**42**	39	38	39.7
4 (Pier Hose LT7113)	No	~	35	31	36	32	34	32	28.3*
5 (Pier House LT7120)	No	~	34	30	35	29	34	32	26.4

Site ID	Within AQMA?	Annual mean concentration bias adjusted (µg/m^3) *(Adjustment factor used for 2014 = 0.91)*							
		2007	2008	2009	2010	2011	2012	2013	2014
6 (Landguard Eng LT7404)	No	~	36	29	31	28	29	26	27.1
7 (90 Park LT7403)	No	~	32	30	32	29	29	27	26.7
8 (90 Park LT7410	No	~	30	28	28	28	25	25	24.1
9 (75 Park (LT7402)	No	~	37	35	40	33	31	28	29.6*
10 (75 Park (LT7507)	No	35	30	30	31	27	28	30	23.2*

*Sites annualised as monitoring ceased in June 2014 (see Appendix C). All other tubes had a data capture rate of 92% or greater.

Concentrations in the AQMA

Since the Action Plan was finalised in 2012/13 the results of diffusion tube monitoring show that annual mean NO_2 concentrations within the AQMA have fallen below the relevant objective and the three diffusion tube sites within the AQMA have measured concentrations below the objective for the last three years (see **Table 5**). The concentration at FLX26, which is the worst-case location, situated on the front façade of the Dooley Inn facing Ferry Lane is the only site where the annual mean NO_2 objective has been exceeded in the past. Between 2008-2010, concentrations were above the objective and in 2011, concentrations were equal to the objective. FLX26 continues to record the highest concentrations in the AQMA, with levels holding at between 36-37µg/m^3.

Concentrations outside the AQMA

The local authority monitoring sites outside of the AQMA do not represent relevant exposure. However, site FLX33 records the highest annual mean NO_2 concentrations, (55 µg/m^3 in 2014). This site is located 5 metres from the kerbside of Dock Gate 2 roundabout at the port boundary. Concentrations are found to decline away from Dock Gate 2 roundabout along Ferry Lane, towards The Dooley Inn (FLX34 and 35) and past it, to FLX38. The main source of emissions at Dock Gate 2 is from HDVs entering and leaving the port. Emissions from these vehicles also play part in contributing to the concentrations seen within the AQMA. The Further Assessment report found that emissions from HDVs contributed to 29% of concentrations at the AQMA [5]. This gradient in measured concentrations is shown in **Figure 8** (i.e. green being low, yellow marginal and red exceeding the air quality annual NO_2 mean objective)

There is no relevant exposure to the annual mean objective on the port itself, but the monitoring data shows that the highest concentrations are recorded at Mallard House and the stores car park which are closet to Dock Gate 2 (see map in Appendix A). The annual mean objective has not been exceeded on the port since 2012. Similarly to the measured concentrations in the AQMA, levels of NO_2 have fallen at all sites in Felixstowe. These trends are considered further in Section 3.

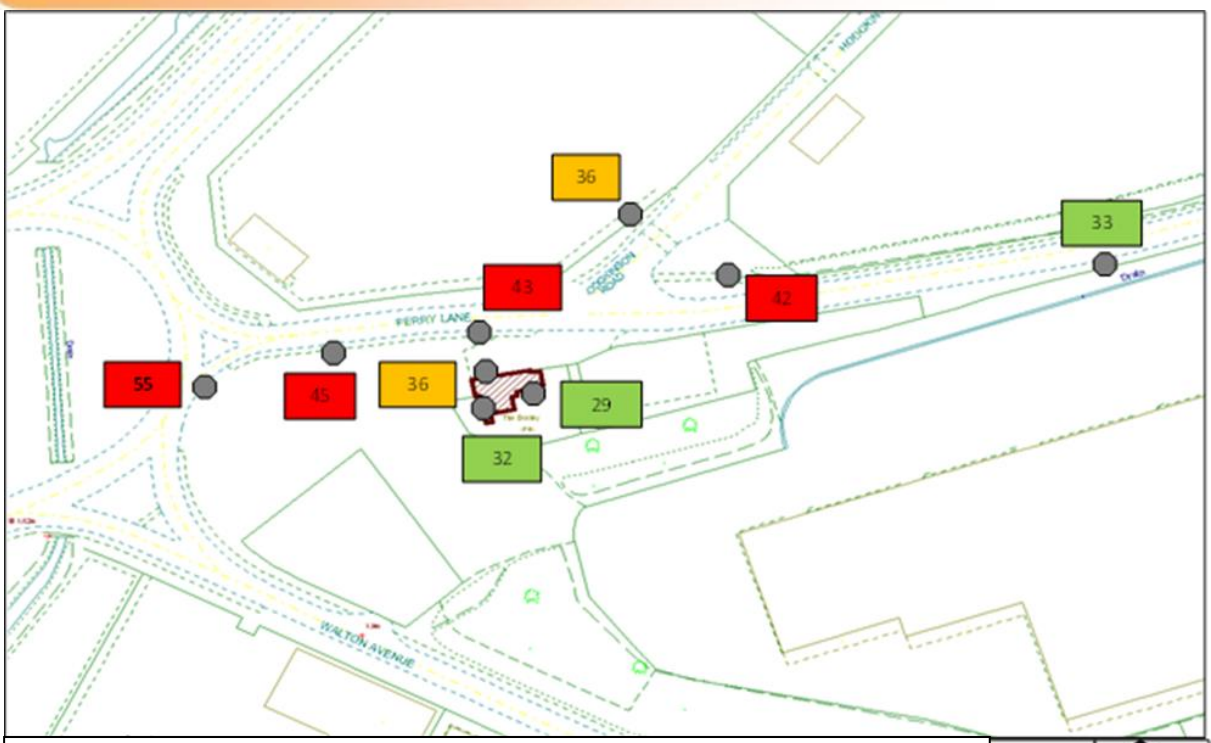


Figure 8: 2014 annual mean NO_2 concentrations in the vicinity of the Felixstowe AQMA

7 Trends

According to Defra's technical guidance [4], when considering whether to revoke an AQMA, local authorities should consider measurements for several years or more (i.e. three to five years). They should also investigate national trends and local influences that may be affecting the AQMA. For this reason, the three years' worth of data showing compliance with the objective at the Felixstowe AQMA is considered sufficient. However, the guidance also states that when conducting trend analysis, ideally more than five years' worth of data should be assessed to demonstrate whether trends are statistically significant. The reason for this is because changes in concentrations occur from year to year due to weather conditions. This section therefore considers trends in measured annual mean NO_2 concentrations for the longest time period possible. Data from monitoring sites within Felixstowe have been compared to trend data from local and national background sites.

7.1 Comparison of trends in NO_2 concentrations within the AQMA

The trends in annual mean concentrations measured within the AQMA have firstly been compared to the urban background site within Felixstowe. These data are given in **Figure 9**, for the period from 2008-2014.

The graph shows that although concentrations exhibit a small year on year variability and were generally highest in 2009, the overall trend is for concentrations to have declined since 2008. Concentrations in the AQMA have been below the annual mean objective since 2011, when the value was equal to the objective at FLX26. Since 2010, the annual mean concentrations measured within the AQMA have declined by a maximum of 16% (at FLX26), compared to a reduction in the background concentration of 21% over these five years.

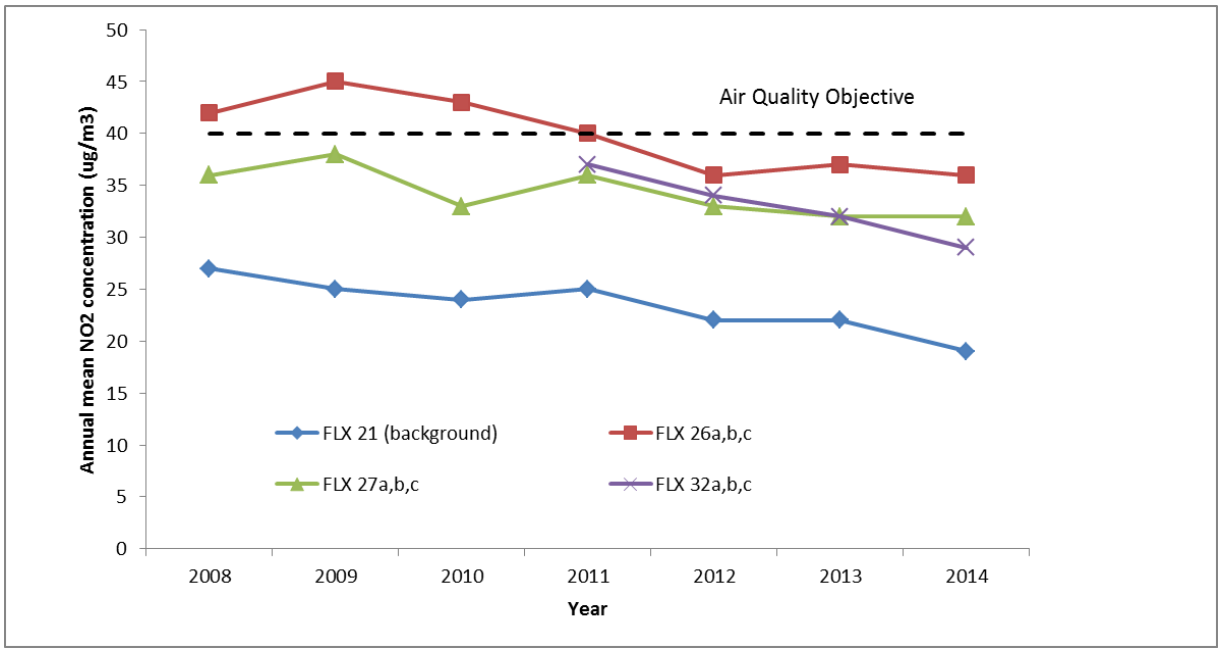


Figure 9: Trends in annual mean NO_2 concentrations in the Felixstowe AQMA compared to urban background

7.2 Comparison of trends in NO_2 concentrations outside the AQMA

Measured concentrations at diffusion tube sites outside of the AQMA in the Port of Felixstowe have also been compared to the local background site. These data are shown in **Figure 10**, for the period 2007-2014 where data are available. As for concentrations within the AQMA, there is a variation in the levels each year, with the highest recorded concentrations found in 2009 and 2010. The meteorological conditions in these years may have been less favourable for pollution than in other years. Although the majority of monitoring sites had a reduction in concentrations in the last year, there were small increases in 2014 compared to 2013 at a few sites (e.g. FLX34 and 35).

