




BOROUGH COUNCIL OF KING'S LYNN AND WEST NORFOLK

LAQM ANNUAL PROGRESS REPORT 2010

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Submitted to	Dave Robson		Fabia Pollard
Prepared by	Patricia Bowe Samantha Munn Gavin Tivey		
Signature			
Approved by	Erwan Corfa		
Signature			
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Executive Summary

Part IV of the Environment Act 1995 places a statutory duty on local authorities to review and assess the air quality within their area and take account of Government Guidance when undertaking such work. This Progress Report is a requirement of the Fourth Round of Review and Assessment and is a requirement for all local authorities. The Report has been undertaken in accordance with the Technical Guidance LAQM.TG (09) and associated tools (as updated in 2010).

This Progress Report considers all new monitoring data and assesses the data against the Air Quality Objectives. It also considers any development changes that may have an impact on air quality as well as updating on any relevant strategy and policy changes.

Having considered the latest monitoring data and development updates, it is concluded that the air quality objectives for benzene, 1, 3-butadiene, carbon monoxide, lead, particulates (PM₁₀) and sulphur dioxide will be met. There is no requirement to undertake a detailed assessment for these pollutants. Updated results from NO₂ monitoring sites installed across the borough show that 13 sites exceeded the annual mean objective, with 11 of these within the King's Lynn AQMAs. However there are two sites showing exceedence outside the AQMAs that are not representative of public exposure for the annual mean objective and a Detailed Assessment is not required for these sites.

Consent was granted for a phased development of 125 homes on Wootton Road to the north of the Gaywood AQMA. The potential impacts on air quality and especially on the AQMA will need to be considered in the next USA in 2012.

There is one new industrial installation identified in the borough, Freedom Farm MRF Engine in Hockwold, for which an air quality assessment was carried out with the conclusions that there would be no breach of the UK air quality objectives.

The proposed King's Lynn Combined Cycle Gas Turbine Power Station in Willows Business Park, Saddlebow Road, King's Lynn was granted permission in 2009. The Council's environmental quality team were consulted on this application for which an air quality impact assessment was submitted. Conditions were placed on the consent requiring a Construction Environmental Management Plan (CEMP) to show how dust, airborne pollutants and smoke would be controlled and mitigated during construction.

Proposed actions arising from this Progress Report are as follows:

- Continue with current continuous automatic monitoring programme for NO₂ at Southgates Road in King's Lynn;
- Continue with NO₂ diffusion tube monitoring in the Borough, especially in the King's Lynn AQMAs and along other parts of the town centre outside the AQMAs;
- Progress to a 2011 Annual Progress Report, to be completed by April 2011.

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1 Introduction

1.1 Description of Local Authority Area

The Borough of King's Lynn & West Norfolk covers approximately 550 square miles (142,877 hectares) and is essentially rural in nature. The Borough includes the two market towns of King's Lynn and Downham Market, the Victorian coastal town of Hunstanton, and comprises of more than one hundred villages of varying sizes. The Borough is located about 100 miles north of London and stretches from the north Norfolk coast, along the eastern side of The Wash, through the Marshland, Fens and Brecks to the borders of Lincolnshire, Cambridgeshire and Suffolk. The Borough is the tenth largest district council area in England and Wales. In 2003, the population of King's Lynn & West Norfolk was estimated at approximately 137,900 (source: ONS).

King's Lynn is an important nodal point, where major transport routes converge, including a trunk road (A47) and three principal roads (A10, A17 and A134); a direct, electrified rail service to London and Cambridge; an extensive system of inland navigable waterways; and sea links to the northern and eastern Europe. The town lies some forty miles from the other regional centres of Cambridge, Norwich and Peterborough.

The main source of air pollution in the Borough is road traffic emissions, notably along the A148 (London Road / Gaywood Road / Wootton Road) going through King's Lynn town centre. Other pollution sources, including commercial, industrial and domestic sources, also make a contribution to background pollution concentrations.

Two Air Quality Management Areas (AQMA) have been declared in King's Lynn where exceedences of the annual mean Air Quality Strategy (AQS) objective for nitrogen dioxide (NO₂) were identified, mainly due to traffic congestion.

Another AQMA has previously been declared in 2002 in South Quay, King's Lynn, where the loading of grain onto vessels, highlighted as a potential source of fugitive PM₁₀ emissions, contributed to the exceedence of the PM₁₀ daily mean AQS objective. The AQMA was revoked in 2006 following the implementation of an Air Quality Action Plan and evidence that PM₁₀ levels met the objective.

1.2 Purpose of Progress Report

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to Local Air Quality Management (LAQM) in England are set out in the Air Quality (England) Regulations 2000 (SI 928), and the Air Quality (England) (Amendment) Regulations 2002 (SI 3043). They are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre µg/m³ (for carbon monoxide the units used are milligrams per cubic metre, mg/m³). Table 1.1 includes the number of permitted exceedences in any given year (where applicable).

Table 1.1 - Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 µg/m ³	Running annual mean	31.12.2003
	5.00 µg/m ³	Running annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m ³	Running annual mean	31.12.2003
Carbon monoxide (CO)	10.0 mg/m ³	Running 8-hour mean	31.12.2003
Lead	0.5 µg/m ³	Annual mean	31.12.2004
	0.25 µg/m ³	Annual mean	31.12.2008
Nitrogen dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m ³	Annual mean	31.12.2005
Particles (PM ₁₀) (gravimetric)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m ³	Annual mean	31.12.2004
Sulphur Dioxide (SO ₂)	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Between 1999 and 2003, the Borough Council of King's Lynn & West Norfolk undertook its first round of Review and Assessment of air quality, which concluded that PM₁₀ and NO₂ levels were likely to exceed the AQS objectives at a number of locations in King's Lynn. As a result, the Council declared two AQMAs, one in South Quay (for PM₁₀) in April 2002, and another one in Railway Road (for NO₂) in November 2003. The South Quay AQMA was revoked in June 2006 following the effective implementation of an Air Quality Action Plan for the area.

The second round of Review and Assessment began with an Updating and Screening Assessment (USA), completed in 2003. The report concluded that there had been no significant changes since the first round and that it was not necessary to carry out a Detailed Assessment at that time. However, the subsequent Progress Report (2004) recommended proceeding to a Detailed Assessment of NO₂, following new monitored exceedences of the annual mean objective outside the AQMA in King's Lynn. The Detailed Assessment (2005) confirmed that exceedences were likely to occur at several sites outside the AQMA, and as a result, made a recommendation to extend the AQMA to encompass properties along Railway Road, Blackfriars Road and London Road.

The third round of Review and Assessment began with the USA, completed in 2006. The report provided an update with respect to air quality issues within the Borough since the previous round. A number of changes made to the technical guidance for the Review and Assessment process since the second round (Technical Guidance LAQM.TG(03)) were taken into account for this assessment. Having considered each pollutant, the USA concluded that the AQS objectives for benzene, 1,3-butadiene, carbon monoxide, lead, PM₁₀ and sulphur dioxide were still being met and that no further assessment was required for these pollutants.

The report also recommended (following the conclusions of the Detailed Assessment 2005) that monitoring of NO₂ be continued in the Borough to validate the proposal to extend the Railway Road AQMA in King's Lynn. The Council approved a variation order (February 2007) to extend the AQMA, which now includes all of Railway Road, Austin Street, Blackfriars Road, St James Road and London Road. The current extent of the AQMA is shown in Figure 1.1.

Modelling undertaken by a neighbouring Local Authority, Fenland District Council, also predicted potential exceedences of the NO₂ annual mean AQS objective along Elm High Road in Wisbech. The area lies on the border of the Borough of King's Lynn & West Norfolk; therefore, both local authorities deployed additional diffusion tubes in the area to confirm the modelling results.

The Progress Report carried out in 2007 confirmed that NO₂ concentrations were still exceeding the objective at the majority of the monitoring sites in the AQMA; justifying its extension. It also concluded that a Detailed Assessment for NO₂ in Wisbech was not required, as new monitoring results were below the AQS objective. However, new available NO₂ monitoring results showed an exceedence of the objective at the 'Wootton Road 2' diffusion tube in the Gaywood Clock area of King's Lynn. This site is located about 1200m east of the extended AQMA in the town centre; therefore, it was recommended that a Detailed Assessment be carried out in this area.

The Detailed Assessment, which also included the Further Assessment of the Railway Road AQMA, was completed in 2008. The report concluded that a new AQMA in the Gaywood Clock area was required, as both updated monitoring data and predicted NO₂ concentrations confirmed that the AQS annual mean objective was likely to be exceeded. The new AQMA was declared in April 2009, for an area encompassing properties at the junction of Wootton Road, Gayton Road and Lynn Road. The Gaywood AQMA is shown in Figure 1.2.

The Further Assessment confirmed that the extended Railway Road AQMA in King's Lynn Town Centre was still valid and should remain, as both monitoring and modelling confirmed exceedences of the AQS objective. The source apportionment results showed that cars are the main contributors with respect to high levels of NO₂ in the AQMA, followed by buses, HGVs and LGVs, while background pollution levels also contribute significantly.

The 2009 USA took into consideration changes to the Technical Guidance LAQM.TG(09) and concluded that although exceedences of NO₂ were still recorded in the Borough, these were confined to the existing AQMAs. Pollutant concentrations outside the AQMAs met the objectives and no Detailed Assessment was required.

The Further Assessment of the Gaywood Clock AQMA has been completed. This provides an update with regards to the extent of the AQMA and the contribution of all sources of pollution towards the overall NO₂ levels in the area.

