



West Lothian
Council

2012 Air Quality Updating and Screening Assessment for *West Lothian Council*

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

November, 2012



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Executive Summary

This report is the 2012 Updating and Screening Assessment, undertaken in accordance with West Lothian Council's statutory obligation under the National Air Quality Strategy.

The report considers measured pollutant concentrations from within West Lothian for the calendar year 2011 and considers the potential for exceedences of air quality objectives as a result of new or significantly changed local emission sources.

Measured pollutant concentrations across the council area in 2011 were typically lower than those measured in 2010, although a longer term upward trend in measured concentrations is apparent at some sites.

Measured PM₁₀ annual mean concentrations within Broxburn remain above air quality objective levels, therefore the requirement for an Air Quality Management Area remains.

Measured NO₂ annual mean concentrations at diffusion tube locations within the AQMA fell below the objective and were significantly reduced from 2010. However, measured NO₂ concentrations at the automatic analyser at Broxburn remain above the annual mean objective.

Measured NO₂ concentrations met air quality objectives at all other monitoring locations.

No new or significantly changed emission sources were identified within West Lothian which have potential to cause exceedences of air quality objectives.

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1 Introduction

1.1 Description of Local Authority Area

West Lothian is situated between Edinburgh and the Borders to the east Falkirk, North and South Lanarkshire to the west with the Firth of Forth to the north. The region rises from the lowlands in the north and northeast to the Pentland Hills in the southeast and moorland in the south and west. Its 428 sq. km (165 sq. miles) are mainly used for agriculture or urban development. The major source of air pollution is from road traffic with several main roads including the M8, M9, A89 and A71 passing east-west through the district. Industrial sources of air pollution in West Lothian are relatively scarce and are mostly situated in designated industrial areas away from relevant receptors.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 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 exceedences are considered likely, the local authority must then 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.

The objective of this Updating and Screening Assessment (USA) is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in **Scotland** are set out in the Air Quality (Scotland) Regulations 2000 (Scottish SI 2000 No 97), the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish SI 2002 No 297), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in Scotland

| Pollutant | Air Quality Objective | | Date to be achieved by |
|--|---|---------------------|------------------------|
| | Concentration | Measured as | |
| Benzene | 16.25 $\mu\text{g}/\text{m}^3$ | Running annual mean | 31.12.2003 |
| | 3.25 $\mu\text{g}/\text{m}^3$ | Running annual mean | 31.12.2010 |
| 1,3-Butadiene | 2.25 $\mu\text{g}/\text{m}^3$ | Running annual mean | 31.12.2003 |
| Carbon monoxide | 10.0 mg/m^3 | Running 8-hour mean | 31.12.2003 |
| Lead | 0.5 $\mu\text{g}/\text{m}^3$ | Annual mean | 31.12.2004 |
| | 0.25 $\mu\text{g}/\text{m}^3$ | Annual mean | 31.12.2008 |
| Nitrogen dioxide | 200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year | 1-hour mean | 31.12.2005 |
| | 40 $\mu\text{g}/\text{m}^3$ | Annual mean | 31.12.2005 |
| Particles (PM_{10}) (gravimetric) | 50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 7 times a year | 24-hour mean | 31.12.2010 |
| | 18 $\mu\text{g}/\text{m}^3$ | Annual mean | 31.12.2010 |
| Sulphur dioxide | 350 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 24 times a year | 1-hour mean | 31.12.2004 |
| | 125 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 3 times a year | 24-hour mean | 31.12.2004 |
| | 266 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year | 15-minute mean | 31.12.2005 |

1.4 Summary of Previous Review and Assessments

A brief summary of all previous reviews and assessments of local air quality since 2000 are presented in Table 1.2 and described further in the following texts.

The conclusions from the previous rounds of review and assessment of air quality in West Lothian are summarised in Table 1.2 below.