For those sites that had data available since 2010, the overall reduction in measured annual mean concentrations for the last five years varied between 12% to a maximum reduction of 26% on the port. Measured concentrations were also found to exhibit a tendency to decline across Suffolk Coastal's entire diffusion tube monitoring network (including Felixstowe sites), with an average reduction of 15% between 2010-2014, similarly to that seen within the Felixstowe AQMA and slightly lower than that found at the local urban background site (FLX21).

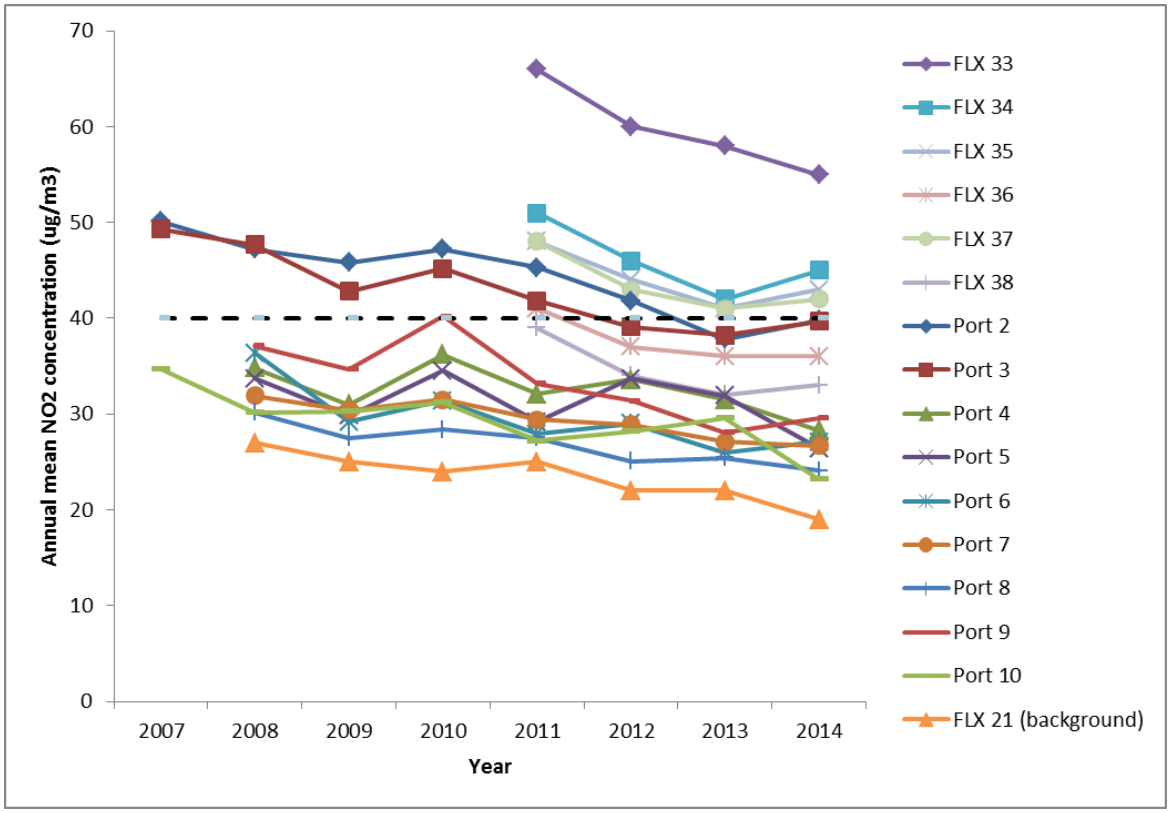


Figure 10: Trends in annual mean NO_2 concentrations outside the Felixstowe AQMA compared to urban background

7.3 Comparison of national trends in NO_2 concentrations

The trend in annual mean NO_2 concentrations in Felixstowe can also be compared to the trends in concentrations at the nearest national background sites run by Defra as part of their Automatic, Urban and Rural Network (AURN). This comparison is given in **Figure 11**, for the AQMA sites, two urban background sites (Thurrock and Southend) and two more rural background sites (St Osyth and Wicken Fen). The data from three of these national background sites were relatively stable over these five years, except for at

Wicken Fen where annual mean concentrations reduced by 32% to a value lower than 10 µg/m^3. The year on year variability was slightly different, with the national sites exhibiting a slight increase in 2012, which was not seen in Felixstowe.

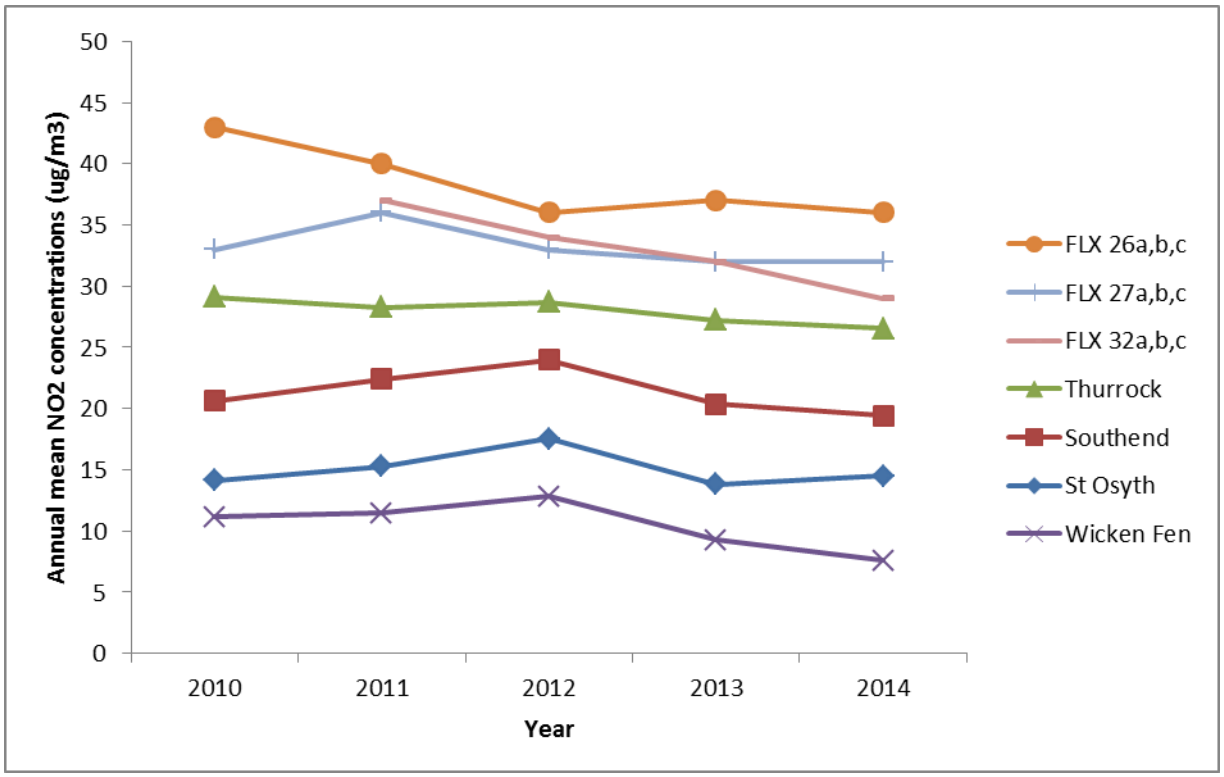


Figure 11: Trends in annual mean NO_2 concentrations outside the Felixstowe AQMA compared to urban background

7.4 Summary of trends

Defra's technical guidance [4] recommends that in situations where air quality monitoring data are being analysed, relatively long-term data series are required. They suggest that at least three years of data might be needed to indicate the effects of an intervention or to revoke an AQMA, whilst even longer-term information (five years or more) would be needed to show a statistically significant long term change. Long term datasets reduce the risk of random year-on-year variation due to changes in weather and other local circumstances.

Based on the most recent air quality monitoring data and trends over the last three to five years, it is clear that annual mean NO_2 concentrations are declining in the Port of Felixstowe, potentially at a higher rate than concentrations at nearby background sites. Measured concentrations are now below the objective in the AQMA and based on the trend analysis and the progress on measures to reduce emissions associated with the port (see Section 4), it is considered very unlikely that the objective will be exceeded in the AQMA in the future.

The local authority will continue to monitor NO_2 concentrations within the AQMA and along Ferry Lane. The number of monitoring sites within Ferry Lane may be reduced at some point in the future as these are not located at relevant receptors.

8 Action Plan Progress

8.1 Introduction

The local authority and Port of Felixstowe (PoF) have been proactive in working together to develop and implement the air quality action plan in an effort to try and reduce emissions from activities associated with the port. The final action plan was agreed in 2012, although work on some of the thirteen measures had already begun. To date, seven of these measures are now complete – three by Suffolk Coastal District Council and four by the Port of Felixstowe. All other measures which are the responsibility of the port of Felixstowe are on-going.

The Further Assessment suggested that emissions from the container handling operations at the Port (including vehicles on the road within the Port boundary) are the largest contributor to the concentrations measured at the AQMA, with emissions from heavy duty vehicles (HDVs) on roads outside the Port boundary being the second largest contributor. This is recognised by the Port Authority, and they have undertaken a vast and costly amount of work to successfully reduce emissions from the main sources from within their site, and from Dock Gate 2 roundabout. Despite the fact that productivity (throughput) has increased at the port, measured NO_2 concentrations have continued to decline.

8.2 Summary of progress

A full summary of progress made on all measures within the action plan is given in the 2015 USA Report [8], but a summary of some of the measures already implemented or ongoing that have helped to reduce emissions is given here.

Measure 2c – Identify Section 106 Planning gain opportunities and Measure 5c – Develop Supplementary Planning Document (SCDC)

All relevant planning applications for the district are assessed for their impacts on air quality, particularly with respect to declared AQMAs. SCDC ensure that any new, relevant, planning applications are received and commented on with regard to air quality. Further information regarding new developments in this area is given in Section 5 of this detailed assessment.

Measure 3a – Evaluate and implement efficient power technologies (PoF)

The Port has purchased 22 eco-Rubber Tyred Gantry Cranes (RTGs) which have smaller engines to allow them to run at maximum efficiency - leading to emission reductions. Sections of the Trinity Terminal were converted in 2014 to accommodate four fully electric RTGs (eRTGS) and a further 14 eRTGs are been installed in 2015. The Port has an ongoing commitment to increase the eRTGs over the next few years up to 50. This programme has the potential to reduce total diesel use at the port by up to 30%.