Figure 1.1 - King's Lynn AQMA 1 – Railway Road (Town Centre)

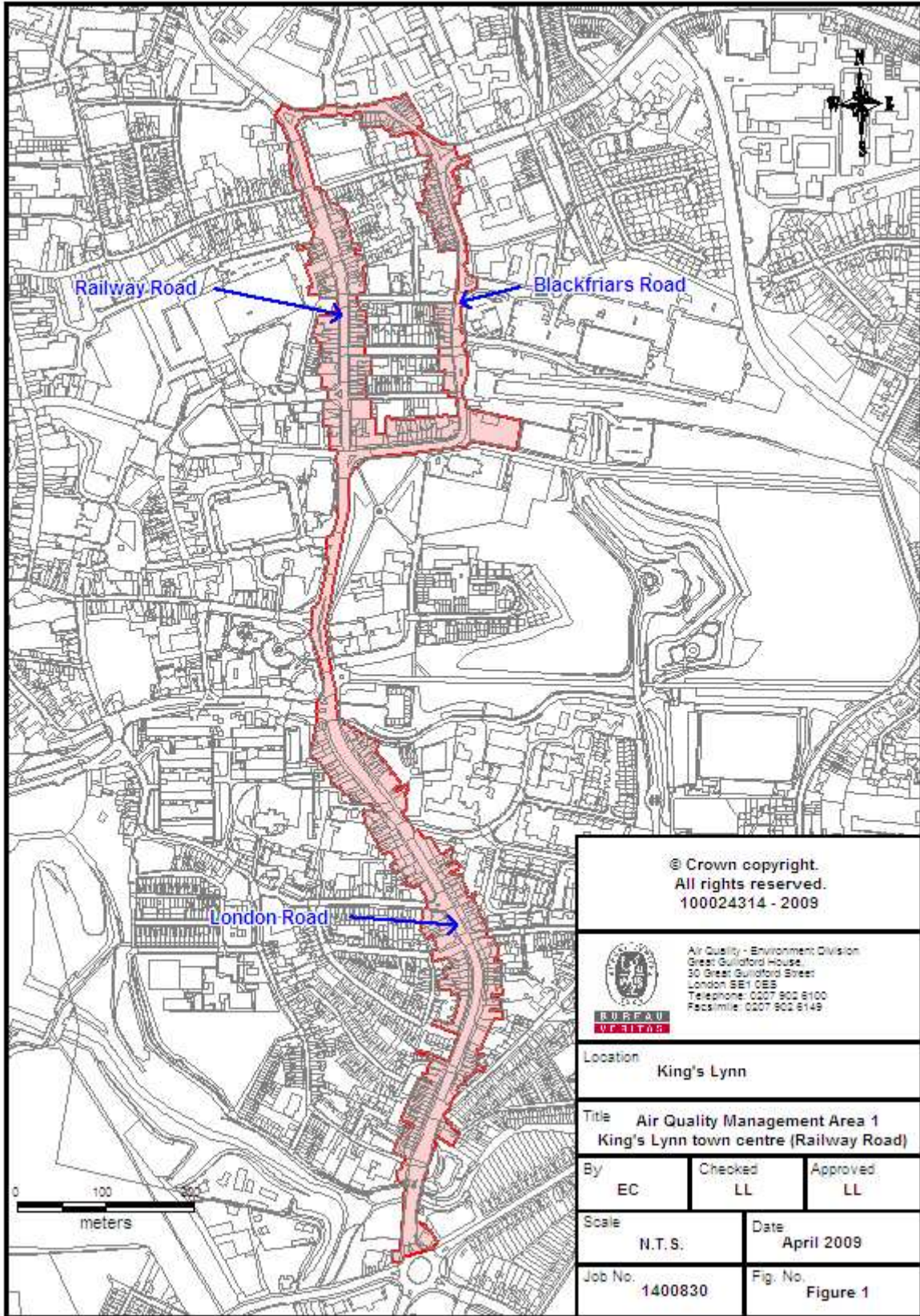
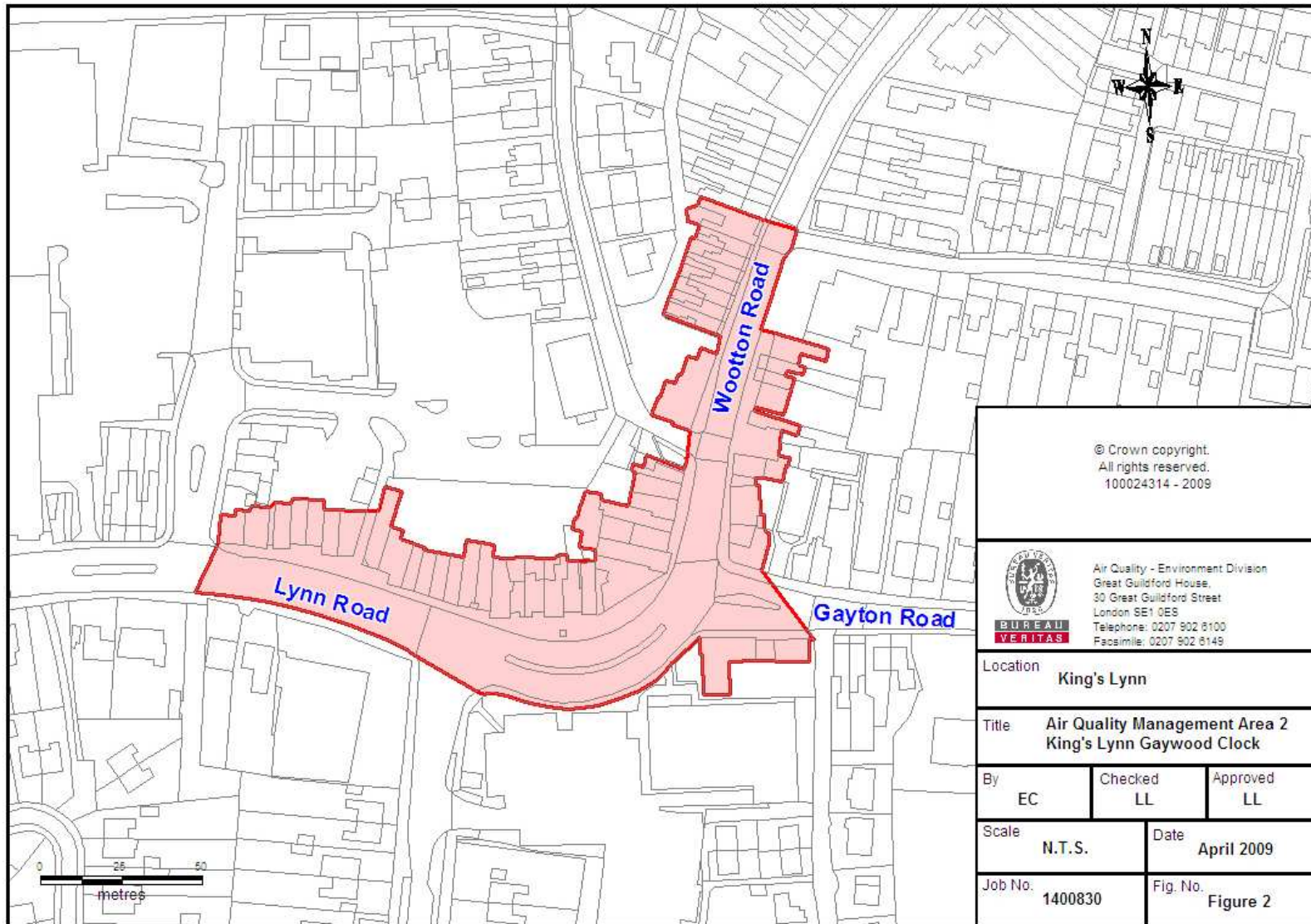


Figure 1.2 - King's Lynn AQMA 2 – Gaywood Clock



2 New Monitoring Data

Section 2 reviews and assesses all new monitoring data in order to determine whether the air quality objectives are at risk of exceedence.

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

The Borough Council of King's Lynn and West Norfolk undertook continuous monitoring of pollutants at two locations during 2009: in Southgates, King's Lynn and in the village of Leziate near a sand quarry site. Both stations are shown in Figure 2.1.

There is currently automatic monitoring of nitrogen dioxide (NO₂) and particulates (PM₁₀) at Southgates, in King's Lynn town centre AQMA. The monitoring station, previously located further north on Railway Road in the AQMA, was relocated at a roadside site in Southgates in June 2008. The station comprises a chemiluminescence NO_x / NO₂ analyser and a Tapered Element Oscillating Microbalance (TEOM) PM₁₀ analyser. Both analysers have been operational since 2006.

The Leziate monitoring station was established in July 2009 off Station Road near the sand quarry site entrance. The station comprises a TEOM PM₁₀ analyser.

The Council also monitors particulate levels based on Osiris dust and particle analysers installed at three sites in the borough: Page Stair Lane in King's Lynn, and the villages of Stoke Ferry and Leziate, all near industrial sites.

Further details of these monitoring stations are provided in Table 2.1.

Table 2.1 - Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
King's Lynn Southgates	Roadside	562227	319198	NO ₂ , PM ₁₀	Chemiluminescence, TEOM	Yes (NO ₂)	No – property façade 4m from kerb further north	5m	No
Leziate	Industrial	567090	318257	PM ₁₀	TEOM	No	No	41m	No
Leziate	Industrial	561546	320415	TSP, PM ₁₀ , PM _{2.5} , PM ₁	Osiris	No	No	N/A	Yes
Furlong Road, Stoke Ferry	Industrial	570339	300083	TSP, PM ₁₀ , PM _{2.5} , PM ₁	Osiris	No	Yes – 5m	N/A	Yes
King's Lynn, Page Stair Lane	Industrial	567090	318257	TSP, PM ₁₀ , PM _{2.5} , PM ₁	Osiris	No	Yes – 8m	N/A	Yes

2.1.2 Non-Automatic Monitoring

The Council monitors NO₂ at 72 sites in the Borough, based on passive diffusion tubes. The vast majority of the monitoring sites are located in King's Lynn town centre, including a set of triplicate tubes co-located with the continuous monitoring analyser in Southgates.

Project Atmosphere, which includes a diffusion tube survey on school premises as an extension of the Council's diffusion tube programme, is still ongoing.

Overall, 27 diffusion tube sites are located in the town centre AQMA, and 5 other sites are within the Gaywood Clock AQMA. Two new sites were installed in April 2009:

- Site 59 – St James Swimming and Fitness Centre 1
- Site 60 – St James Swimming and Fitness Centre 2

Details of the diffusion tube monitoring sites are given in Table 2.2.