Table 1.2 Summary of previous review and assessment.

| Date submitted | Assessment / Report | Conclusions |
|--------------------------------------|----------------------------|---|
| Review and Assessment Stages 1 and 2 | October 2000 | <ul style="list-style-type: none"> – Prescribed air quality objectives are all likely to be achieved – Recommended that current air quality monitoring work in West Lothian be continued. |
| Updating and Screening Assessment | June 2003 | <ul style="list-style-type: none"> – Objectives for both NO₂ and PM10 currently being met. To continue monitoring in worst-case situations including locations close to busy roads. – No need for Detailed Assessment of Benzene, however consideration to be given to monitoring at petrol stations at Deer Park and Lizzie Bryce roundabouts. – No need for further monitoring of 1,3- Butadiene and Lead. – No need for Detailed Assessment of CO or SO₂ |
| Progress Report | 2004 | <ul style="list-style-type: none"> – No detailed assessment required for any pollutant. – Benzene to be monitored at Lizzie Bryce petrol station. |
| Progress Report | 2005 | <ul style="list-style-type: none"> – Groundhog moved to Cairnie Place, Whitburn from 31/01/2005 – NO₂ Analyser problems, low data capture. – One exceedences of 24-hour mean PM10 objective due to elevated background. – No Detailed Assessment for any pollutant required. |
| Updating and Screening Assessment | July 2006 | <ul style="list-style-type: none"> – No exceedences of any pollutant therefore no requirement to proceed to a Detailed Assessment for any pollutant. |
| Progress Report | April 2007 | <ul style="list-style-type: none"> – No exceedences of any pollutant therefore no requirement to proceed to a Detailed Assessment for any pollutant. – Monitoring of Benzene to cease due to low measured concentrations – PM10 concentration very close to objective in Linlithgow. – Automatic monitoring of NO₂ proposed for Broxburn. |

| Date submitted | Assessment / Report | Conclusions |
|-----------------------------------|---------------------|---|
| Progress Report | March 2008 | <ul style="list-style-type: none"> – No exceedences of any pollutant therefore no requirement to proceed to a Detailed Assessment for any pollutant. – Automatic monitoring of NO₂ and PM10 proposed for Broxburn. Upgrade to FDMS planned at Linlithgow. |
| Updating and Screening Assessment | September 2009 | <ul style="list-style-type: none"> – No exceedences of any of the pollutants objective values. – Real time monitoring to continue in Linlithgow and Broxburn. PM10 concentration at Linlithgow close to objective and with elevated levels measured at Broxburn. – NO₂ diffusion tubes to be deployed in West Calder Main Street for Detailed Assessment. – A poultry farm was identified as requiring a detailed assessment. – Further traffic surveys required to assess identified busy roads/junctions using DMRB. – Mobile monitoring station (Groundhog) to be relocated to Uphall Station. – Osiris units measuring PM10 to be deployed at various locations throughout West Lothian. |
| Progress Report | June 2010 | <ul style="list-style-type: none"> – Groundhog relocated to Whitburn Cross providing data from 08/02/10. – Poultry farm detailed assessment not required per Scottish Government advice. – Broxburn exceeded annual PM10 objective, Detailed Assessment to be undertaken. – |
| Progress Report | July 2011 | <ul style="list-style-type: none"> – Monitoring at Broxburn continued to exhibit an exceedence (21µg/m³) of the PM10 annual objective. A Detailed Assessment (DA) was commissioned. – A diffusion tube survey was also undertaken in Broxburn in 2010 which highlighted elevated concentration of NO₂ levels. Potential for an Air Quality Management Area (AQMA) to be declared for PM10 and potentially NO₂. – Monitoring at Linlithgow High Street in 2010 highlighted a reduction in PM10 concentrations, however poor data capture experienced. Measured concentrations in Linlithgow identified to be close to exceedences of PM10 annual objective level, continuing trend. It was therefore considered appropriate for a DA to be undertaken. – A Diffusion tube survey for NO₂ in West Calder was undertaken as recommended in the 2009 Progress Report. The levels of NO₂ concentration were well below the annual objective level. The survey continued through 2011. |

2 New Monitoring Data

During 2011 West Lothian Council monitored both PM₁₀ and NO₂ at several locations throughout the Council area using both automatic and passive sampling methods.

All automatic monitoring NO₂ and PM₁₀ data have been fully ratified by AEA Technology on behalf of the Scottish Government. Diffusion tube data have been corrected using a local bias correction. Details of the quality control and data correction processes carried out are reported in Appendix A.

2.1 Summary of Monitoring Undertaken

West Lothian Council monitor NO₂ and PM₁₀ using a combination of automatic analysers and passive diffusion tubes (PDT). The automatic monitoring sites are presented in Table 2.1 and the details of non-automatic monitoring sites are presented in Table 2.2.

2.1.1 Automatic Monitoring Sites

The Council currently operate three automatic monitoring stations, two of which are permanent stations situated at Linlithgow and Broxburn and one mobile Groundhog unit which has been located at Whitburn Cross since February 2010.

Details of the monitoring sites are shown in Table 2.1 and annotated in Figure 1, Appendix B.