Measure 3d – Adopt NOx abatement technologies on Internal Movement Vehicles (IMVs) (PoF)

The Port has purchased 55 new IMVs in the last two years and all will be fitted with selective catalytic reduction (SCR) systems to decrease NOx concentrations in exhaust emissions. These vehicles comply with Euro III emission standards which is a significant improvement over the ones replaced, which met Euro I emission requirements.

Additional measures implemented (PoF)

- The Port of Felixstowe released a mobile phone app in 2014 to give customers up-to-date container status information. Users can track the status of a container through the port in real time and be notified when a container is ready for collection. This measure is helping to reduce unnecessary trips by HDVs around the port.
- In 2015 the first ever Ultra Large Container Ship designed to run on liquefied natural gas (LNG) made its maiden call at the Port of Felixstowe. These vessels are highly efficient which reduces significantly the amount of fuel they use, and therefore the emissions they create, per container.
- The Port is starting investigations to look at the possibility of using LNG to run ships whilst they are in berth rather than diesel.
- A 190m extension to Berth 9 will open in 2015 with 3 giant electric RTGs delivered mid-2015 for this extension. Due to the amount of containers that these larger ships can carry, and improved technology making emissions cleaner, the amount of emissions to air per container is much reduced.
- Felixstowe Logistics Park, the latest warehousing and logistics will be located within the Port's perimeter and accessed from internal roads close to Dock Gate 1. See Section 5 for more information on this development.
- Work is continuing in order to dual the Felixstowe Branch Line which should be open by 2019. This will increase the number of trains that can run each day from 30 to 48 thereby helping to increase the amount of freight moved by rail to and from the Port.
- Two new Rail Mounted Gantry cranes (RMGs) have been installed at the North Rail Terminal. These will help increase the volume of freight that can be moved by rail.
- The Port has recently opened Dock Gate 1 at night and they are encouraging hauliers to use this, particularly when accessing the Ro-Ro ferries. This measure will reduce the traffic around Dock Gate 2 which is closer to the AQMA.

9 New Developments which may have an effect on air quality

9.1 Planning polices

Suffolk Coastal District Council adopted their Core Strategy in 2013 and they are currently drawing up their new Local Plan to set out all planning policies and actions for future development up to 2027 and beyond. As these plans are being developed, the Council continues to have regard to the remaining 'saved' policies from the previously adopted Local Plan until these are replaced.

The Council has started the first stages of consultation on an Area Action Plan for the Felixstowe Peninsula to identify the scale and distribution of new development appropriate for the area. This action plan is planned for adoption by the end of 2016.

9.2 Developments on the port

Port of Felixstowe Logistics Park

The Port of Felixstowe submitted an application for a 1.45 million ft^2 logistics park (warehousing) within the Port perimeter in 2015. The logistic park aims to allow businesses to deal with their freight before moving it on either by ship, rail or road. Access from the berths to the warehousing will all be via internal roads and the logistics park's main external access will be via Dock Gate 1.

An air quality assessment for the logistics park was submitted in May 2015. This modelling assessment concluded that the magnitude of change at all receptors, included those within the AQMA was considered to be imperceptible with the development in place in 2016. For example, at receptors within the AQMA, the increase in annual mean NO_2 concentrations due to the development was predicted to be 0.03 $\mu g/m^3$. The annual mean objective was shown to have been met in 2016 within the AQMA [9].

There were likely to be some site specific mitigation measures required to reduce any residual impacts associated with construction. This could be done by adopting suitable construction dust mitigation measures and ensuring that HDVs use Dock Gate 1 rather than Dock Gate 2 through a planning condition.

9.3 Development proposed or planned in the near vicinity

High bay distribution centre at Clickett Hill, Trimley St Mary

This planning application has planning consent although work has yet to be started. The distribution centre will be located on the A14 Port of Felixstowe Road and take bulk containerised goods from the Port of Felixstowe and reprocess them for onward distribution. Onward distribution will be via container back to the Port or onto an HDV for

onward road distribution. The centre will have 369 car parking spaces and 168 spaces for HDV parking and will operate 24 hours a day.

An air quality assessment was submitted which modelled air quality at receptor locations on the road network including in the AQMA. The distribution centre was found to add to the HDV traffic using Dock Gate 2 roundabout near to the AQMA. The assessment predicted increases in concentrations of 0.2 µg/m^3 for NO_2 and 0.02µg/m^3 PM_{10} at the site of the AQMA with the development in place. Given the current annual mean concentration at the AQMA, these increases were considered not to result in a significant air quality impact.

These small cumulative increases in NO_2 concentration resulting from both developments when they are in place is unlikely to result in future exceedences of the annual mean objective within the AQMA.

Mixed use development, Candlet Road in Felixstowe

The only other relevant application is an Outline Planning Permission for up to 560 dwellings, including a Local Community Centre, a 60 Bedroom extra Care Home and 50 assisted Living Units, 2 small Business Units and open space provision with associated Infrastructure. This is based at Candlet Road in Felixstowe which is approximately 3 km from the AQMA. This application has been refused but is being appealed. However, it is unlikely to have an impact on the AQMA even if approved.

10 Conclusion

This detailed assessment has assessed the following evidence to demonstrate with confidence that the air quality objective for annual mean NO_2 is met within the Felixstowe AQMA and that there are unlikely to be any exceedences in the future:

- Recent annual mean NO_2 monitoring data in the AQMA and vicinity
- Long term annual mean NO_2 trends from local and national sites
- Existing and future measure to reduce emissions
- New or planned developments or sources that may increase emissions

There is strong evidence from local and nearby national monitoring sites for a downward trend in NO_2 concentrations over the last three to five years and there have been no measured exceedences of the objective in the AQMA since 2011, when the concentration at the worst case receptor (FLX26) was equal to the objective at 40 $\mu g/m^3$. Based on this evidence, it is expected that this downward trend in concentration will be maintained. The local authority will continue to monitor NO_2 concentrations within the AQMA and along Ferry Lane. The number of monitoring sites within Ferry Lane may be reduced at some point in the future as these are not located at relevant receptors.

Since the publication of the air quality action plan, the local authority and Port of Felixstowe have been proactive in working together to implement measures to reduce emissions from activities on the port from emissions from HDVs accessing the port – the two major source contributions to emissions. These measures include:

- Use of more smaller, more efficient and electric Rubber Tyred Gantry Cranes to replace the existing larger diesel cranes
- Purchase of newer internal movement vehicles fitted with selective catalytic reduction (SCR) systems to meet newer emission standards
- Reduction of emissions from HDV traffic using the port via Dock Gate 2 through better management of arrivals, increased use of rail for freight movements and increased used of Dock Gate 1 which is further away from relevant receptors.
- Improvements to shipping including increasing the sizes of berth to allow larger more efficient ships to use the port and investigating the potential for ships to run on liquefied natural gas in berth rather than diesel.
- Encouraging hauliers to use Dock Gate 1 instead of Gate 2 to reduce traffic close to the AQMA.

Despite an increase in throughput in the port, the implementation of these measures have assisted to reduce NO_2 concentrations. Furthermore, a similar decline in measured levels are occurring further away from the port.

There are currently two major developments proposed for the area which have the potential to add to the number of HDVs. However, with mitigation measures in place, it is expected that these developments will not lead to a significant increase in annual mean NO_2 concentrations. Modelled data from the logistics park development shows that concentrations at the diffusion tube sites within the AQMA and receptors (at first floor

height) are predicted to be below the annual mean objective in 2016 with the development in place [9].

As a result of this evidence, it is recommended that the Felixstowe AQMA at Dooley Inn, Ferry Lane should be revoked. Suffolk Coastal District Council agree with this recommendation and will proceed to consult with Defra and other statutory bodies regarding this decision.

References

1. *Environment Act 1995*, Chapter 25. HMSO, 1997.

2. *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volume 1 and 2)*. Report by the Department of Environment, Food and Rural Affairs in partnership with the Scottish Executive, Welsh assembly Government and Department of the Environment Northern Ireland. DEFRA Publications, July 2007.

3. *Part IV of the Environment Act 1995, Local Air Quality Management, Policy Guidance. LAQM.PG(09).* Report by the Department of Environment, Food and Rural Affairs in partnership with the Scottish Executive, Welsh assembly Government and Department of the Environment Northern Ireland. DEFRA Publications, February 2009.

4. *Part IV of the Environment Act 1995, Local Air Quality Management, Technical Guidance. LAQM.TG(09).* Report by the Department of Environment, Food and Rural Affairs in partnership with the Scottish Executive, Welsh assembly Government and Department of the Environment Northern Ireland. DEFRA Publications, February 2009.

5. *Further Assessment for the Air Quality Management Areas at Ferry Lane, Felixstowe*. Prepared by Transport Research Laboratory under contract to Suffolk Coastal District Council, April 2010