Table 2.2 - Details of Non- Automatic Monitoring Sites

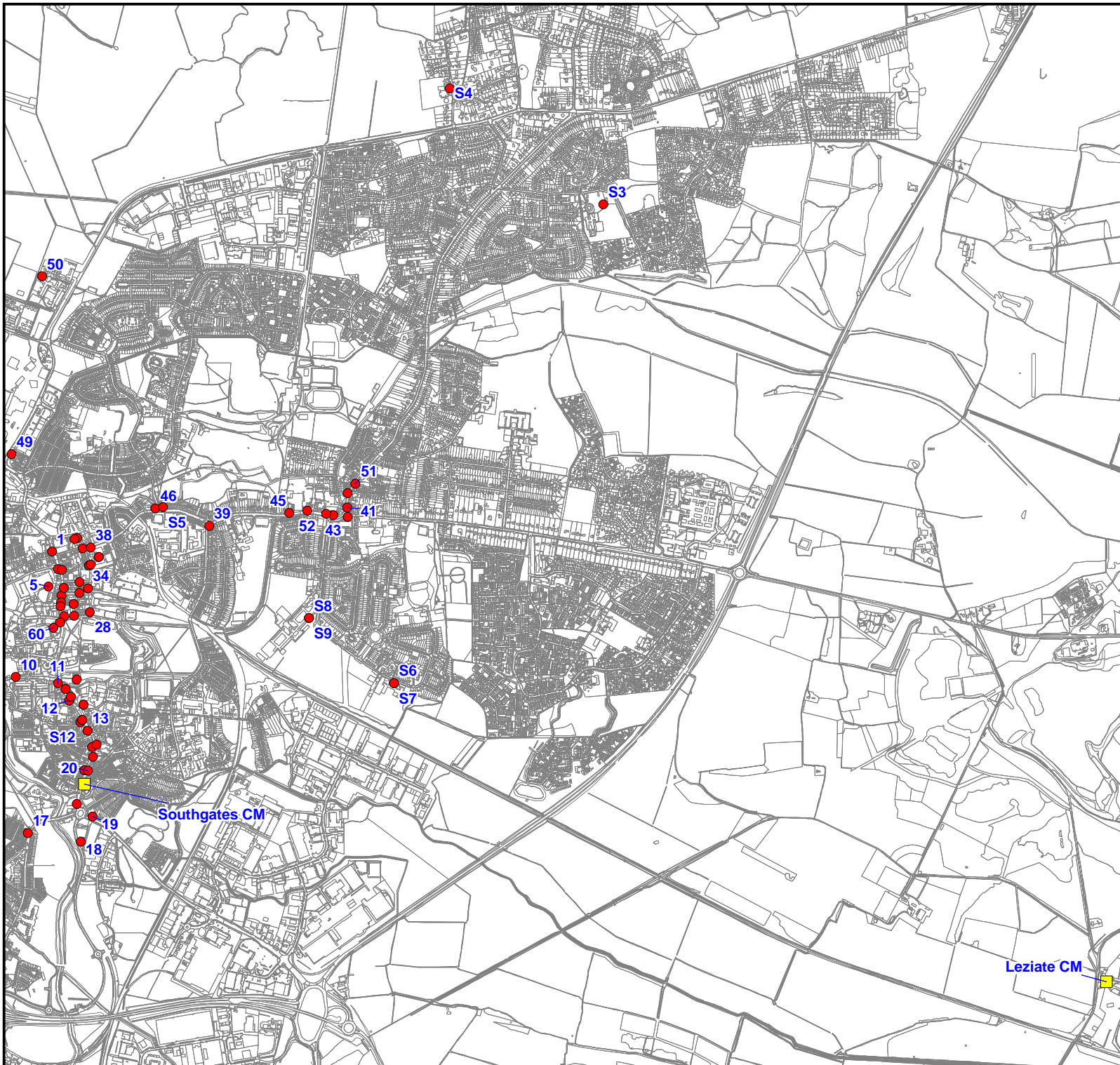
Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
1	Kerbside	562073	320304	NO ₂	Y – Town Centre	Y - 3m	2m	Y
2	Roadside	562100	320222	NO ₂	Y – Town Centre	Y - 0m	2m	Y
3	Roadside	562117	320095	NO ₂	Y – Town Centre	Y - 0m	1.5m	Y
4	Kerbside	562115	320062	NO ₂	Y – Town Centre	Y - 2.5m	1m	Y
5	Bus Station	562055	320137	NO ₂	N	N	N/A	Y
6,7,8	Roadside	562113	320043	NO ₂	Y – Town Centre	No but property façade 4m from kerb further north	5m	Y
9	Roadside	562227	319198	NO ₂	N	No but property façade 4m from kerb in same street	4m	Y
10	Roadside	561900	319707	NO ₂	Y	Y - 2.5m	3m	Y
11	Roadside	562101	319679	NO ₂	Y – Town Centre	Y - 0m	3m	Y
12	Roadside	562154	319594	NO ₂	Y – Town Centre	Y - 1m	3m	Y
13	Roadside	562242	319452	NO ₂	Y – Town Centre	Y - 0m	4.5m	Y

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
14	Roadside	562264	319375	NO ₂	Y – Town Centre	Y - 0.5m	4m	Y
15	Roadside	562226	319263	NO ₂	Y – Town Centre	Y - 1m	0.5m	Y
16	Kerbside	562190	319102	NO ₂	N	Y - 0m	5m	Y
17	Roadside	561958	318963	NO ₂	N	Y - 0m	11m	Y
18	Roadside	562209	318924	NO ₂	N	Y - 0m	7m	Y
19	Roadside	562266	319043	NO ₂	N	Y - 0m	6m	Y
20	Kerbside	562244	319261	NO ₂	Y – Town Centre	Y - 0m	3.5m	Y
21	Roadside	562267	319327	NO ₂	Y – Town Centre	Y - 3m	1.5m	Y
22	Roadside	562285	319386	NO ₂	Y – Town Centre	Y - 0m	5m	Y
23	Roadside	562162	319614	NO ₂	Y – Town Centre	Y - 0m	4.5m	Y
24	Roadside	562136	319651	NO ₂	Y – Town Centre	Y - 0m	5.5m	Y
25	Urban Background	562191	319695	NO ₂	N	Y - 0m	75m	Y
26	Roadside	562131	319996	NO ₂	Y – Town Centre	Y - 0m	2m	Y
27	Roadside	562178	319999	NO ₂	Y – Town Centre	Y - 3m	2m	Y
28	Roadside	562253	320016	NO ₂	Y – Town Centre	Y - 0m	1.5m	Y
29	Kerbside	562175	320055	NO ₂	N	Y - 2.5m	1m	Y
30	Kerbside	562204	320108	NO ₂	N	Y - 2.5m	1m	Y
31	Kerbside	562129	320132	NO ₂	Y – Town Centre	Y - 0m	2m	Y
32	Roadside	562119	320216	NO ₂	Y – Town Centre	Y - 0m	2m	Y
33	Kerbside	562203	320159	NO ₂	N	Y - 2.5m	0.5m	Y
34	Roadside	562244	320129	NO ₂	Y – Town Centre	Y - 0m	2.5m	Y
35	Roadside	562248	320239	NO ₂	Y – Town	Y - 3m	1.5m	Y

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
					Centre			
36	Roadside	562219	320319	NO ₂	Y – Town Centre	Y - 0m	2m	Y
37	Roadside	562257	320243	NO ₂	Y – Town Centre	No	2m	Y
38	Roadside	562257	320323	NO ₂	Y – Town Centre	Y - 0m	2.5m	Y
39	Roadside	562822	320427	NO ₂	N	Y - 0m	7m	Y
40	Roadside	563480	320470	NO ₂	Y – Gaywood Clock	Y - 0m	2m	Y
41	Roadside	563478	320515	NO ₂	Y – Gaywood Clock	Y - 0m	2m	Y
42	Roadside	563480	320582	NO ₂	Y – Gaywood Clock	Y - 0m	3m	Y
43	Roadside	563412	320477	NO ₂	Y – Gaywood Clock	Y - 0m	5m	Y
44	Roadside	563377	320484	NO ₂	Y – Gaywood Clock	Y - 0m	2m	Y
45	Roadside	563202	320488	NO ₂	N	Y - 0m	4.5m	Y
46	Roadside	562565	320509	NO ₂	N	Y - 0m	6.5m	Y
47	Roadside	562193	320369	NO ₂	Y – Town Centre	Y - 0.5m	1m	Y
48	Roadside	562180	320365	NO ₂	Y – Town Centre	Y - 0m	2m	Y
49	Roadside	561881	320768	NO ₂	N	Y - 0m	7m	Y
50	Urban Background	562026	321615	NO ₂	N	Y - 0m	140m	Y
51	Roadside	563515	320628	NO ₂	N	Y - 6m	1.5m	Y
52	Roadside	563288	320499	NO ₂	N	Y - 5.5m	1m	Y
53	Roadside	546947	308215	NO ₂	N	Y - 0m	2m	Y
54	Roadside	546940	308207	NO ₂	N	Y - 0m	2m	Y
55	Roadside	546945	308216	NO ₂	N	Y - 0m	2m	Y

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
56	Roadside	547235	307645	NO ₂	N	Y - 0m	2m	Y
57	Roadside	562268	318411	NO ₂	N	N	2.5m	Y
58	Roadside	562186	319031	NO ₂	N	Y - 18m	2m	Y
59	Roadside	562111	319967	NO ₂	N	Y - 0m	6.5m	Y
60	Urban Background	562080	319942	NO ₂	N	Y - 1m	37m	N
S1	Urban Background	562296	320278	NO ₂	N	Y - 0m	N/A	Y
S2	Urban Background	562296	320278	NO ₂	N	Y - 0m	N/A	Y
S3	Urban Background	564696	321958	NO ₂	N	Y - 0m	N/A	Y
S4	Urban Background	563965	322509	NO ₂	N	Y - 0m	N/A	Y
S5	Urban Background	562601	320516	NO ₂	N	Y - 0m	N/A	Y
S6	Urban Background	563699	319679	NO ₂	N	Y - 0m	N/A	Y
S7	Urban Background	563699	319679	NO ₂	N	Y - 0m	N/A	Y
S8	Urban Background	563296	319988	NO ₂	N	Y - 0m	N/A	Y
S9	Urban Background	563296	319988	NO ₂	N	Y - 0m	N/A	Y
S10	Urban Background	562222	319576	NO ₂	N	Y - 0m	N/A	Y
S11	Urban Background	562222	319576	NO ₂	N	Y - 0m	N/A	Y
S12	Urban Background	562208	319493	NO ₂	N	Y - 0m	N/A	Y
S13	Urban Background	562215	319502	NO ₂	N	Y - 0m	N/A	Y
S14	Urban Background	562215	319502	NO ₂	N	Y - 0m	N/A	Y