Table 2.1 Details of Automatic Monitoring Sites

| Site Name | Site Type | X OS GridRef | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Monitoring Technique | Relevant Exposure (distance (m) to relevant exposure) | Distance to kerb of nearest road (N/A if not applicable) | Does this location represent worst-case exposure? |
|------------------|------------------|---------------------|----------------------|------------------------------------|-----------------|--------------------------------|--|---|--|
| Linlithgow | Roadside | 299989 | 677090 | PM ₁₀ , NO ₂ | N | FDMS, NO _x analyser | Y (-5.5 m) | 7 m | N |
| Broxburn | Roadside | 308314 | 672231 | PM ₁₀ , NO ₂ | N | FDMS, NO _x analyser | Y (3.5 m) | 2 m | Y |
| Whitburn | Roadside | 294657 | 664941 | PM ₁₀ , NO ₂ | N | FDMS, NO _x analyser | Y (0 m) | 5 m | Y |

2.1.2 Non-Automatic Monitoring Sites

The Council maintain a network of thirty NO₂ diffusion tubes located at fourteen sites across West Lothian. The monitoring sites represent public exposure and areas of high pollution concentrations at a variety of kerbside, roadside and urban background locations. Two tubes are located at twelve of the sites and three tubes are co-located with the real-time analysers at Linlithgow High Street and Broxburn. Diffusion tube data remains valuable and the Council is committed to making it publicly available. The Council has therefore continued to input data on the web based data entry system.

Table 2.2 Details of Non-Automatic Monitoring Sites

| Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Is monitoring collocated with a Continuous Analyser (Y/N) | 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? |
|--------------------------------|------------------|---------------|---------------|----------------------|----------|---|---|--|---|
| Armadale Cross_1 | Roadside | 293842 | 668588 | NO ₂ | N | N | Y (2 m) | 2 m | Y |
| Armadale Cross_2 | Roadside | 293842 | 668588 | NO ₂ | N | N | Y (2 m) | 2 m | Y |
| Bathgate High Street_1 | Urban Background | 297656 | 669298 | NO ₂ | N | N | Y (3 m) | 10 m | N |
| Bathgate High Street_2 | Urban Background | 297656 | 669298 | NO ₂ | N | N | Y (3 m) | 10 m | N |
| Bathgate King Street_1 | Roadside | 297570 | 668583 | NO ₂ | N | N | Y (5 m) | 4 m | Y |
| Bathgate King Street_2 | Roadside | 297570 | 668583 | NO ₂ | N | N | Y (5 m) | 4 m | Y |
| Bathgate South Bridge Street_1 | Roadside | 297401 | 668772 | NO ₂ | N | N | Y(0.5m) | 3m | Y |
| Bathgate South Bridge Street_2 | Roadside | 297401 | 668772 | NO ₂ | N | N | Y(0.5m) | 3m | Y |

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| Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Is monitoring collocated with a Continuous Analyser (Y/N) | 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? |
|---------------------------|-----------|---------------|---------------|----------------------|----------|---|---|--|---|
| Bathgate Steelyard_1 | Roadside | 297467 | 668734 | NO ₂ | N | N | Y (12m) | 4m | Y |
| Bathgate Steelyard_2 | Roadside | 297467 | 668734 | NO ₂ | N | N | Y (12m) | 4m | Y |
| Broxburn East Main St 1 | Roadside | 308426 | 672233 | NO ₂ | Y | N | Y (1.5 m) | 4 m | Y |
| Broxburn East Main St 2 | Roadside | 308426 | 672233 | NO ₂ | Y | N | Y (1.5 m) | 4 m | Y |
| Broxburn Unit 1 | Roadside | 308314 | 672231 | NO ₂ | Y | Y | Y (3 m) | 2 m | Y |
| Broxburn Unit 2 | Roadside | 308314 | 672231 | NO ₂ | Y | Y | Y (3 m) | 2 m | Y |
| Broxburn Unit 3 | Roadside | 308314 | 672231 | NO ₂ | Y | Y | Y (3 m) | 2 m | Y |
| Broxburn East Mains Ind.1 | Roadside | 309368 | 672213 | NO ₂ | Y | N | Y (4 m) | 2.5 m | Y |
| Broxburn East Mains Ind.2 | Roadside | 309368 | 672213 | NO ₂ | Y | N | Y (4 m) | 2.5 m | Y |
| Broxburn West Main St 1 | Roadside | 308165 | 672222 | NO ₂ | Y | N | Y (0.4 m) | 3 m | Y |