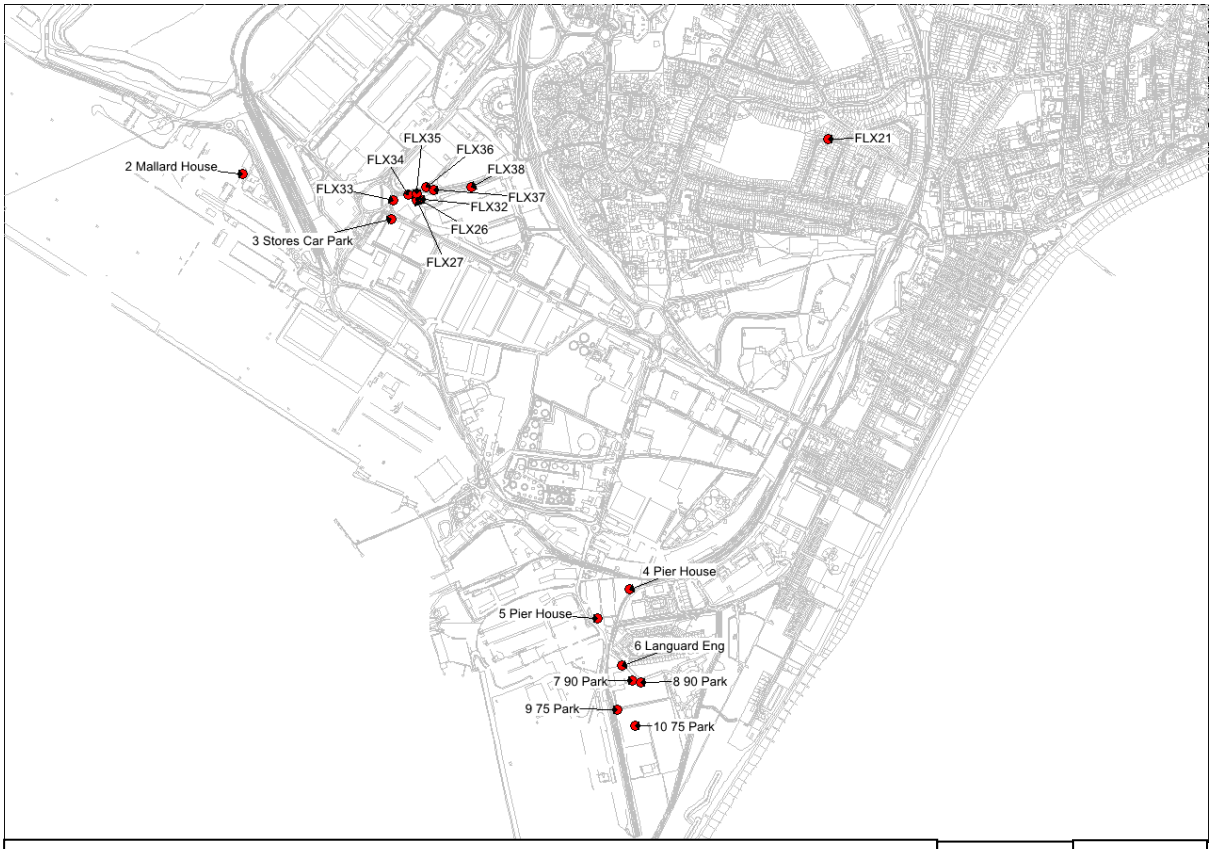
6. *Local Air Quality Management Action Plan for the Air Quality Management Area at Ferry Lane Felixstowe*. Prepared by Transport Research Laboratory under contract to Suffolk Coastal District Council, September 2012.

7. *2014 Air Quality Progress Report for Suffolk Coastal District Council. Produced by Suffolk Coastal District Council*, December 2014.

8. *2015 Air Quality Updating and Screening Assessment for Suffolk Coastal District Counci*l. Produced by Suffolk Coastal District Council, July 2015.

9. *Port of Felixstowe Logistics Park. Air Quality Assessment*. Royal Haskoning DHV, May 2015.

Map of Diffusion Tubes around the Port



1 cm = 0.1 km

NO_2 Diffusion Tube Bias Adjustment Factor

The analytical laboratory used for supply and analysis of the local authority NO_2 diffusion tubes is Environmental Scientifics Group (ESG) based in Didcot. The tubes are prepared by spiking acetone:triethanloamine (TEA) (50:50) onto the grids prior to the tubes being assembled. The tubes are then desorbed with distilled water and the extract analysed using a segmented flow auto-analyser with ultraviolet detection. The laboratory is formally accredited under the United Kingdom Accreditation Scheme (UKAS). The Port of Felixstowe using a different laboratory (Gradko) which uses 20% TEA in water.

Combined "national" bias adjustment factors for UK diffusion tube laboratories, based upon Local Authority co-location studies throughout the UK, are provided on behalf of Defra and the Devolved Administrations. The national bias adjustment factor given for ESG, Didcot in 2014, in the March 2015 edition of 'National Spreadsheet of Bias Adjustment Factors' was 0.81, using results from 22 different studies.[6] For Gradko, this adjustment factor is 0.91 based on 21 different studies.

These factors were applied to annual mean concentrations to the relevant diffusion tubes in this report.

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

Short term adjustment

Three diffusion tube sites operated by the Port of Felixstowe ceased in June 2014 (LT7 507, LT7 402 and LT7 113). Therefore their data capture rate for 2014 was 50%, which meant that the data needed to be adjusted (annualised) to represent an annual mean for the year. To do this, the methodology given in the Technical Guidance was followed and an average adjustment factor of 1.01 was calculated based on data from nearby background monitoring sites on Defra's automatic, rural and urban monitoring network – AURN (see table below). The data capture rates from the three chosen sites were above 90%. Wicken Fen was not used as the site had a data capture rate of 73% in 2014.

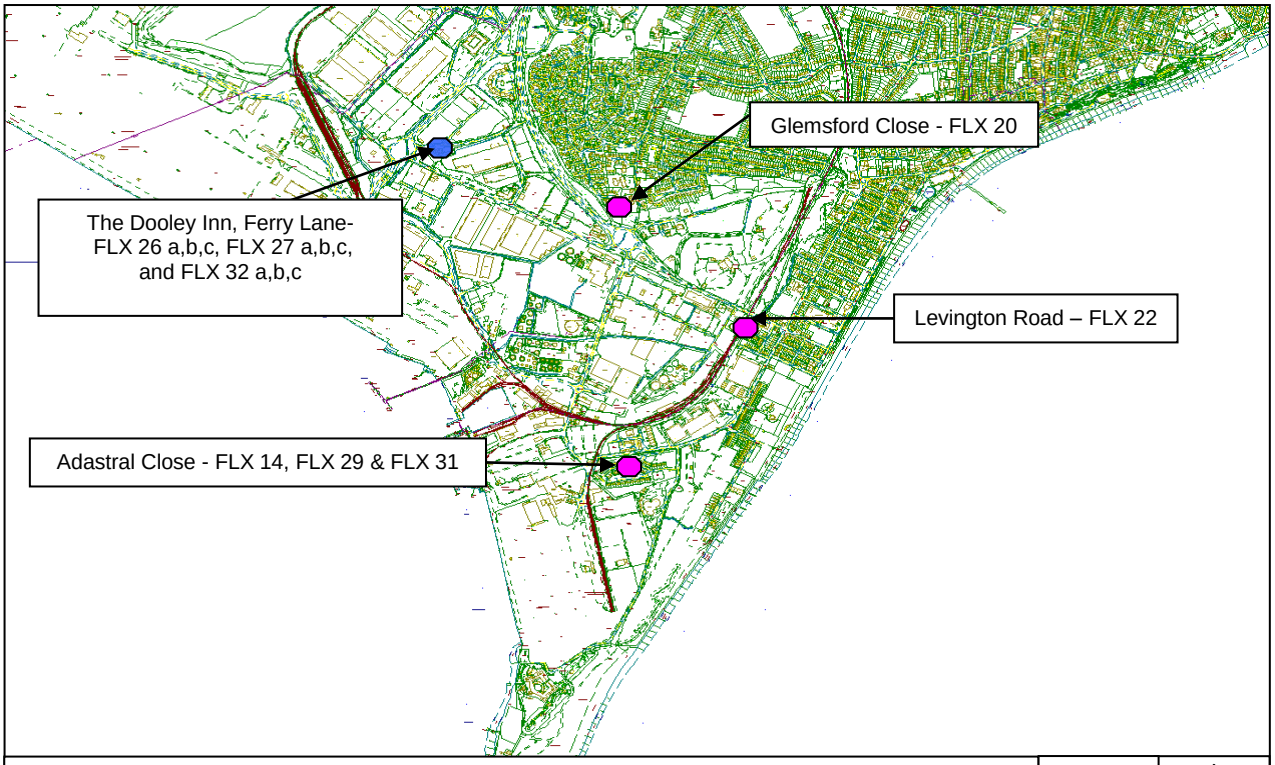
This adjustment factor was applied to the raw diffusion tube concentrations and this was then bias adjusted.

AURN monitoring site	Annual mean (Jan-Dec 2014)	Period mean (Jan-June 2014)	Adjustment factor (annual mean/period mean)
St Osyth	14.51	14.47	1.00
Southend	19.43	19.2	1.01
Thurrock	26.26	25.95	1.02
Average			**1.01**

Appendix D: Map(s) of Monitoring Locations

Felixstowe Maps

Map 1: Map of diffusion tube locations at Adastral Park, Levington Road, Glemsford Close and The Dooley Inn



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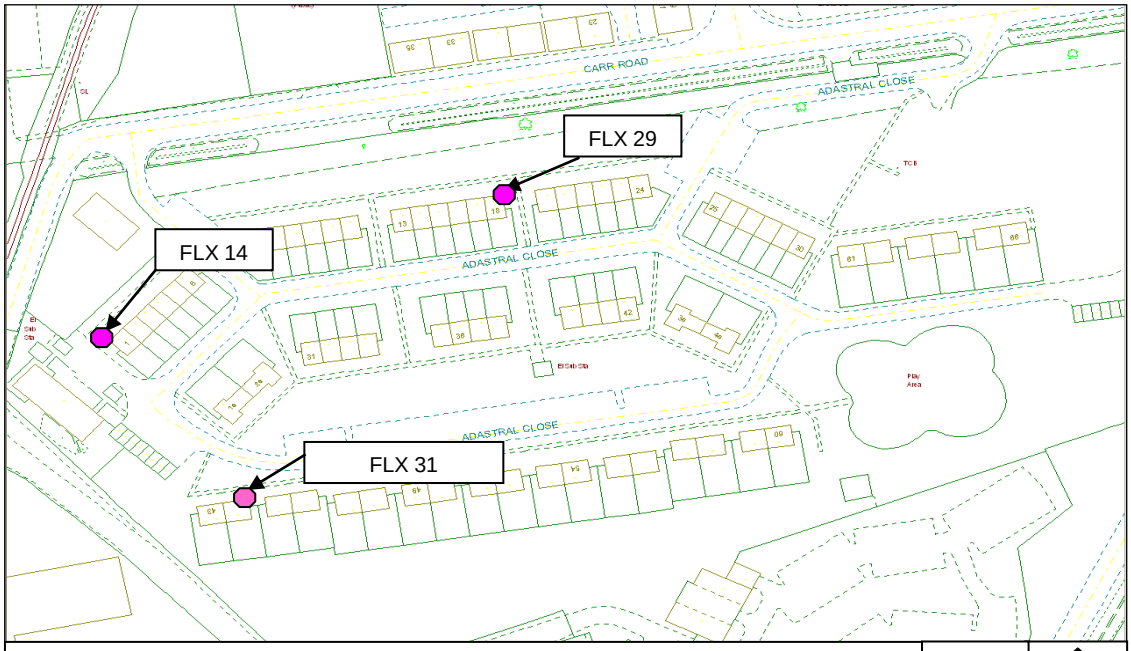
Not to scale