S1 to S14 = Project Atmosphere diffusion tubes



- Monitoring Sites**
- Continuous Analyser
 - NO2 Diffusion Tube

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Air Quality - Environment Division
 Great Guildford House,
 30 Great Guildford Street
 London SE1 0ES
 Telephone: 0207 902 6100
 Facsimile: 0207 902 6149

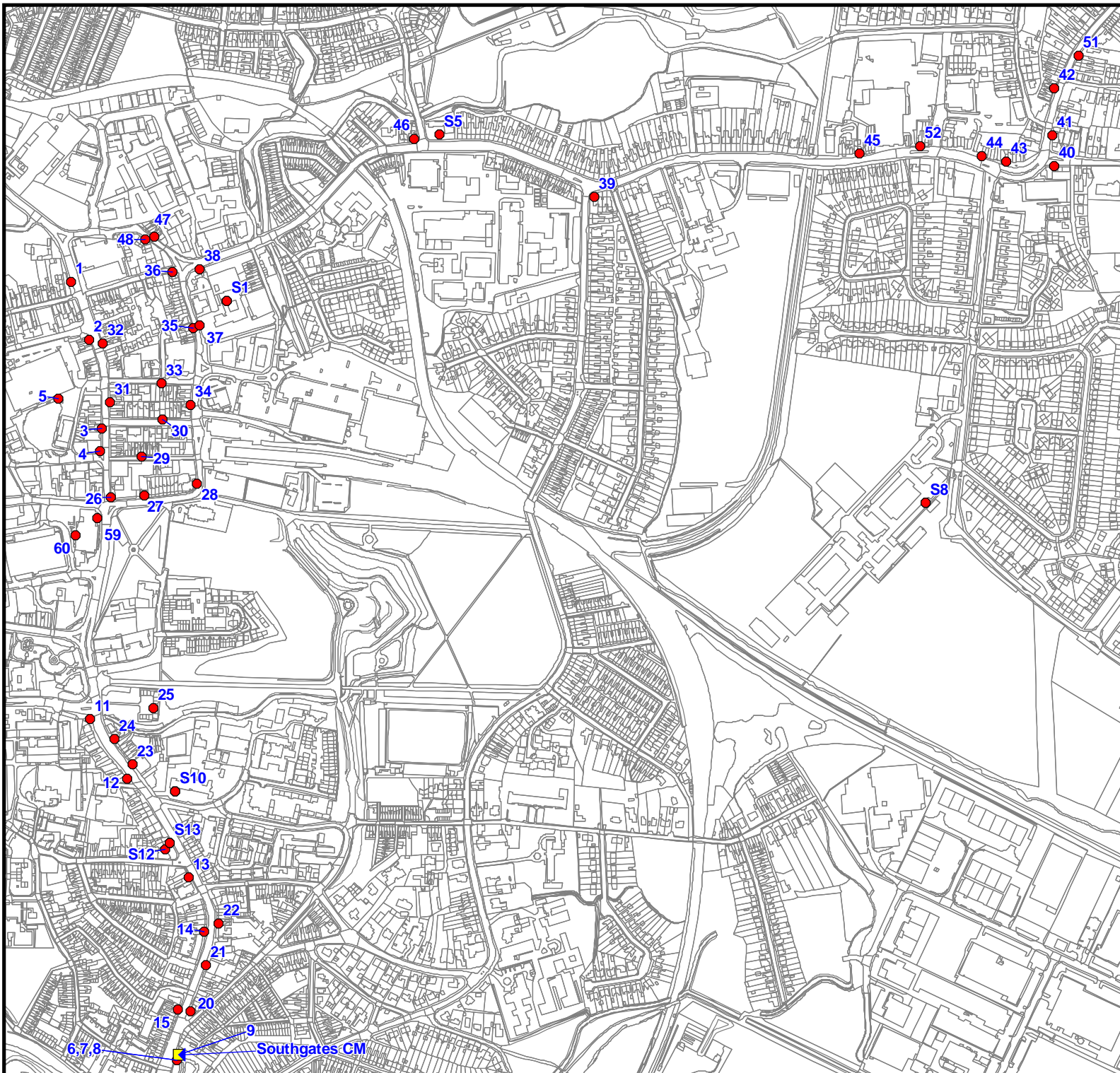
Location **Borough of King's Lynn
 and West Norfolk**

Title **Air Quality Monitoring Sites**

By EC	Checked EC	Approved LL
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Scale N.T.S.	Date June 2010
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Job No. AGGX4042177	Fig. No. Figure 2.1
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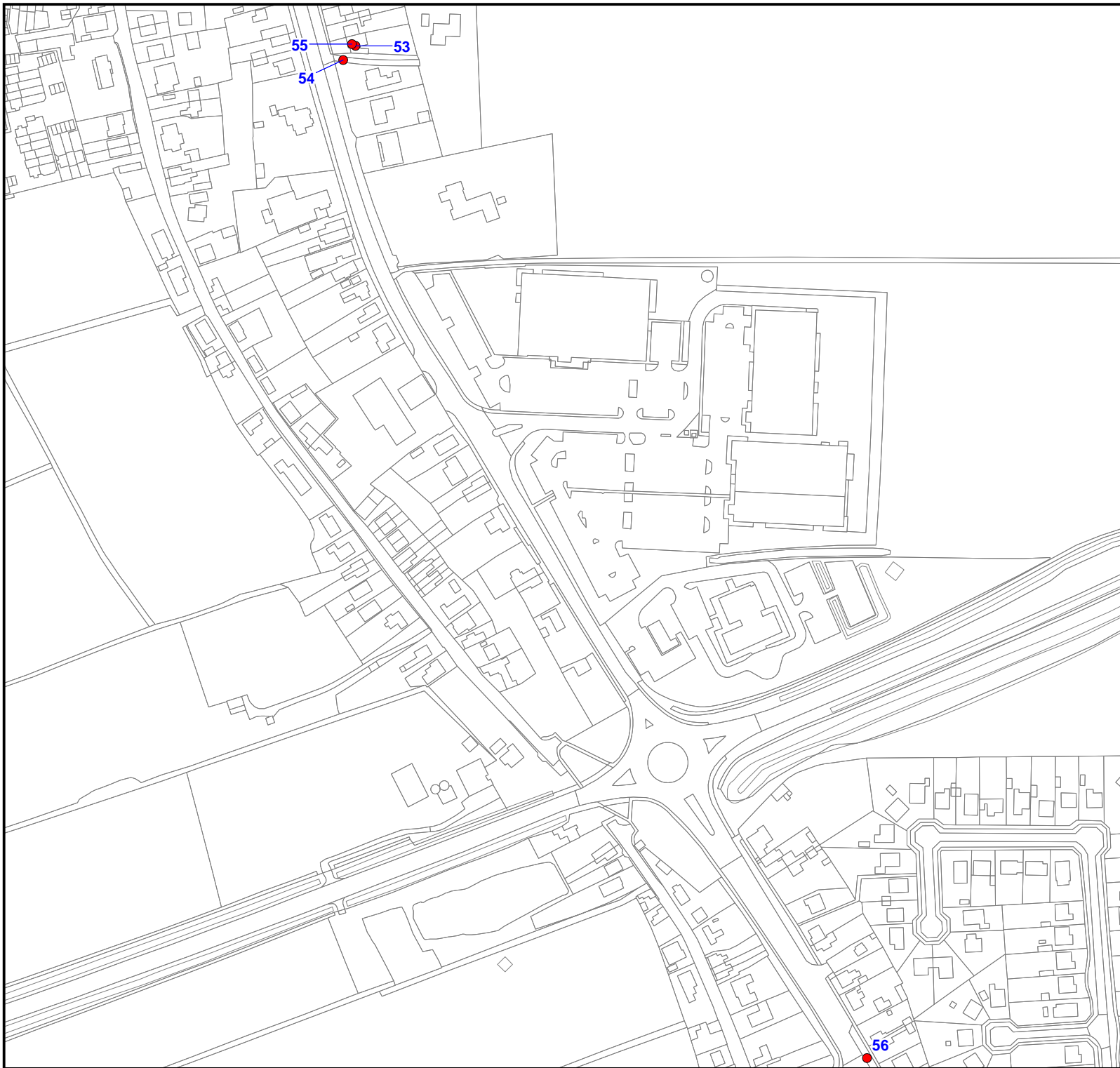
Monitoring Sites
 ■ Continuous Analyser
 ● NO2 Diffusion Tube

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Air Quality - Environment Division
 Great Guildford House,
 30 Great Guildford Street
 London SE1 0ES
 Telephone: 0207 902 6100
 Facsimile: 0207 902 6149

Location			Borough of King's Lynn and West Norfolk		
Title			Air Quality Monitoring Sites Town Centre		
By	Checked	Approved			
EC	EC	LL			
Scale		Date			
N.T.S.		June 2010			
Job No.		Fig. No.			
AGGX4042177		Figure 2.2			



- Monitoring Sites**
- Continuous Analyser
 - NO2 Diffusion Tube

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Air Quality - Environment Division
 Great Guildford House,
 30 Great Guildford Street
 London SE1 0ES
 Telephone: 0207 902 6100
 Facsimile: 0207 902 6149

**BUREAU
 VERITAS**

Location **Borough of King's Lynn
 and West Norfolk**

Title **Air Quality Monitoring Sites - Wisbech**

By EC	Checked EC	Approved LL
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Scale N.T.S.	Date June 2010
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Job No. AGGX4042177	Fig. No. Figure 2.3
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2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide

2.2.1.1 Automatic Monitoring Data

The Council monitored NO₂ at one location during 2009 in Southgates. Data capture met the 90% criterion and no annualisation was required.