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| Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Is monitoring collocated with a Continuous Analyser (Y/N) | 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? |
|-------------------------|------------------|---------------|---------------|----------------------|----------|---|---|--|---|
| Broxburn West Main St 2 | Roadside | 308165 | 672222 | NO ₂ | Y | N | Y (0.4 m) | 3 m | Y |
| Dedridge Cedric Rise_1 | Urban Background | 306403 | 666341 | NO ₂ | N | N | Y (4 m) | 3 m | Y |
| Dedridge Cedric Rise_2 | Urban Background | 306403 | 666341 | NO ₂ | N | N | Y (4 m) | 3 m | Y |
| Linlithgow ROMON 1 | Roadside | 299989 | 677090 | NO ₂ | N | Y | Y (-5.5 m) | 7 m | N |
| Linlithgow ROMON 2 | Roadside | 299989 | 677090 | NO ₂ | N | Y | Y (-5.5 m) | 7 m | N |
| Linlithgow ROMON 3 | Roadside | 299989 | 677090 | NO ₂ | N | Y | Y (-5.5 m) | 7 m | N |
| Newton_1 | Roadside | 309223 | 677711 | NO ₂ | N | N | Y (3 m) | 2 m | Y |
| Newton_2 | Roadside | 309223 | 677711 | NO ₂ | N | N | Y (3 m) | 2 m | Y |
| Uphall Station_1* | Roadside | 306096 | 670497 | NO ₂ | N | N | Y (5 m) | 5 m | Y |
| Uphall Station_2* | Roadside | 306096 | 670497 | NO ₂ | N | N | Y (5 m) | 5 m | Y |
| West Calder_1 | Roadside | 301758 | 663158 | NO ₂ | N | N | Y (2 m) | 2 m | Y |
| West Calder_2 | Roadside | 301758 | 663158 | NO ₂ | N | N | Y (2 m) | 2 m | Y |

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| Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Is monitoring collocated with a Continuous Analyser (Y/N) | 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? |
|----------------------|-----------|---------------|---------------|----------------------|----------|---|---|--|---|
| Whitburn Cross 1 | Roadside | 294687 | 665030 | NO ₂ | N | N | Y (1 m) | 3 m | Y |
| Whitburn Cross 2 | Roadside | 294687 | 665030 | NO ₂ | N | N | Y (1 m) | 3 m | Y |
| Whitehill Inprint_1* | Roadside | 298259 | 666298 | NO ₂ | N | N | N | 25 m | N |
| Whitehill Inprint_2* | Roadside | 298259 | 666298 | NO ₂ | N | N | N | 25 m | N |

* Ceased operation in April 201

2.2 Comparison of Monitoring Results with AQ Objectives

The following section considers measured PM₁₀ and NO₂ concentrations and compares the monitoring results with the relevant air quality objective.

2.2.1 Nitrogen Dioxide

During 2011 the Council monitored NO₂ at three locations using real time automatic analysers, located at Whitburn Cross (Groundhog mobile unit), Broxburn East Main Street (CMC) and Linlithgow High Street (Romon 300)

Automatic Monitoring Data

The annual mean and 1-hour mean NO₂ automatic monitoring data for 2011 and previous years are presented in Tables 2.3 and 2.4 respectively. Measured exceedences of NAQS objectives are highlighted in bold.

Data capture at all automatic monitoring locations was higher than 90%, therefore was considered to be good.

Measured concentrations are significantly below the annual mean objective for NO₂ at both Linlithgow and Whitburn. The measured annual mean NO₂ concentration at Broxburn in 2011 was 43 µg/m³ which is above the annual mean objective level of 40 µg/m³.

There were no measured exceedences of the 1-hour objective for NO₂.

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

| Site ID | Site Type | Within AQMA? | Valid Data Capture for monitoring Period % ^a | Valid Data Capture 2011 % ^b | Annual Mean Concentration $\mu\text{g}/\text{m}^3$ | | | | |
|------------|-----------|--------------|---|--|--|------------------------------|------------------------|------------------------------|-------------------|
| | | | | | 2007 ^{*c} | 2008 ^{*c} | 2009 ^{*c} | 2010 ^{*c} | 2011 ^c |
| Broxburn | Roadside | N | 91.1 | 91.1 | N/A | 40 (33.3)^d | 39 (32.2) ^d | 46 (38.1)^d | 43 |
| Linlithgow | Roadside | N | 99.6 | 99.6 | 23 | 20 (21.4) ^d | 21 (22.5) ^d | 26 (31.0) ^d | 18 |
| Whitburn | Roadside | N | 93.1 | 93.1 | N/A | N/A | N/A | 17 | 22 |

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

^c Means should be “annualised” as in Box 3.2 of TG(09), if monitoring was not carried out for the full year.