N

Single Diffusion tube site Triplicate diffusion tube site

Map 2 Detailed map of diffusion tube locations at Adastral Close



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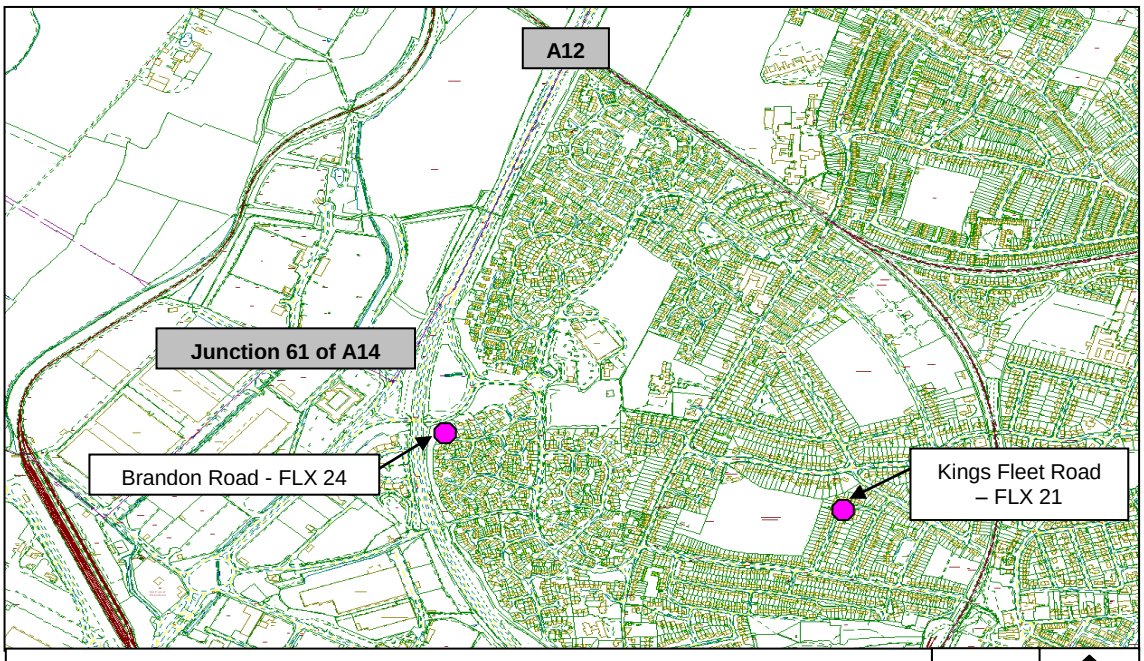
Single Diffusion tube site

Map 3 Map of diffusion tube locations at Kingsfleet Road and Brandon Road



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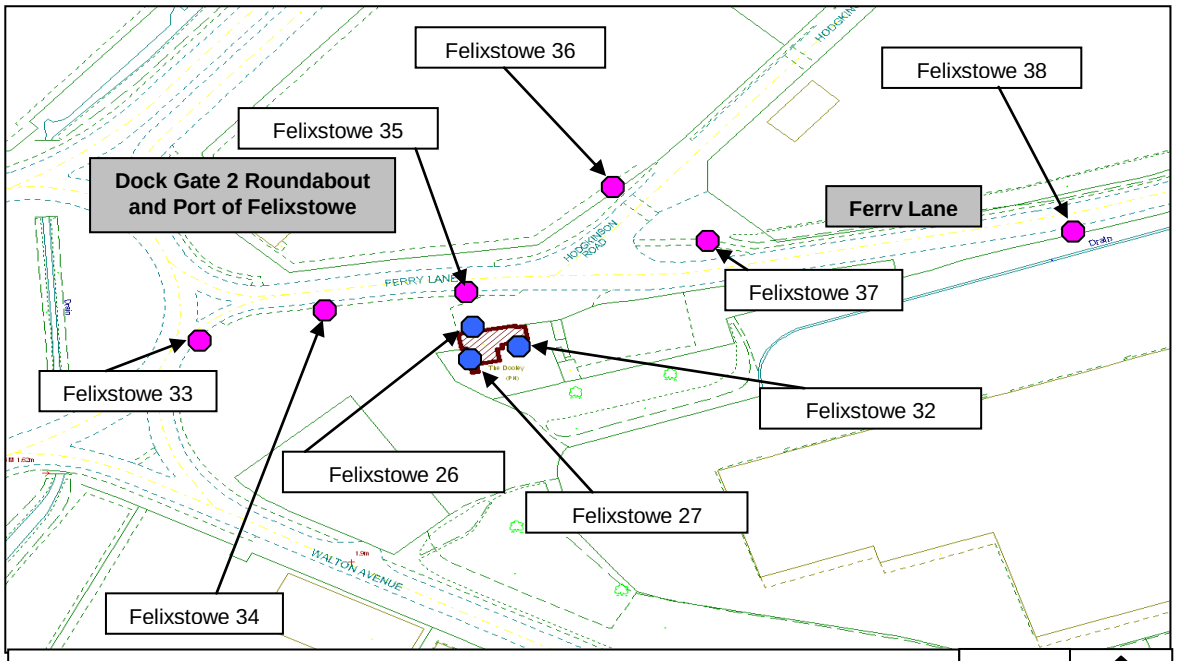
Single Diffusion tube site

Map 4 Map of diffusion tube locations around the Dooley Inn



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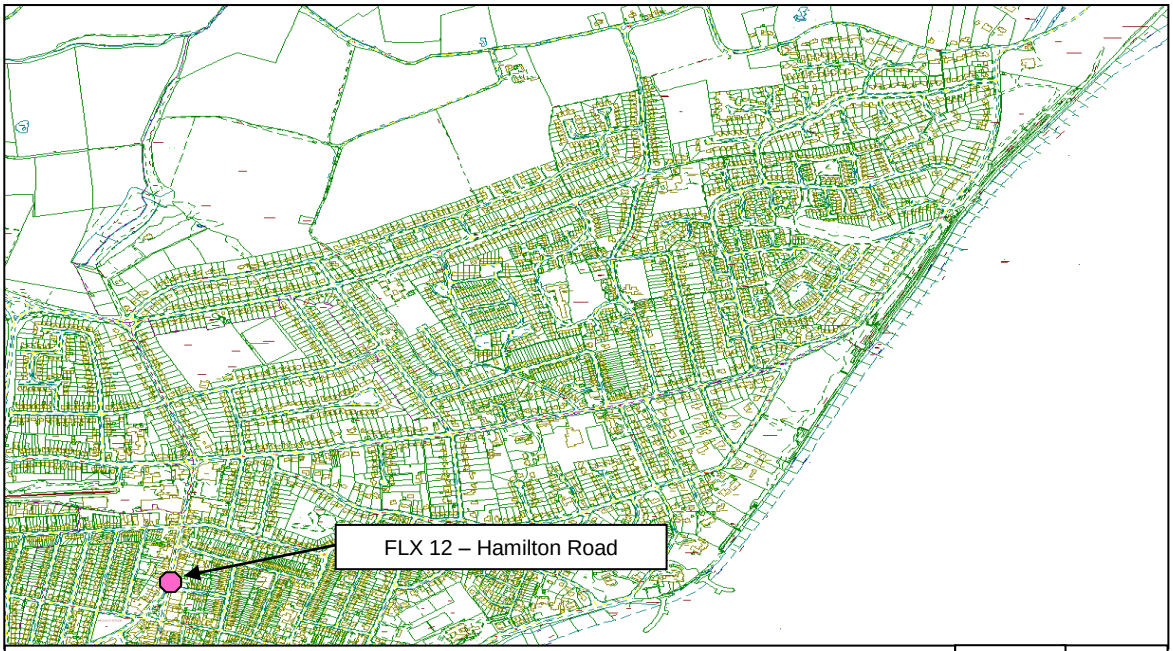
Single Diffusion tube site Triplicate diffusion tube site

Map 5 Map of diffusion tube location at Hamilton Road



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Not to scale

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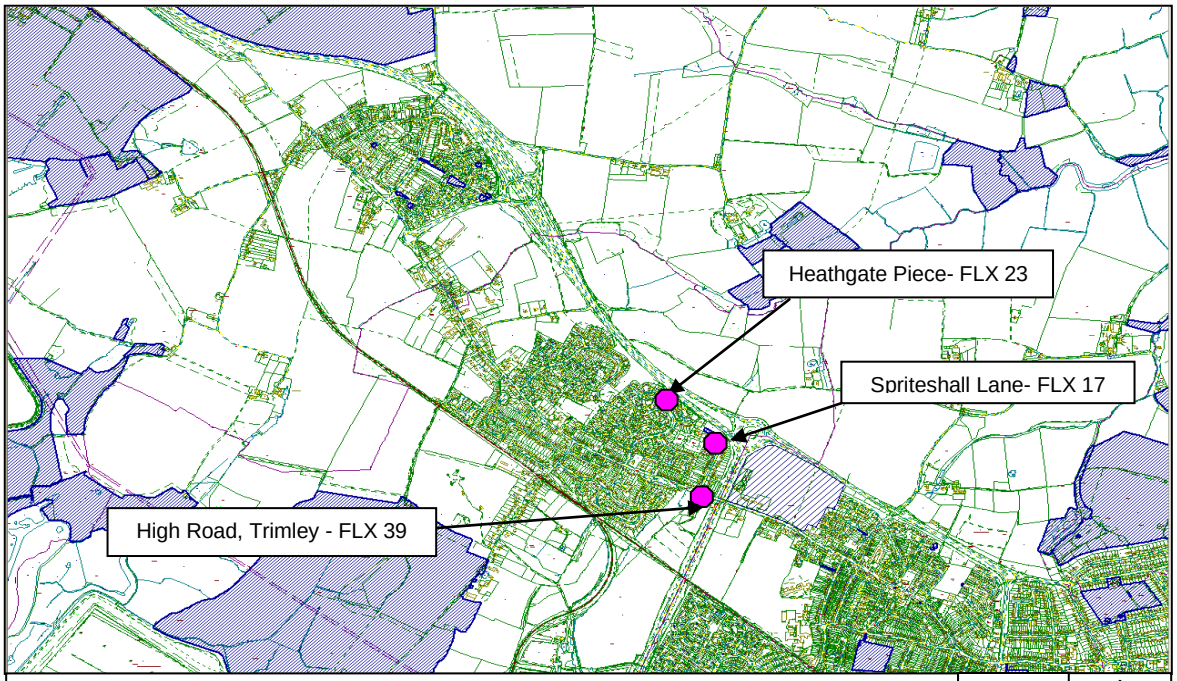
Single Diffusion tube site

Map 6 Map of diffusion tube locations at Heathgate Piece, Spriteshall Lane and High Road, Trimley