Data for the closed Railway Road monitoring station has been included for comparative purposes; the station closed in June 2008.

Results for 2009 (shown in Tables 2.3 and 2.4 below) indicate that both the annual mean and 1-hour objectives for NO₂ were met. No exceedences of the 1-hour mean objective were recorded during 2009.

The Southgates monitoring site was installed during June 2008 and that year's data was annualised (reference AURN sites Wicken Fen, Northampton and market Harborough). A comparison between 2008 and 2009 indicates an increase in NO₂ concentrations.

Table 2.3 - Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site Name	Location	Within AQMA ?	Data Capture for Monitoring Period - %	Data Capture for Full Calendar Year 2009 - %	Annual Mean Concentrations (µg/m ³)		
					2007	2008	2009
King's Lynn Continuous Monitoring Station	Railway Road	Y	closed		31.1	32.1	-
	Southgates	Y	91	91	-	27.2	30.4

Table 2.4 - Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site Name	Location	Within AQMA?	Data Capture for Monitoring Period - %	Data Capture for Full Calendar Year 2009 - %	Number of Exceedences of hourly mean (200µg/m ³) (If the period of valid data is less than 90% of a full year, the 99.8 th percentile of hourly means is shown in brackets)		
					2007	2008	2009
King's Lynn Continuous Monitoring Station	Railway Road	Y	closed		3	0	-
	Southgates	Y	91	91		0	0

2.2.1.2 Diffusion Tube Monitoring Data

Results for 2009 diffusion tube monitoring are summarised in Table 2.4 below. The full data set (monthly mean values) is included in Appendix B.

A bias adjustment factor has been applied to the data, which is an estimate of the difference between diffusion tube concentrations and continuous monitoring concentrations, the latter assumed to be a more accurate method of monitoring. For 2007 and 2008 data, the bias adjustment factors have been taken from the Council's previous LAQM annual reports. All adjustment factors are derived from the triplicate diffusion tube results co-located with the continuous monitoring site in King's Lynn. Details of the bias adjustment are given in Appendix A.

Diffusion tube sites that did not meet the 75% data capture criterion in 2009 sites have been annualised to estimate the annual mean for 2009. The details of annualisation are given in Appendix A. Results at these sites are subject to greater uncertainty.

Thirteen sites recorded annual mean concentrations which exceeded the 40µg/m³ objective, these are marked in bold. Eleven of these sites were within the AQMAs; of the remaining two:

- Site 5 Bus Station 1, which has been identified in previous LAQM reports, has no relevant exposure.
- Site 59 St James 1 is a new site at the façade of the St James' Swimming Pool and Fitness Centre, off the A148 St James' Road (the road itself being part of the King's Lynn town centre AQMA). The site is not relevant of exposure for the annual mean NO₂ concentration, which is the reason why it was not included in the town centre AQMA, as the boundaries were based on residential properties.

With regard to the short term objective; there is a potential risk of exceedence where the annual mean concentration is greater than 60µg/m³. There are no monitoring locations which recorded such concentrations and therefore it is expected that the short-term objective is being met.

Table 2.5 - Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture for Monitoring Period - %	Data Capture for Full Calendar Year 2009 - %	Annual Mean Concentrations (µg/m ³)		
					2007 (Bias: 0.89)	2008 (Bias: 0.88)	2009 (Bias: 0.97)
1	Railway Road 1	Y	83	83	44.0	44.4	46.7
2	Railway Road 4	Y	100	100	55.0	51.5	56.6
3	Railway Road 5	Y	100	100	50.4	46.8	53.1
4	Railway Road 6	Y	100	100	38.3	37.5	41.1
5	Bus Station 1	N	75	75	39.4	40.0	41.6
6/7/8	Southgates Monitoring Station	Y	100	100	-	28.9	29.5
9	Mill Fleet 1	N	100	100	26.7	23.4	24.4
10	London Road 1	Y	92	92	44.6	41.1	45.8
11	London Road 2	Y	100	100	34.9	31.6	34.6
12	London Road 3	Y	100	100	39.2	38.5	39.6
13	London Road 4	Y	92	92	40.5	36.0	38.5
14	London Road 5	Y	67	67	42.3	39.1	37.5
15	Southgates	Y	100	100	47.1	42.1	44.3
16	Wisbech Rd KL	N	100	100	28.2	24.4	28.4
17	Nora 1	N	100	100	21.4	20.3	21.7
18	Hardwick Rd	N	100	100	31.7	30.0	31.5
19	Vancouver Avenue 1	N	100	100	28.0	24.6	29.0
20	London Road 10	Y	100	100	35.2	32.2	36.2
21	London Road 11	Y	100	100	39.9	34.6	39.1
22	London Road 6	Y	100	100	39.9	37.2	38.8

Site ID	Location	Within AQMA?	Data Capture for Monitoring Period - %	Data Capture for Full Calendar Year 2009 - %	Annual Mean Concentrations ($\mu\text{g}/\text{m}^3$)		
					2007 (Bias: 0.89)	2008 (Bias: 0.88)	2009 (Bias: 0.97)
23	London Road 7	Y	75	75	40.1	35.5	35.9
24	London Road 8	Y	100	100	34.3	32.2	36.6
25	The Walks	N	100	100	19.9	18.8	20.1
26	Railway Road 7	Y	100	100	44.4	40.7	43.0
27	St John's Terrace	Y	100	100	36.3	31.9	37.7
28	St John's Terrace/Blackfriars	Y	83	83	33.7	33.9	36.8
29	Waterloo Street	N	100	100	26.3	24.8	25.8
30	Portland Street	N	83	83	27.1	25.2	28.4
31	Railway Road 2	Y	17	17	39.2	36.8	43.5
32	Railway Road 3	Y	92	92	36.6	33.8	37.9
33	Wellsley Street	N	92	92	35.8	32.7	35.2
34	Blackfriars 2	Y	100	100	40.4	35.4	39.4
35	Blackfriars 1	Y	83	83	38.3	33.1	37.6
36	Norfolk Street	Y	100	100	35.7	34.9	36.9
37	Blackfriars 3	Y	100	100	34.1	32.1	37.4
38	Littleport Street	Y	100	100	39.5	39.5	44.5
39	Gaywood Road 2	N	92	92	29.7	27.8	31.5
40	The Swan Gayton Road	Y	92	92	36.9	36.6	39.0
41	Wootton Road 2	Y	100	100	45.1	40.4	45.1
42	Wootton Road 1	Y	100	100	35.2	31.6	35.4
43	Lynn Road 1	Y	92	92	34.6	30.0	32.7
44	Lynn Road 2	Y	92	92	39.8	34.1	38.6
45	Gaywood Road 3	N	92	92	34.0	30.8	33.3
46	Gaywood Road 1	N	92	92	29.7	28.2	30.4
47	Austin Street 1	Y	100	100	44.1	41.0	43.8
48	Austin Street 2	Y	92	92	36.6	33.4	38.3
49	Edward Benefer Way	N	100	100	25.0	24.1	24.5
50	Kilham's Way	N	100	100	13.7	14.2	15.1
51	Wootton Road 3	N	100	100	22.3	21.4	23.6
52	Lynn Road 3	N	83	83	33.2	30.7	37.0
53	Wisbech Rd Elm 3	N	100	100	27.0	26.9	31.1
54	Wisbech Rd Elm 4	N	92	92	25.3	23.8	28.2
55	Wisbech Rd Elm 5	N	100	100	20.7	20.0	21.9
56	Wisbech Road Elm 2	N	100	100	31.7	28.7	31.8
57	NORR 1	N	83	83	31.1	24.4	27.3
58	NORR 2	N	100	100	38.9	30.8	34.3
59	St James 1	N	100	75	-	-	42.8
60	St James 2	N	78	58	-	-	27.8
S1	Eastgate 1 Primary School	N	83	83	-	20.0	21.8
S2	Eastgate 2 Primary School	N	100	100	-	26.1	25.6
S3	Reffley Community School	N	100	100	-	14.8	17.5
S4	South Wootton Junior School	N	92	92	-	16.8	18.1
S5	Highgate Primary School	N	100	100	-	26.2	26.0
S6	Howard 1 Junior School	N	100	100	-	15.3	14.9

Site ID	Location	Within AQMA?	Data Capture for Monitoring Period - %	Data Capture for Full Calendar Year 2009 - %	Annual Mean Concentrations ($\mu\text{g}/\text{m}^3$)		
					2007 (Bias: 0.89)	2008 (Bias: 0.88)	2009 (Bias: 0.97)
S7	Howard 2 Junior School	N	100	100	-	15.5	15.2
S8	Park 1 High School	N	100	100	-	15.1	16.7
S9	Park 2 High School	N	75	75	-	16.1	19.1
S10	Greyfriars 1 Primary School	N	100	100	-	22.2	23.0
S11	Greyfriars 2 Primary School	N	100	100	-	21.5	21.9
S12	Nursery School	N	92	92	-	23.8	25.3
S13	Whitefriars 1 Primary School	N	100	100	-	17.5	18.5
S14	Whitefriars 2 Primary School	N	100	100	-	16.5	17.0

2.2.2 PM_{10}

The Council undertook monitoring of PM_{10} based on TEOM analysers at two locations during 2009. Osiris dust and particles analysers were also installed at three locations for several months in 2009. Osiris data have been adjusted by a factor of 1.1 derived from result analysis at the co-located Osiris and TEOM monitors in Leziate.

Data for the closed Railway Road monitoring site has been included for comparative purposes; the site closed in June 2008 and was re-established as Southgates. Data for 2008 and 2009 have been annualised. Results for 2009 have been VCM¹ corrected. Details of the VCM correction and annualisation are provided in Appendix A.

The 2009 Results shown in Tables 2.6 and 2.7 indicate that both the PM_{10} annual mean and daily mean AQS objectives have been met at the two TEOM monitoring locations.