^d Incorporating distance correction to building façade (receptor)

*Annual mean concentrations for previous years are optional.

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

| Site ID | Site Type | Within AQMA? | Valid Data Capture for period of monitoring % ^a | Valid Data Capture 2011 % ^b | Number of Exceedences of Hourly Mean (200 $\mu\text{g}/\text{m}^3$) | | | | |
|------------|-----------|--------------|--|--|--|--------------------|--------------------|--------------------|-------------------|
| | | | | | 2007 ^{*c} | 2008 ^{*c} | 2009 ^{*c} | 2010 ^{*c} | 2011 ^c |
| Broxburn | Roadside | N | 91.1 | 91.1 | N/A | 0 (126)* | 1 | 0 | 0 |
| Linlithgow | Roadside | N | 99.6 | 99.6 | 0 | 0 | 0 | 0(149) | 0 |
| Whitburn | Roadside | N | 93.1 | 93.1 | N/A | 0(111) | 0(82) | 0(59) | 0 |

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

^c If the period of valid data is less than 90%, include the 99.8th percentile of hourly means in brackets

*Number of exceedences for previous years are optional.

Diffusion Tube Monitoring Data

The NO₂ diffusion tube monitoring data for 2011 and previous years are presented in Table 2.6. At diffusion tube locations where data capture is less than 75% it has been necessary to annualise measured concentrations.

The diffusion tube monitoring results have been adjusted for laboratory bias and corrected for distance. Further details of the annualisation and laboratory bias adjustment are provided in Appendix A. Trend charts of historic diffusion tube data at urban background and roadside sites are presented in Figures 2.1 and 2.2 respectively.

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes in 2011

| Site ID | Location | Site Type | Within AQMA? | Triplicate or Collocated Tube | Data Capture 2011 (Number of Months or %) | Data with less than 9 months has been annualised (Y/N) | Confirm if data has been distance corrected (Y/N) | Distance Corrected Annual mean concentration (Bias Adjustment factor = 1.04) | Annual mean concentration (Bias Adjustment factor = 1.04) |
|---------|--------------------------|-----------|--------------|-------------------------------|---|--|---|--|---|
| | | | | | | | | 2011 ($\mu\text{g}/\text{m}^3$) | 2011 ($\mu\text{g}/\text{m}^3$) |
| WL 12 | Linlithgow ROMON | Roadside | N | Y | 12 months | N | Y | 31.2 | 24.5 |
| WL 13 | Linlithgow ROMON | Roadside | N | Y | 12 | N | Y | 31.5 | 24.7 |
| WL 14 | Linlithgow ROMON | Roadside | N | Y | 12 | N | Y | 31.2 | 24.5 |
| WL 1 | Whitburn Cross | Roadside | N | N | 11 | N | Y | 29.0 | 31.3 |
| WL 7 | Whitburn Cross | Roadside | N | N | 12 | N | Y | 29.6 | 30.6 |
| WL 2 | Broxburn West Main St | Roadside | Y | N | 12 | N | Y | 35.1 | 35.8 |
| WL 6 | Broxburn West Main St | Roadside | Y | N | 12 | N | Y | 33.7 | 34.4 |
| WL 11 | Broxburn East Main St | Roadside | Y | N | 11 | N | Y | 33.4 | 35.3 |
| WL 27 | Broxburn East Main St | Roadside | Y | N | 12 | N | Y | 34.0 | 36.0 |
| WL 30 | Broxburn Unit 1 | Roadside | Y | Y | 12 | N | Y | 35.8 | 42.2 |
| WL 31 | Broxburn Unit | Roadside | Y | Y | 12 | N | Y | 36.1 | 41.7 |
| WL 32 | Broxburn Unit | Roadside | Y | Y | 12 | N | Y | 35.7 | 41.6 |
| WL 26 | Broxburn East Mains Ind. | Roadside | Y | Y | 11 | N | Y | 32.7 | 37.3 |