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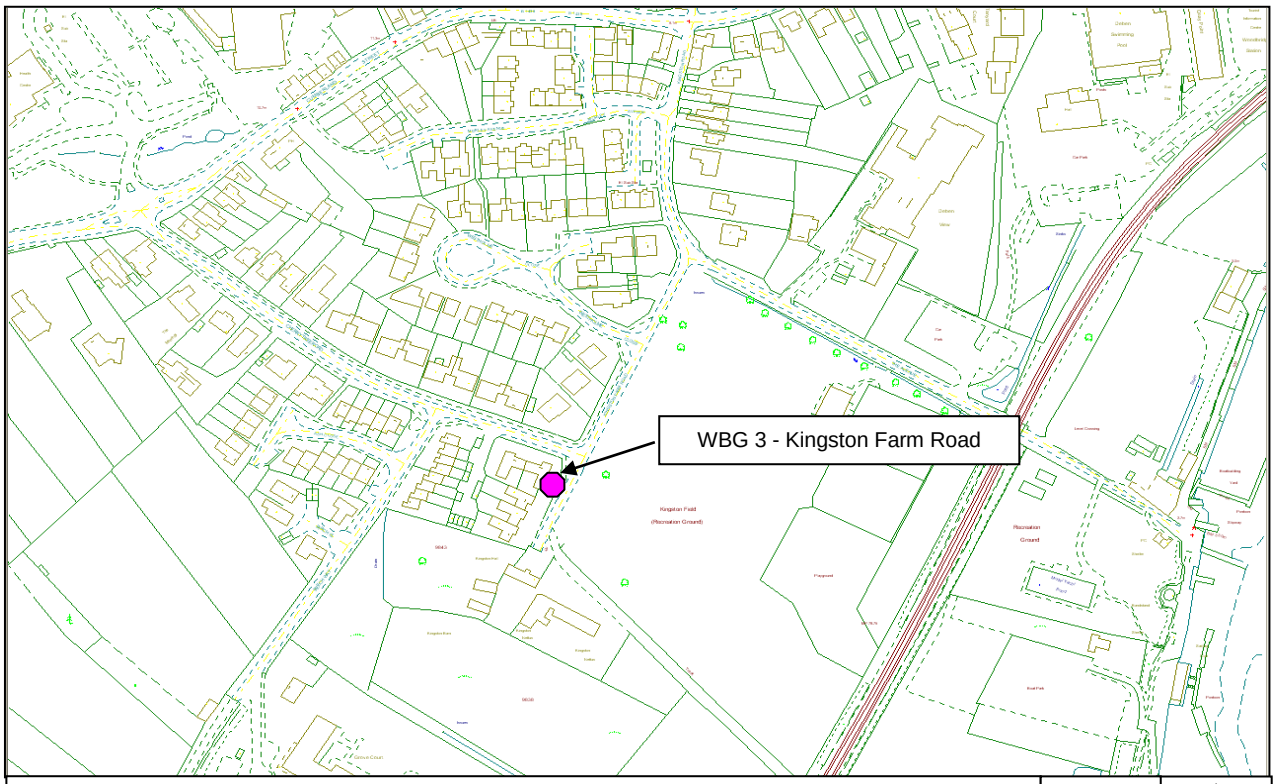
Single diffusion tube site

Woodbridge Maps

Map 7 Map showing diffusion tube location at Kingston Farm Road.



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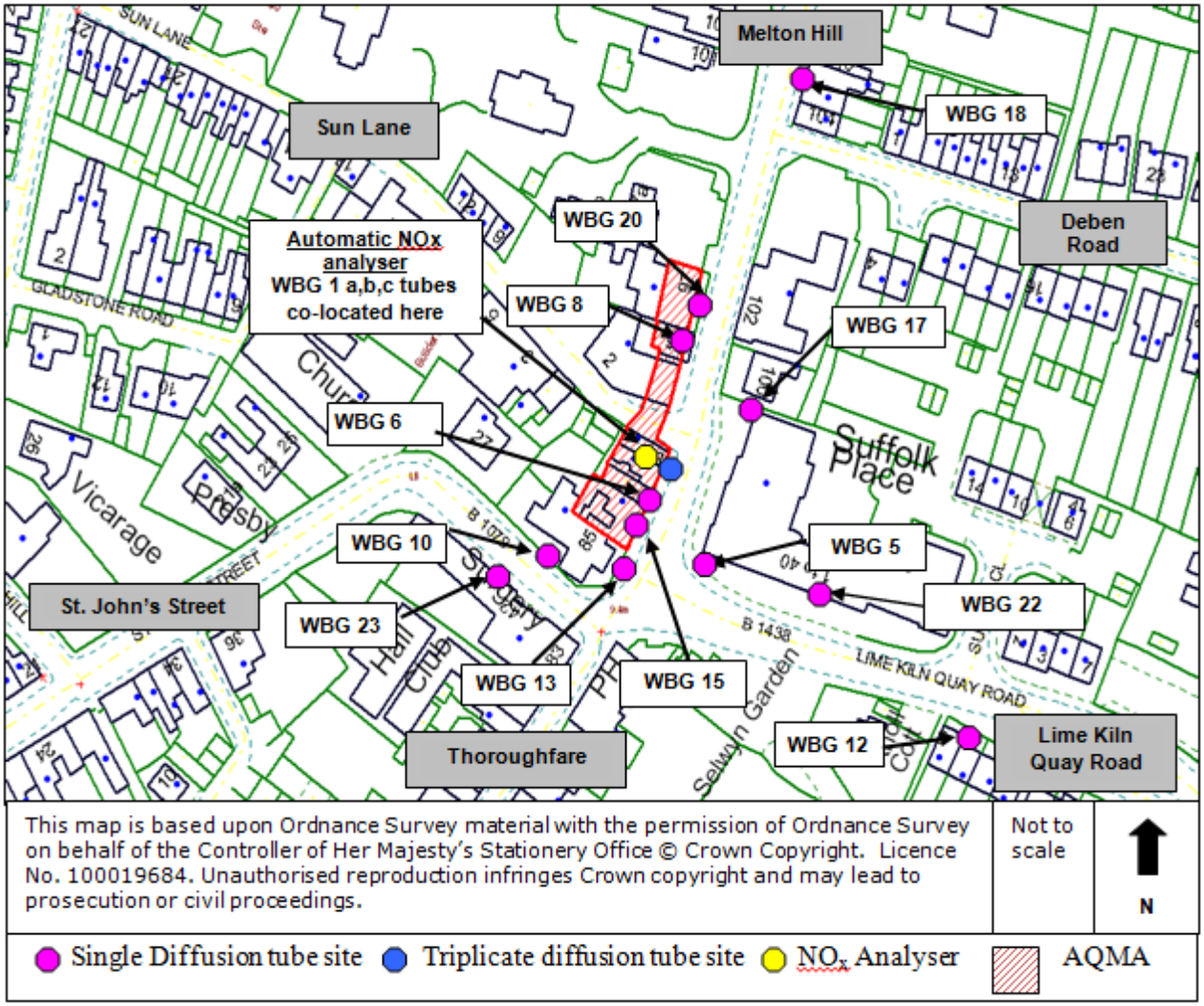
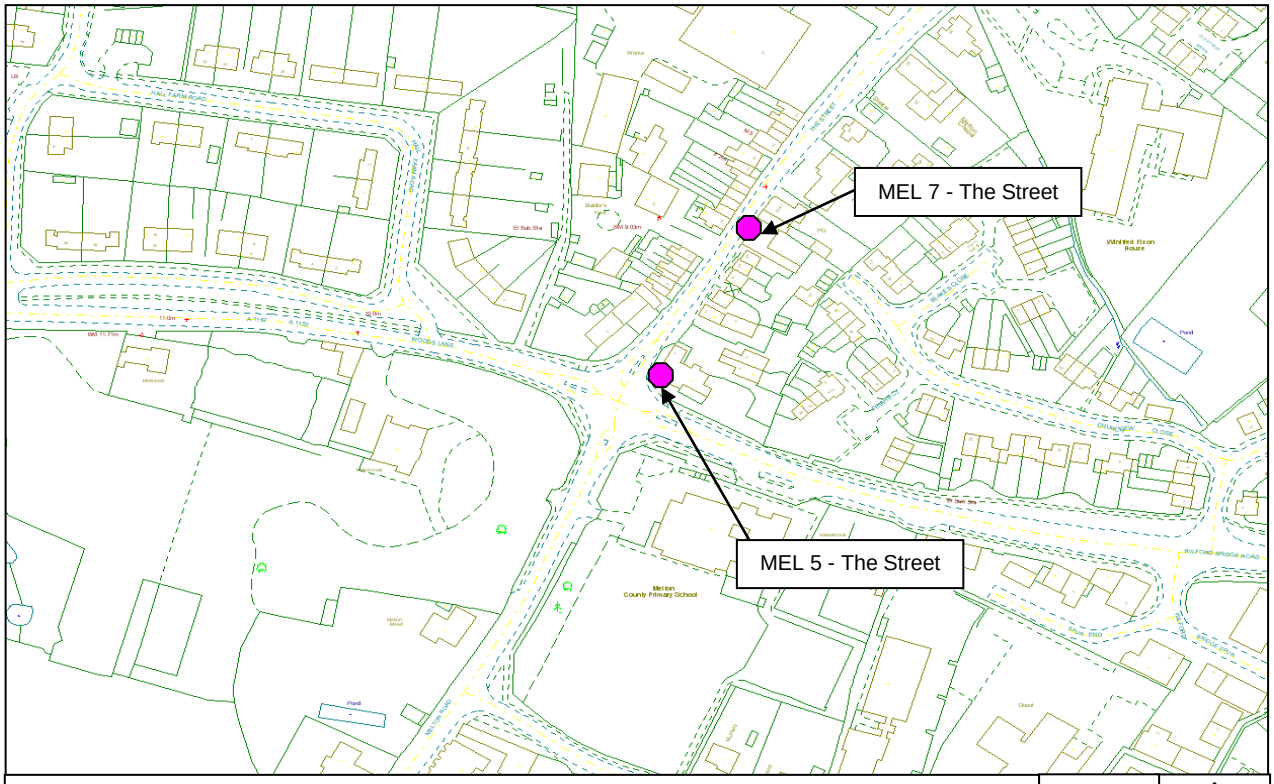
Single Diffusion tube site