Three daily means exceeded $50\mu\text{g}/\text{m}^3$ at Southgates station, and one at Leziate station. These are within the 35 exceedences per annum permitted for the PM_{10} daily mean AQS objective.

Given the greater uncertainty in Osiris monitoring results, only the estimated PM_{10} annual mean is reported. Results show compliance with the annual mean AQS objective.

¹ Volatile Correction Model – Used to correct TEOM measurements for the loss of volatile components of particulate matter that occur due to the high sampling temperatures employed by this instrument

Table 2.6 - Results of PM₁₀ Automatic Monitoring: Comparison with Annual Mean Objective

Site Name	Location	Within AQMA?	Data Capture for Monitoring Period %	Data Capture for Full Calendar Year 2009 %	Annual mean concentrations (µg/m ³)		
					2007	2008	2009
King's Lynn Continuous Monitoring Station	Railway Road	Y	Closed		24.4	19.7	-
	Southgates	Y	88.5	88.5	-	19.0	20.1
Leziate TEOM	Station Road, Leziate	N	33.1	14.5	-	-	27.1
Leziate Osiris ⁽¹⁾	Station Road, Leziate	N	98.7	10.7	-	-	29.1
Stoke Ferry Osiris ⁽²⁾	Furlong Road, Stoke Ferry	N	99.0	43.6	-	-	16.5
Page Stair Lane Osiris ⁽³⁾	Page Stair Lane, King's Lynn	N	75.8	31.8	-	-	13.3

(1) – monitoring period from 03/07/2009 to 13/08/2009
(2) – monitoring period from 06/01/2009 to 18/07/2009
(3) – monitoring period from 02/02/2009 to 07/06/2009

Table 2.7 - Results of PM₁₀ Automatic Monitoring: Comparison with 24-hour Mean Objective

Site Name	Location	Within AQMA?	Data Capture for Monitoring Period %	Data Capture for Full Calendar Year 2009 %	Number of Exceedences of daily mean objective (50µg/m ³) (If data capture < 90%, the 90 th percentile of daily means is included in brackets).		
					2007	2008	2009
King's Lynn Continuous Monitoring Station	Railway Road	Y	Closed		6	6	-
	Southgates	Y	88.5	88.5	-	1	3
King's Lynn Leziate	Leziate	N	33.1	14.5	-	-	1

2.2.3 Summary of Compliance with AQS Objectives

The Borough Council of King's Lynn & West Norfolk undertook monitoring of nitrogen dioxide based on a continuous analyser at the Southgates monitoring site in the AQMA. The 2009 results indicate concentrations of NO₂ at this location continue to meet the annual mean and short term objectives.

Monitoring of NO₂ was undertaken at 72 sites across the borough in 2009; including two new sites. Thirteen sites exceeded the annual mean objective; eleven within the AQMAs. The remaining two sites have no relevant exposure.

The Council also monitored PM₁₀ at the Southgates monitoring station. Concentrations of PM₁₀ continued to meet the annual mean and 24-hour mean objectives.

The Council commenced monitoring of PM₁₀ at the Leziate monitoring station near the sand quarry in July 2009. Data capture for the period was low; however, the annualised data suggests both annual and daily means AQS objectives would be met.

The Borough Council of King's Lynn & West Norfolk has examined new results from monitoring in the borough for the year 2009. Concentrations outside of the King's Lynn AQMAs are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

3.1 Road Traffic Sources

The Borough Council of King's Lynn & West Norfolk confirms the construction of a bus-only route between Wisbech Road and Boal Quay. An air quality assessment has been conducted for this source and has concluded that the route would have a beneficial impact on the existing AQMA.

In April 2009 consent was granted for a phased development of 125 homes on Wootton Road to the north of the Gaywood AQMA. The potential impacts on air quality and especially on the AQMA will need to be considered in the next USA in 2012.

3.2 Other Transport Sources

The Borough Council of King's Lynn & West Norfolk confirms there are no new other transport sources that have been identified since the 2009 USA.

3.3 Industrial Sources

Two new industrial developments have been identified since the 2009 USA:

- King's Lynn Combined Power Station, for which permissions was granted
- Freedom Farm MRF Engine in Hockwold

The King's Lynn Combined Cycle Gas Turbine Power Station was granted permission on 5th February 2009. The proposed site would be Willows Business Park, Saddlebow Road, King's Lynn, PE34 3RD. The Council's environmental quality team were consulted on this application for which an air quality impact assessment was submitted. Conditions were placed on the consent requiring a Construction Environmental Management Plan (CEMP) to show how dust, airborne pollutants and smoke would be controlled and mitigated during construction.

An air quality assessment for Freedom Farm MRF Engine was completed and concluded that there would be no breach of the UK air quality objectives.

3.4 Commercial and Domestic Sources

The Borough Council of King's Lynn & West Norfolk confirms there are no new commercial sources that have been identified since the 2009 USA.

3.5 New Developments with Fugitive or Uncontrolled Sources

The Council's environmental quality team carried out a survey of fugitive sources from mineral, quarry and waste sites. The results of this survey are provided in Table 3.1. The Council will continue monitoring at Leziat and particulate (TSP and PM₁₀) will be measured in Ashwicken.

Table 3.1 – Fugitive Dust Assessments

Site	Operational / Defunct	Receptor within 200m?	Recent Dust Complaints	Significant Dust Emissions Noted During Visit?
Coxford	Operational	Yes	No	No
Crimplesham	Operational	Yes	No	No
Stoke Ferry	Defunct Chalk Workings	Yes	No	No
Feltwell	Operational	Yes	No	No
Leziate/ Ashwicken	Operational and expanding	Yes	Yes	No
Snettisham	Operational and expanding	Yes	No	No
Tottenhill	Suspended / Defunct Sand operation	Yes	No	No
Estuary Farm Composting	Operational under expansion	Yes	No	No
Hillington / Congleton	Operational Chalk Workings – may need permit – under investigation	No	No	Yes
Pentney	Operational & expanding	Yes	No	No

The team also commented on the Norfolk Minerals and Waste Development Framework on several proposed sites where air quality could potentially be affected by site operations. These comments have been incorporated into the Site Allocations Development Plan Document.

The Borough Council of King’s Lynn & West Norfolk has identified the following new or previously unidentified local developments which may impact on air quality in the Local Authority area:

- Development of 125 homes on Wootton Road to the north of the Gaywood AQMA.
- King's Lynn Combined Power Station, for which permissions was granted
- Freedom Farm MRF Engine in Hockwold

These will be taken into consideration in the next Updating and Screening Assessment, scheduled for 2012.

4 Planning Applications

In May 2008, King's Lynn was designated a Growth Point and an integrated programme for development was submitted to the Government in October 2008. Funds totalling £8 million for implementation and the creation of community infrastructure were awarded in December 2008.

The Growth Point is designed to facilitate the delivery of 7000 homes within the urban area of King's Lynn Nar Ouse Regeneration Area and the Waterfront redevelopment.

The Quays is the flagship development project and the plans include the provision of 250 berth marina, in addition to the mixed commercial and residential units at Boal Quay.

The proposed town centre development extension is expected to utilise an area near the bus station and provide an additional 20,000 square metres of retail and leisure space and an improved bus terminal. Increased areas of the town centre would be pedestrianised to develop a café culture.

The West Lynn - King's Lynn ferry has been identified as an urban development strategy to increase passenger's numbers (around 86,000 in 2008). A feasibility study has been conducted by Norfolk County Council and recommendations are expected to be implemented in 2010.

The Nar Ouse Regeneration Area is progressing and an application for an enterprise centre has been received. The centre would comprise 31,000 square metres of managed work space, a medical centre, child care facilities, meeting rooms and leisure facilities. The utilities have already been installed for the development to take place. The relocation of the College of West Anglia has been deferred due to funding uncertainties.

5 Air Quality Planning Policies

The Council's Local Development Framework (LDF) documents are currently under development. The Core Strategy was available for consultation earlier this year. Consideration to air quality issues will be included in the Core Strategy.

The current Regional Spatial Strategy (RSS) for the region is the East of England Plan, which outlines at a regional level the scope of development, specific targets for achievement and a broad policy framework for sustainable development within sub-regions, which include the Borough of King's Lynn and West Norfolk. It estimated approximately 12,000 new homes and 5,000 new jobs would be required between 2001 and 2021. Policies that may have air quality benefits are highlighted below:

- **Policy SS8 - The Urban Fringe** – developments should “seek to provide networks of accessible green infrastructure lining urban areas with the countryside”.

- **Policy E2 - Provision of Land for Employment** should:
 - Minimise commuting and promote more sustainable communities with a closer relationship between work and home
 - Meet the needs of the region
 - Provide adequately for the identified skills and education
 - Maximise use of public transport
 - Minimise loss to environmental capital

- **Policy E5 - Regional Structure of Town Centres** (specifically included King's Lynn), which states that new developments:
 - Should result in a sustainable pattern of development and movement including reducing the need to travel
 - Have no significant harmful impact on the existing transport networks

- **Sub-region policy KL1** - while attracting new developments for housing and employment to achieve the urban renaissance of King's Lynn, developments should:
 - Enhance the quality of the local environment
 - Make effective use of previously developed land
 - Provide improved services in King's Lynn
 - Support socio-economic development, job creation and community building
 - Provide improved transport choices in the urban area and between the urban area and hinterland.

6 Local Transport Plans and Strategies

The development of a Transport Study for King's Lynn arose from the Norfolk Local Transport Plan's sub-regional strategy; to address the growth and development outlined in the East of England Plan, other planning documents and the objectives of the Borough Council for the town.

King's Lynn is a regional centre for the rural hinterland surrounding it, providing employment opportunities, access to key services as well as acting as a retail and industrial hub. King's Lynn attained Growth Point status which would afford opportunities for regeneration in the town. As with other towns across the country, it suffers from congestion at peak periods, affecting both public transport and other modes' progression through the town. This causes delays which have an economic impact on the town, constraining its growth and leading to poor air quality in the town centre. Together with the current high levels of car use, these present barriers to improving the transport offer in King's Lynn.