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| Site ID | Location | Site Type | Within AQMA? | Triplicate or Collocated Tube | Data Capture 2011 (Number of Months or %) | Data with less than 9 months has been annualised (Y/N) | Confirm if data has been distance corrected (Y/N) | Distance Corrected Annual mean concentration (Bias Adjustment factor = 1.04) | Annual mean concentration (Bias Adjustment factor = 1.04) |
|---------|--------------------------|------------------|--------------|-------------------------------|---|--|---|--|---|
| | | | | | | | | 2011 ($\mu\text{g}/\text{m}^3$) | 2011 ($\mu\text{g}/\text{m}^3$) |
| WL 29 | Broxburn East Mains Ind. | Roadside | Y | N | 12 | N | Y | 32.1 | 36.5 |
| WL 3 | Dedridge Cedric Rise | Urban Background | N | N | 12 | N | Y | 15.6 | 16.9 |
| WL 8 | Dedridge Cedric Rise | Urban Background | N | N | 12 | N | Y | 15.9 | 17.3 |
| WL 4 | Bathgate High Street | Urban Background | N | N | 12 | N | Y | 14.3 | 14.9 |
| WL 9 | Bathgate High Street | Urban Background | N | N | 12 | N | Y | 14.8 | 15.4 |
| WL 21 | Bathgate King Street | Roadside | N | N | 10 | N | Y | 32.3 | 37.5 |
| WL 23 | Bathgate King Street | Roadside | N | N | 9 | Y | Y | 32.2 | 37.3 |
| WL 5* | Whitehill Inprint | Roadside | N | N | 3 | Y | Y | 30.0 | 30.0 |
| WL 10* | Whitehill Inprint | Roadside | N | N | 3 | Y | Y | 29.9 | 29.9 |
| WL 15 | Armadale Cross | Roadside | N | N | 12 | N | Y | 30.2 | 34.3 |
| WL 18 | Armadale Cross | Roadside | N | N | 12 | N | Y | 29 | 32.9 |
| WL 16* | Uphall Station | Roadside | N | N | 3 | Y | Y | 26.4 | 29.3 |
| WL 19* | Uphall Station | Roadside | N | N | 3 | Y | Y | 26.3 | 29.2 |

West Lothian Council

| Site ID | Location | Site Type | Within AQMA? | Triplicate or Collocated Tube | Data Capture 2011 (Number of Months or %) | Data with less than 9 months has been annualised (Y/N) | Confirm if data has been distance corrected (Y/N) | Distance Corrected Annual mean concentration (Bias Adjustment factor = 1.04) | Annual mean concentration (Bias Adjustment factor = 1.04) |
|-----------|------------------------------|-----------|--------------|-------------------------------|---|--|---|--|---|
| | | | | | | | | 2011 ($\mu\text{g}/\text{m}^3$) | 2011 ($\mu\text{g}/\text{m}^3$) |
| WL 17 | West Calder | Roadside | N | N | 12 | N | Y | 26.2 | 30.0 |
| WL 20 | West Calder | Roadside | N | N | 11 | N | Y | 27.0 | 31.0 |
| WL 22 | Newton | Roadside | N | N | 12 | N | Y | 27.0 | 32.0 |
| WL 24 | Newton | Roadside | N | N | 12 | N | Y | 27.7 | 33.0 |
| New WL 5 | Bathgate South Bridge Street | Roadside | N | N | 9 | Y | Y | 24.8 | 25.2 |
| New WL 10 | Bathgate South Bridge Street | Roadside | N | N | 9 | Y | Y | 24.8 | 25.2 |
| New WL 16 | Bathgate Steelyard | Roadside | N | N | 9 | Y | Y | 29.5 | 38.8 |
| New WL 19 | Bathgate Steelyard | Roadside | N | N | 9 | Y | Y | 28.7 | 37.5 |

* Ceased operation in April 2011

Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes (2007 to 2011)

| Site ID | Location | Site Type | Within AQMA? | Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$ | | | | |
|---------|-----------------------|-----------|--------------|--|--|--|--|---|
| | | | | 2007* (Bias Adjustment Factor = 1.10) | 2008* (Bias Adjustment Factor = 0.88) | 2009* (Bias Adjustment Factor = 0.89) | 2010* (Bias Adjustment Factor = 1.08) | 2011 (Bias Adjustment Factor = 1.04) |
| WL 12 | Linlithgow ROMON | Roadside | N | N/A | 20 | 23 | 26 | 31.2 |
| WL 13 | Linlithgow ROMON | Roadside | N | N/A | 20 | 23 | 26 | 31.5 |
| WL 14 | Linlithgow ROMON | Roadside | N | N/A | 20 | 23 | 26 | 31.2 |
| WL 1 | Whitburn Cross | Roadside | N | 25 | 24 | 27 | 49.4 | 29.0 |
| WL 7 | Whitburn Cross | Roadside | N | 25 | 24 | 27 | 49.4 | 29.6 |
| WL 2 | Broxburn West Main St | Roadside | Y | 39.5 | N/A | N/A | 49.4 | 35.1 |
| WL 6 | Broxburn West Main St | Roadside | Y | 39.5 | N/A | N/A | 49.4 | 33.7 |
| WL 11 | Broxburn East Main St | Roadside | Y | N/A | N/A | N/A | 40 | 33.4 |
| WL 27 | Broxburn East Main St | Roadside | Y | N/A | N/A | N/A | 40 | 34.0 |
| WL 30 | Broxburn Unit 1 | Roadside | Y | N/A | N/A | N/A | 47 | 35.8 |