Map 8 Map showing diffusion tube locations around the AQMA



Melton Map

Map 9 Map showing location of the diffusion tubes at Melton



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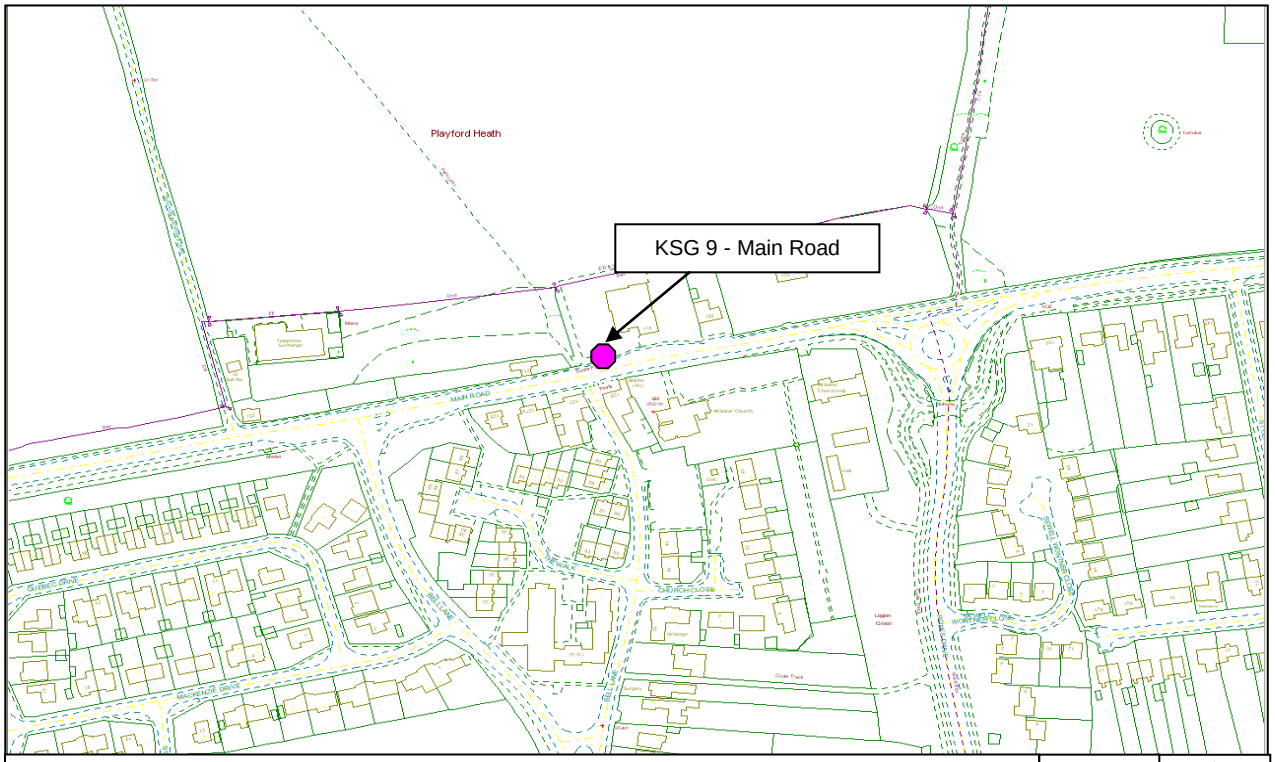
Not to scale

N

Single Diffusion tube site

Kesgrave Map

Map 10 Map showing location of the diffusion tube at Kesgrave



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Not to scale

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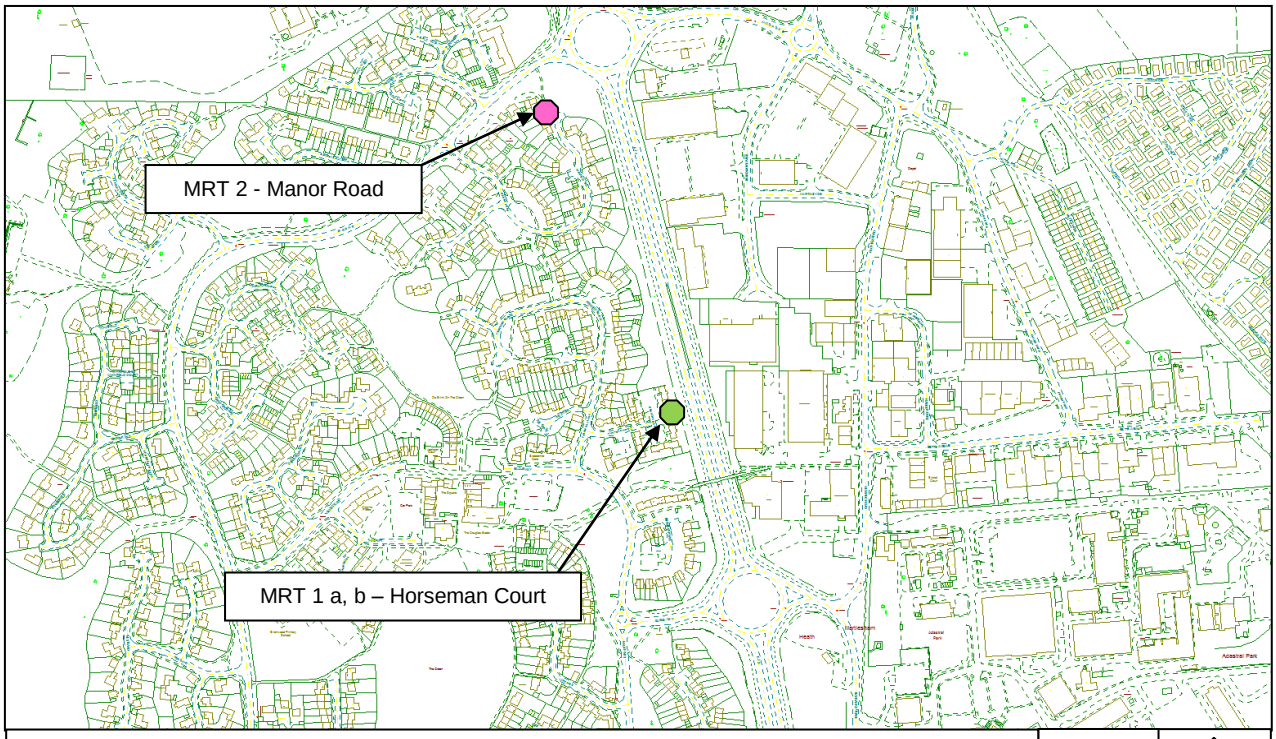
Single Diffusion tube site

Martlesham Map

Map 11 Map of diffusion tube location at Martlesham



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Not to scale

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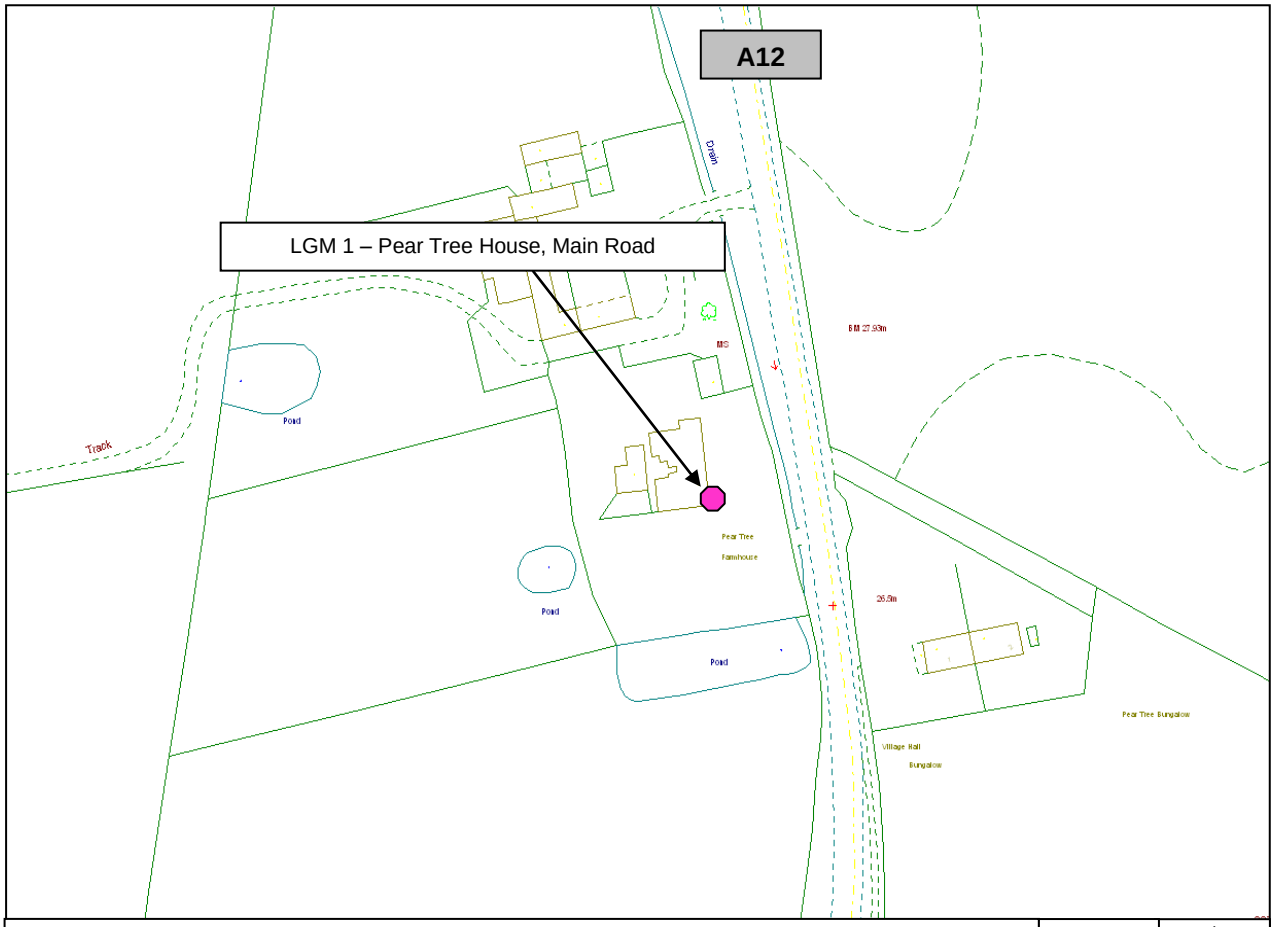
Duplicate diffusion tube site