The King's Lynn Area Transportation Study (KLATS) aims to ensure that the development of King's Lynn proceeds in a way that allows sufficient and sustainable movement of people and goods around the town both now and in the future. This aim is in line with existing national, regional and local policy, planning to allow for and support growth, while managing current demand.

The planned outcome of the completed study was an agreed strategy for transportation in King's Lynn that will inform the detailed development and assessment of specific schemes, ensuring they contribute towards a future comprehensive plan for the area. Stage 1 of this work has been completed.

As part of this first stage of KLATS, transport models (SATURN - highways) (VISUM – public transport) were developed to aid the development of the strategy and evaluate potential interventions and the impacts of the emerging Local Development Framework options. These have been validated by the Department for Transport. DIADEM in conjunction with WEBTAG guidance was employed to evaluate the model outputs to facilitate the best package of intervention measures for the strategy to be developed. All transport methods and key stakeholders were considered in the initial phases although particular attention was focused on the most congested roads and areas within the network.

Potential public transport interventions were developed and evaluated for bus priority and demand management measures on eastern routes into the town as well as the main gyratory; concluding with recommendations which will be carried forward under the potential Community Infrastructure Funding schemes and for modelling in the new transport models.

Limitations in the current cycling network were identified as resulting from the limited infrastructure options available and conflicts between cyclists and other road users, highlighting the need to raise the profile and attraction of cycling. Car parking was reviewed and although no consensus could be found for the current levels of parking provision in King's Lynn; there was support for Park & Ride, public transport and review of parking as part of a package of practical transport solutions for King's Lynn's current transport problems.

Consultation with Network Rail provided encouragement for the consideration of additional rail services and facilities as potential measures for improving rail travel in King's Lynn. However, the wider consultation with members of the public raised the issue of a considerable gap between the current transport situation and the perception for some key issues including air quality, congestion and alternatives to the car.

A Full Business Case has been submitted to the Department for Transport for Community Infrastructure Funding and if successful may assist in the pursuit and delivery of some of the interventions schemes proposed and hence support the implementation of KLATS objectives.

Stage 1 of the study contains a list of possible interventions for consideration by the Growth Point Board and recommendations for further actions. The interventions that the Growth Point Board consider appropriate will be taken forward to the feasibility study stage to develop an integrated costed package of measures. Further study work on future year scenarios will take place under the Growth Point and Local Development Framework. The mechanism and reporting arrangements for Stage 2 of the study will be determined by the Growth Point Board.

A Green Travel Plan for the Council was outlined in the Environmental Strategy 2008 - 2011 and has since been endorsed by the Council. The principle targets are:

- To reduce single car journeys to/from work to 70%
- To increase car sharing from 5 to 10%
- To encourage people living close to public transport routes to use the non-car options; target increase from 9 to 14%
- To encourage people living within 3 miles of work to walk or cycle instead; target of 15%
- To encourage employers to produce Travel Plans, target increase of 5%
- To reduce annual mileage by council staff by 10%

A Green Fleet Review has also been conducted in consultation with the Energy Trust to provide recommendations for wider fleet mileage reductions.

7 Climate Change Strategies

The Norfolk Climate Partnership produced a Climate Change Strategy – “*Tomorrow's Norfolk Today's Challenge*” in 2009. The Norfolk Climate Partnership comprises all the local authorities within Norfolk including King's Lynn & West Norfolk. The Borough is a signatory of the Nottingham Declaration on Climate Change.

Norfolk is particularly vulnerable to the effects of climate change due to the low-lying geology. The predicted impacts of sea level rise, tidal surges and extreme weather events need to be considered in planning decisions.

This Strategy aims to provide the vision and drive for Norfolk to tackle climate change. The vision set out in this Strategy is just the first step, it provides a framework for partnership working and community engagement, and as such it is central to delivering the “Environmentally Responsible” theme in Norfolk Ambition, our Sustainable Community Strategy.

Many businesses already recognise the economic opportunity of reducing energy consumption, but more can be done to reduce emissions from households, business and other sectors, including transport. The scale of housing growth planned for Norfolk and the county's high level of reliance on the car pose particular challenges. Action on climate change also presents a significant opportunity for Norfolk's renewables sector, as new markets are created in low-carbon energy technologies and other low carbon goods and services.

In its ‘Environmental Statement 2008 – 2011’, the Borough Council of King's Lynn & West Norfolk outlined key areas for a low carbon borough based around a number of the National Indicators. The Environmental Statement is updated every year to include progress on the key areas and National Indicators.

8 Implementation of Action Plans

The Railway Road AQMA was declared in 2003 and extended following the expansion of the AQMA into Austin Street, Blackfriars, St James Road and London Road, while the Gaywood Clock AQMA came in to effect in April 2009. An Action Plan which will examine the mitigation measures that could be implemented to reduce traffic-related air pollution and comply with the Air Quality Strategy objectives is currently under development.

9 Conclusions and Proposed Actions

9.1 Conclusions from New Monitoring Data

In 2009, the Borough Council of King's Lynn and West Norfolk has undertaken real-time monitoring in Southgates (for NO₂ and PM₁₀) and in Leziate near the sand quarry (for PM₁₀ only). Results at both continuous monitoring sites show that the Air Quality Strategy objectives are being met.

The 2009 results from the network of NO₂ diffusion tubes installed across the borough show that 13 sites exceeded the annual mean NO₂ objective of 40µg/m³, 11 of these within King's Lynn AQMAs. The two sites showing exceedence outside the AQMAs in Kings Lynn town centre are not representative of public exposure for the annual mean objective. Therefore, a Detailed Assessment is not required for these sites.

9.2 Conclusions relating to New Local Developments

A bus-only route between Wisbech Road and Boal Quay is being constructed, for which an air quality assessment concluded that the impact would be beneficial on the King's Lynn town centre AQMA.

Consent was granted for a phased development of 125 homes on Wootton Road to the north of the Gaywood AQMA. The potential impacts on air quality and especially on the AQMA will need to be considered in the next USA in 2012.

There is one new industrial installation identified in the borough, Freedom Farm MRF Engine in Hockwold, for which an air quality assessment was carried out with the conclusions that there would be no breach of the UK air quality objectives.

The proposed King's Lynn Combined Cycle Gas Turbine Power Station in Willows Business Park, Saddlebow Road, King's Lynn was granted permission in 2009. The Council's environmental quality team were consulted on this application for which an air quality impact assessment was submitted. Conditions were placed on the consent requiring a Construction Environmental Management Plan (CEMP) to show how dust, airborne pollutants and smoke would be controlled and mitigated during construction.

9.3 Proposed Actions

- Continue with current continuous automatic monitoring programme for NO₂ at Southgates Road in King's Lynn;
- Continue with NO₂ diffusion tube monitoring in the Borough, especially in the King's Lynn AQMAs and along other parts of the town centre outside the AQMAs;
- Progress to a 2011 Annual Progress Report, to be completed by April 2011.

10 References

- Local Air Quality Management Technical Guidance LAQM.TG(09). February 2009. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland
- Local Air Quality Management Policy Guidance LAQM.PG(09). February 2009. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland
- Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance for Laboratories and Users, Report to Defra and the Devolved Administrations , Feb 2008
- Borough of King's Lynn & West Norfolk Action Plan for AQMA South Quay, September 2003
- Borough of King's Lynn & West Norfolk Updating and Screening Assessment 2009
- Borough of King's Lynn & West Norfolk Annual Progress Report 2008.
- Borough of King's Lynn & West Norfolk LAQM Detailed/ Further Assessment, July 2008.
- Climate Change Strategy - Tomorrow's Norfolk Today's Challenge. Norfolk Climate Change Partnership, February 2009.
- Borough of King's Lynn & West Norfolk Environmental Statement 2008 – 2011
- East of England Plan: The Revision to the Regional Spatial Strategy for the East of England. May 2008. Government Office for the East of England, TSO, 2008.
- Core Strategy – Proposed Submission Document (2009). Borough Council of King's Lynn & West Norfolk, December 2009.
- Regenerating King's Lynn: Growth Point and the Urban Development Strategy. Borough of King's Lynn & West Norfolk May 2009.

Websites used:

- <http://www.norfolk.gov.uk/Consumption/groups/public/documents/article/ncc067618.pdf>
- http://online.west-norfolk.gov.uk/publicaccess/mapping/map/map_detailview.aspx?module=P3

Appendices

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

The diffusion tubes are supplied and analysed by Gradko Laboratories using the 20% v/v Triethanolamine (TEA) in water preparation method. Bias adjustment factors for 2007 and 2008 have been taken from the 2009 USA.

Factor from Local Co-location Studies (if available)

Tubes are co-located at the Southgates continuous monitoring station. The summary of the bias calculations is shown in Table A.1.

Table A.1 - Summary of Bias Adjustment calculation

Kings Lynn Southgates (based on 10 periods of data)	
Bias factor A	0.97 (0.86 – 1.13)
Bias B	3% (-11% - 17%)
Diffusion Tubes Mean:	31 µg/m ³
Mean CV (Precision):	6
Automatic Mean:	30 µg/m ³
Data Capture for periods used:	97%
Adjusted Tubes Mean:	30 (26.35) µg/m ³

Discussion of Choice of Factor to Use

With regard to the application of a bias adjustment factor for the diffusion tubes, Technical Guidance LAQM.TG(09) and the Review and Assessment Helpdesk recommend the use of a local bias adjustment factor where available and relevant to diffusion tube sites. The co-location site, as in previous review and assessment stages, has been used to derive a local bias correction factor. The default bias correction from the Review and Assessment spreadsheet (version 310310) is 0.90. The local factor of 0.97 would suggest the tubes have only slightly over estimated the ambient concentration of NO₂. The locally derived bias correction provides a degree of conservatism i.e. is a more worse-case result.

PM₁₀ Monitoring Adjustment

The Borough Council of Kings Lynn and West Norfolk operate two TEOMs within the district. The data have been VCM corrected before assessing compliance against the objectives. Summaries of the settings the VCM model used to correct the data are shown in Tables A.2 and A.3.