| Site ID | Location | Site Type | Within AQMA? | Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$ | | | | |
|---------|--------------------------|------------------|--------------|--|--|--|--|---|
| | | | | 2007* (Bias Adjustment Factor = 1.10) | 2008* (Bias Adjustment Factor = 0.88) | 2009* (Bias Adjustment Factor = 0.89) | 2010* (Bias Adjustment Factor = 1.08) | 2011 (Bias Adjustment Factor = 1.04) |
| WL 31 | Broxburn Unit | Roadside | Y | N/A | N/A | N/A | 47 | 36.1 |
| WL 32 | Broxburn Unit | Roadside | Y | N/A | N/A | N/A | 47 | 35.7 |
| WL 26 | Broxburn East Mains Ind. | Roadside | Y | N/A | N/A | N/A | 40 | 32.7 |
| WL 29 | Broxburn East Mains Ind. | Roadside | Y | N/A | N/A | N/A | 40 | 32.1 |
| WL 3 | Dedridge Cedric Rise | Urban Background | N | 17.5 | 13 | 14 | 21 | 15.6 |
| WL 8 | Dedridge Cedric Rise | Urban Background | N | 17.5 | 13 | 14 | 21 | 15.9 |
| WL 4 | Bathgate High Street | Urban Background | N | 16 | 14 | 14 | 18 | 14.3 |
| WL 9 | Bathgate High Street | Urban Background | N | 16 | 14 | 14 | 18 | 14.8 |
| WL 21 | Bathgate King Street | Roadside | N | N/A | 31 | 34 | 42 | 32.3 |

| Site ID | Location | Site Type | Within AQMA? | Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$ | | | | |
|----------|------------------------------|-----------|--------------|--|--|--|--|---|
| | | | | 2007* (Bias Adjustment Factor = 1.10) | 2008* (Bias Adjustment Factor = 0.88) | 2009* (Bias Adjustment Factor = 0.89) | 2010* (Bias Adjustment Factor = 1.08) | 2011 (Bias Adjustment Factor = 1.04) |
| WL 23 | Bathgate King Street | Roadside | N | N/A | 31 | 34 | 42 | 32.2 |
| WL 5* | Whitehill Inprint | Roadside | N | N/A | 28 | 27 | 34 | 30.0 |
| WL 10* | Whitehill Inprint | Roadside | N | N/A | 28 | 27 | 34 | 29.9 |
| WL 15 | Armada Cross | Roadside | N | N/A | 26 | 29 | 37 | 30.2 |
| WL 18 | Armada Cross | Roadside | N | N/A | 26 | 29 | 37 | 29 |
| WL 16* | Uphall Station | Roadside | N | 31.5 | 24 | 24 | 32 | 26.4 |
| WL 19* | Uphall Station | Roadside | N | 31.5 | 24 | 24 | 32 | 26.3 |
| WL 17 | West Calder | Roadside | N | N/A | N/A | N/A | 32 | 26.2 |
| WL 20 | West Calder | Roadside | N | N/A | N/A | N/A | 32 | 27.0 |
| WL 22 | Newton | Roadside | N | N/A | N/A | N/A | 33 | 27.0 |
| WL 24 | Newton | Roadside | N | N/A | N/A | N/A | 33 | 27.7 |
| New WL 5 | Bathgate South Bridge Street | Roadside | N | N/A | N/A | N/A | N/A | 24.8 |

| Site ID | Location | Site Type | Within AQMA? | Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$ | | | | |
|-----------|------------------------------|-----------|--------------|--|--|--|--|---|
| | | | | 2007* (Bias Adjustment Factor = 1.10) | 2008* (Bias Adjustment Factor = 0.88) | 2009* (Bias Adjustment Factor = 0.89) | 2010* (Bias Adjustment Factor = 1.08) | 2011 (Bias Adjustment Factor = 1.04) |
| New WL 10 | Bathgate South Bridge Street | Roadside | N | N/A | N/A | N/A | N/A | 24.8 |
| New WL 16 | Bathgate Steelyard | Roadside | N | N/A | N/A | N/A | N/A | 29.5 |
| New WL 19 | Bathgate Steelyard | Roadside | N | N/A | N/A | N/A | N/A | 28.7 |