Single Diffusion tube site

Little Glemham Map

Map 12 Map of diffusion tube locations at Little Glemham



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Not to scale

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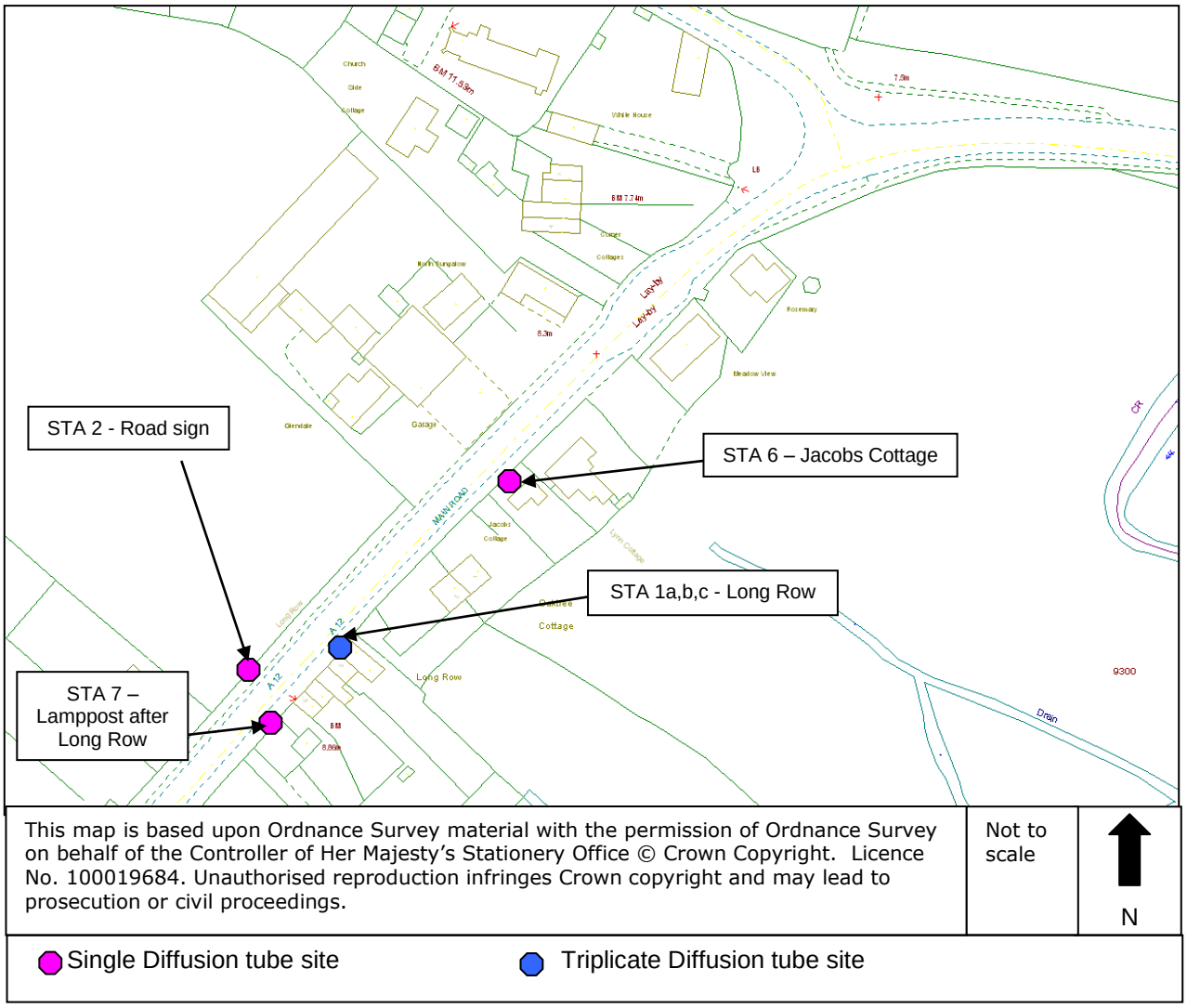
Single Diffusion tube site

Stratford St Andrew Map

Map 13 Map showing diffusion tube locations at Stratford St Andrew



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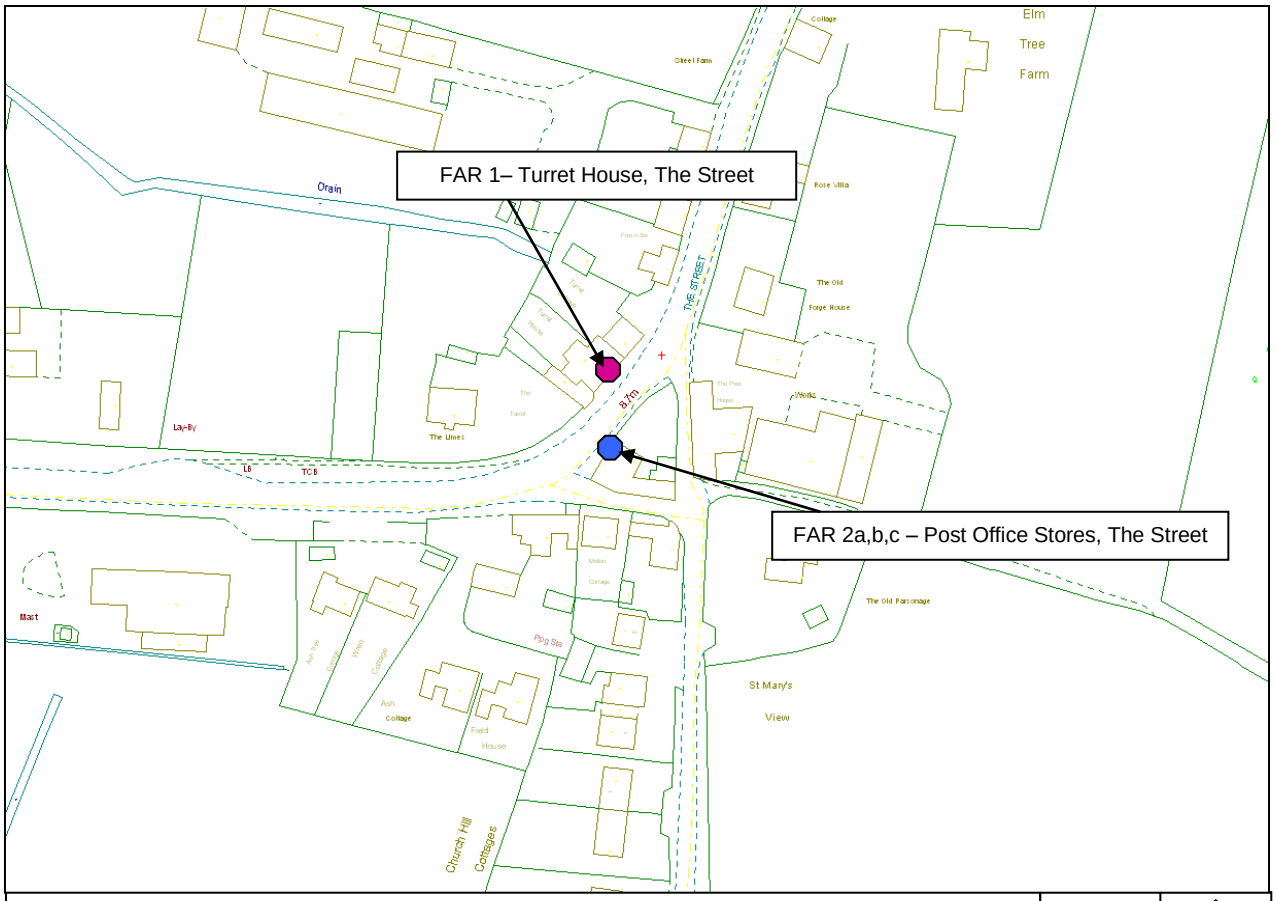
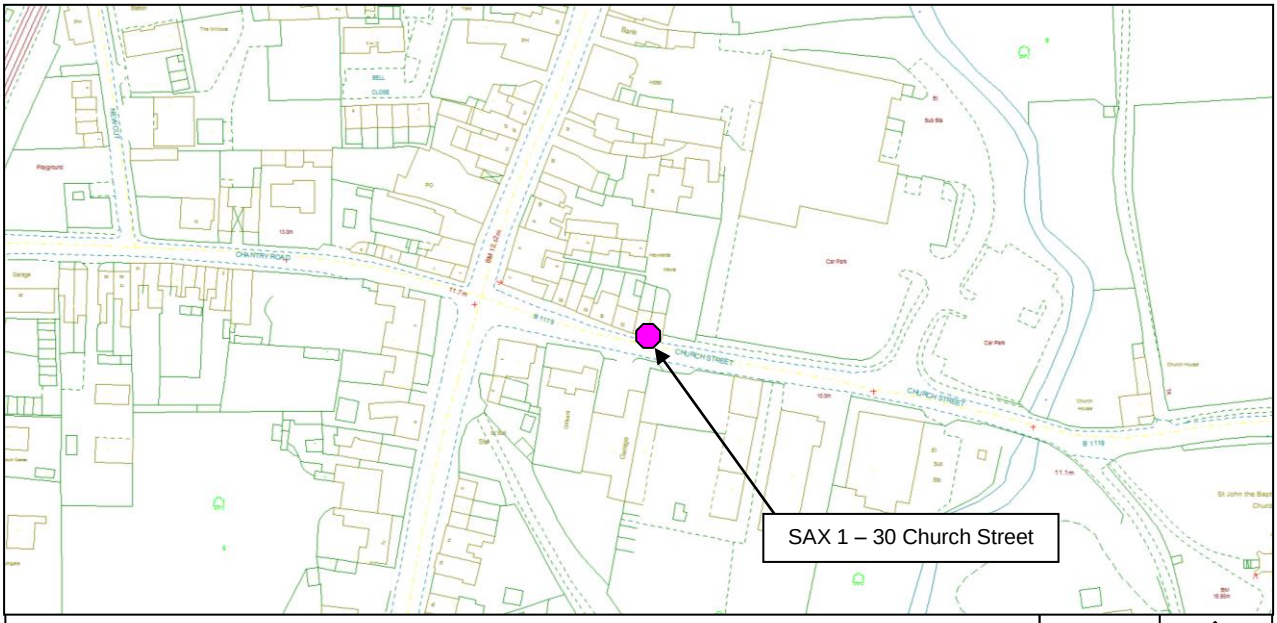
Farnham Map

Map 14 Map showing diffusion tube locations at Farnham



Saxmundham Map

Map 15 Map showing diffusion tube location Church Street, Saxmundham



Not to scale

N

Single Diffusion tube site

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[7]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[7] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
…	…

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