Short-term to Long-term Data adjustment

Automatic Monitoring: Data capture for PM₁₀ at King's Lynn Southgates monitoring was less than 90% in 2009 and has been annualised. The period VCM-corrected mean is 20.4µg/m³. Kings Lynn Leziarte PM₁₀ monitoring commenced on 24 July 2009. The period mean to the end of December 2009 was 18.7µg/m³ (uncorrected). Annualisation of both data sets followed procedures in Box 3.2 of LAQM.TG(09); a summary of the sites and factors is shown in Tables A.4 and A.5.

Non-Automatic Monitoring: Three diffusion tube monitoring locations did not achieve a data capture of 75% in 2009. One site was installed in April 2009 (site 60 – St James 2), the two others were exposed for the whole year (14 - London Road and 31 - Railway Road). A summary of the sites used and the annualisation factors is shown in Table A.6.

Table A.2 – Summary of VCM Settings - Southgates

Summary	
Site Name	King's Lynn Southgates
Organisation	BC of King's Lynn & West Norfolk
Start Date	01/01/2009
End Date	31/12/2009
TEOM data already corrected with 1.3 factor	No
EPA Constant A	3
EPA Constant B	1.03
Instrument Temperature	20
Instrument Pressure	1013
Instrument reports to local ambient readings	No
Timescale	Daily
Pressure Site	Stevenage - Lytton Way (SE1)
Pressure Site Warning	BP Distant site (103km).
Temperature Site	Leicester Centre (LC0)
Temperature Site Warning	TMP Distant site (104km).
FDMS Site 1	Leicester Centre (LC0)
FDMS Site 1 Warning	Distant FDMS1 site (104km).
FDMS Site 2	Central Beds - Sandy (MD3)
FDMS Site 2 Warning	FDMS2 Data capture 83%.
FDMS Site 3	Average of remaining sites within range
FDMS Site 3 Warning	FDMS3 Data capture 89%.

Table A.3 – Summary of VCM Settings - Leziate

Summary	
Site Name	King's Lynn Leziate
Organisation	BC of King's Lynn & West Norfolk
Start Date	01/07/2009
End Date	01/01/2010
TEOM data already corrected with 1.3 factor	No
EPA Constant A	3
EPA Constant B	1.03
Instrument Temperature	25
Instrument Pressure	1013
Instrument reports to local ambient readings	No
Timescale	Daily
Pressure Site	Central Beds - Sandy (MD3)
Pressure Site Warning	
Temperature Site	Central Beds - Sandy (MD3)
Temperature Site Warning	
FDMS Site 1	Leicester Centre (LC0)
FDMS Site 1 Warning	Distant FDMS1 site (109km).
FDMS Site 2	Central Beds - Sandy (MD3)
FDMS Site 2 Warning	FDMS2 Data capture 88%.
FDMS Site 3	Average of remaining sites within range
FDMS Site 3 Warning	FDMS3 Data capture 82%.

Table A.4 – Summary of Annualisation of King's Lynn Southgates PM₁₀ Data

Site	Site Type	Annual Mean	Period Mean	Ratio
Chesterfield	Background	20.0	17.9	0.98
Leicester Centre	Urban Centre	20.2	15.7	0.99
Average				0.99

Table A.5 - Summary of Annualisation of King's Lynn Leziate PM₁₀ Data

Site	Site Type	Annual Mean	Period Mean	Ratio
Chesterfield	Background	20.0	12.1	1.46
Leicester Centre	Urban Centre	20.2	10.7	1.45
Average				1.45

Table A.6 - Summary of Annualisation – Diffusion Tubes

Site	Uncorrected Diffusion Tube Concentration	Annualisation Factor			Annualised Concentration
		Chesterfield	Northampton	Average	
14 – London Road	43.9	0.889	0.872	0.881	38.6
31 – Railway Road 2	48.0	0.896	0.969	0.933	44.8
60 – St James 2	27.1	1.042	1.068	1.055	28.6

QA/QC of Automatic Monitoring

The site is part of the National Automatic Monitoring Calibration Club, where data are managed to the same QA procedures and standards as AURN sites. The data are ratified by AEA.

QA/QC of Diffusion Tube Monitoring

Gradko Laboratories participate in the Workplace Analysis Scheme for Proficiency (WASP) for NO₂ diffusion tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO₂ concentrations reported are of a high calibre. The latest rounds of the WASP scheme relied on a z-score (graded: Satisfactory, Adequate, or Unsatisfactory) rather than an overall score and the assessment rated the laboratory as "Satisfactory". The AEA intercomparison rated Gradko as "Good".

The laboratory follows the procedures set out in the Harmonisation Practical Guidance.

Appendix B: Diffusion Tube Monthly Results

Table B.1 Monthly NO₂ Diffusion Tube Concentrations

Site	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Months	Raw Average Concentration
1	63	46	-	52	47	43	44	41	35	56	54	-	10	48.1
2	73	74	60	51	51	44	63	52	44	56	66	66	12	58.3
3	68	66	68	47	44	49	54	41	44	56	53	66	12	54.7
4	55	34	51	40	38	42	37	36	40	50	42	43	12	42.3
5	66	23	45	40	38	-	43	-	32	50	49	-	9	42.9
6,7,8	42	29	34	30	24	24	26	26	27	32	33	38	12	30.4
9	40	15	28	24	21	23	18	20	25	33	26	29	12	25.2
10	63	27	51	51	-	45	42	43	35	52	51	59	11	47.2
11	51	26	35	37	33	33	37	34	29	36	40	37	12	35.7
12	57	17	45	42	39	36	48	40	33	43	49	41	12	40.8
13	48	26	52	37	33	37	-	34	33	44	43	49	11	39.6
14	55	30	42	39	-	40	-	49	-	47	-	49	8	43.9
15	63	21	49	54	44	50	40	40	42	54	39	52	12	45.7
16	42	40	33	26	25	21	26	24	23	31	31	29	12	29.3
17	39	16	25	19	18	16	16	18	18	28	24	31	12	22.3
18	50	24	36	34	31	31	30	28	22	33	33	37	12	32.4
19	42	17	36	28	26	23	30	28	28	33	33	34	12	29.8
20	55	20	37	44	35	36	34	33	35	42	35	41	12	37.3
21	63	38	31	44	34	39	34	38	26	42	46	48	12	40.3
22	60	22	43	48	35	48	31	26	34	46	37	50	12	40
23	36	29	40	-	-	-	32	31	36	46	37	46	9	37
24	47	23	35	46	35	51	38	31	31	44	32	39	12	37.7
25	34	17	25	17	17	12	17	17	17	25	25	26	12	20.8

Site	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Months	Raw Average Concentration
26	52	40	48	45	41	46	40	39	39	46	41	55	12	44.3
27	46	49	41	36	39	38	32	30	33	45	35	42	12	38.8
28	52	42	-	38	34	31	37	35	31	41	38	-	10	37.9
29	43	26	31	21	26	20	22	20	20	31	26	33	12	26.6
30	41	27	36	31	24	25	21	19	-	32	-	37	10	29.3
31	61	-	-	-	-	-	35	-	-	-	-	-	2	48.0
32	56	32	42	46	39	40	-	31	32	38	38	35	11	39.0
33	48	37	38	38	31	28	-	33	28	39	38	41	11	36.3
34	53	42	44	40	36	35	35	37	34	40	44	47	12	40.6
35	48	31	43	39	36	-	-	33	36	38	39	44	10	38.7
36	55	28	43	37	38	36	36	33	29	40	36	45	12	38.0
37	49	40	48	47	35	35	33	28	34	42	34	37	12	38.5
38	71	32	46	46	43	43	45	43	31	50	54	46	12	45.8
39	48	-	33	35	29	16	35	30	24	36	33	38	11	32.5
40	48	36	43	41	40	38	37	39	-	38	43	39	11	40.2
41	59	46	45	55	46	51	37	34	38	54	43	49	12	46.4
42	46	27	39	35	32	32	34	34	31	52	38	38	12	36.5
43	-	32	42	33	28	35	29	28	31	40	34	38	11	33.6
44	51	21	37	50	35	45	33	-	41	46	32	46	11	39.7
45	44	19	31	-	36	42	29	25	33	43	32	43	11	34.3
46	40	-	32	34	29	33	24	24	25	34	32	37	11	31.3
47	55	26	52	54	45	59	40	33	34	54	42	47	12	45.1
48	60	32	39	-	39	31	38	34	26	42	47	46	11	39.5
49	42	19	32	26	20	19	20	19	21	30	25	30	12	25.3
50	30	16	18	13	11	8	11	11	10	20	20	19	12	15.6
51	36	13	26	27	21	18	22	20	19	27	30	33	12	24.3
52	39	26		72	35	39		27	32	37	32	42	10	38.1

Site	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Months	Raw Average Concentration
53	49	21	31	36	27	26	29	28	25	40	40	33	12	32.1
54	42	36	30	32	20	24	21	21	23	35	-	35	11	29
55	36	20	27	22	16	16	17	16	18	27	26	30	12	22.6
56	45	28	31	31	30	35	27	27	30	38	32	39	12	32.8
57	39	13	26	30	22	-	-	21	24	40	28	38	10	28.1
58	47	25	35	41	31	37	25	28	33	43	31	48	12	35.3
59	-	-	-	48	46	47	39	33	40	46	45	53	9	44.1
60	-	-	-	33	27	-	18	-	23	32	26	31	7	27.1
S1	35	17	24	19	17	13	-	-	15	26	28	31	10	22.5
S2	43	13	28	27	23	19	23	21	24	30	31	34	12	26.3
S3	35	18	19	17	12	11	12	11	13	23	22	23	12	18.0
S4	36	18	19	17	12	9	-	13	12	24	23	22	11	18.6
S5	40	16	29	26	24	23	20	22	22	32	32	35	12	26.8
S6	29	14	15	12	10	8	11	11	12	18	20	24	12	15.3
S7	31	19	15	13	11	8	10	12	11	18	18	22	12	15.7
S8	35	18	20	14	11	9	10	12	12	21	21	24	12	17.3
S9	38	14		18	14	10	14	13	-	24	-	32	9	19.7
S10	38	15	27	22	18	15	20	21	17	29	31	31	12	23.7