*Optional

Figure 2.1 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Roadside Diffusion Tube Monitoring Sites

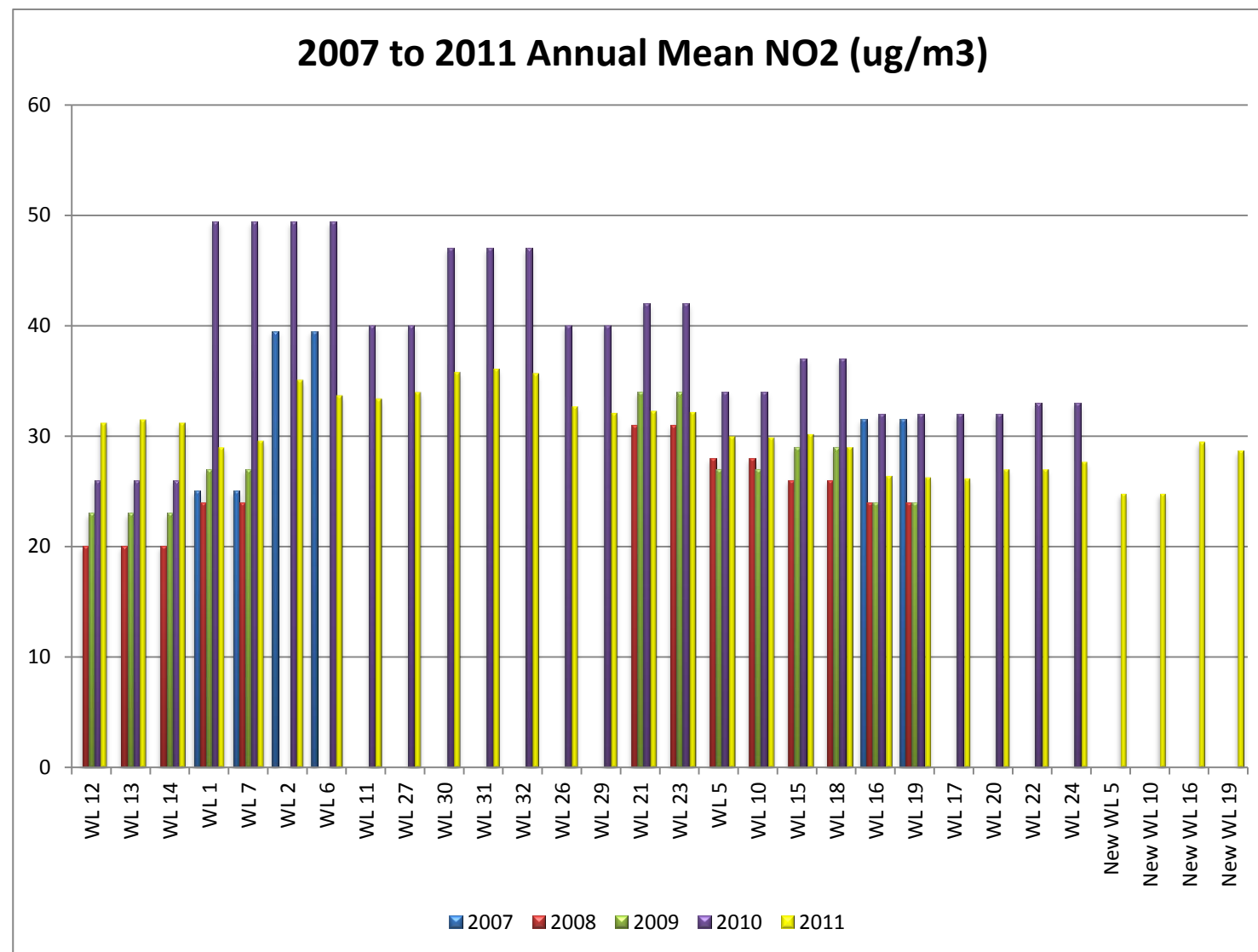
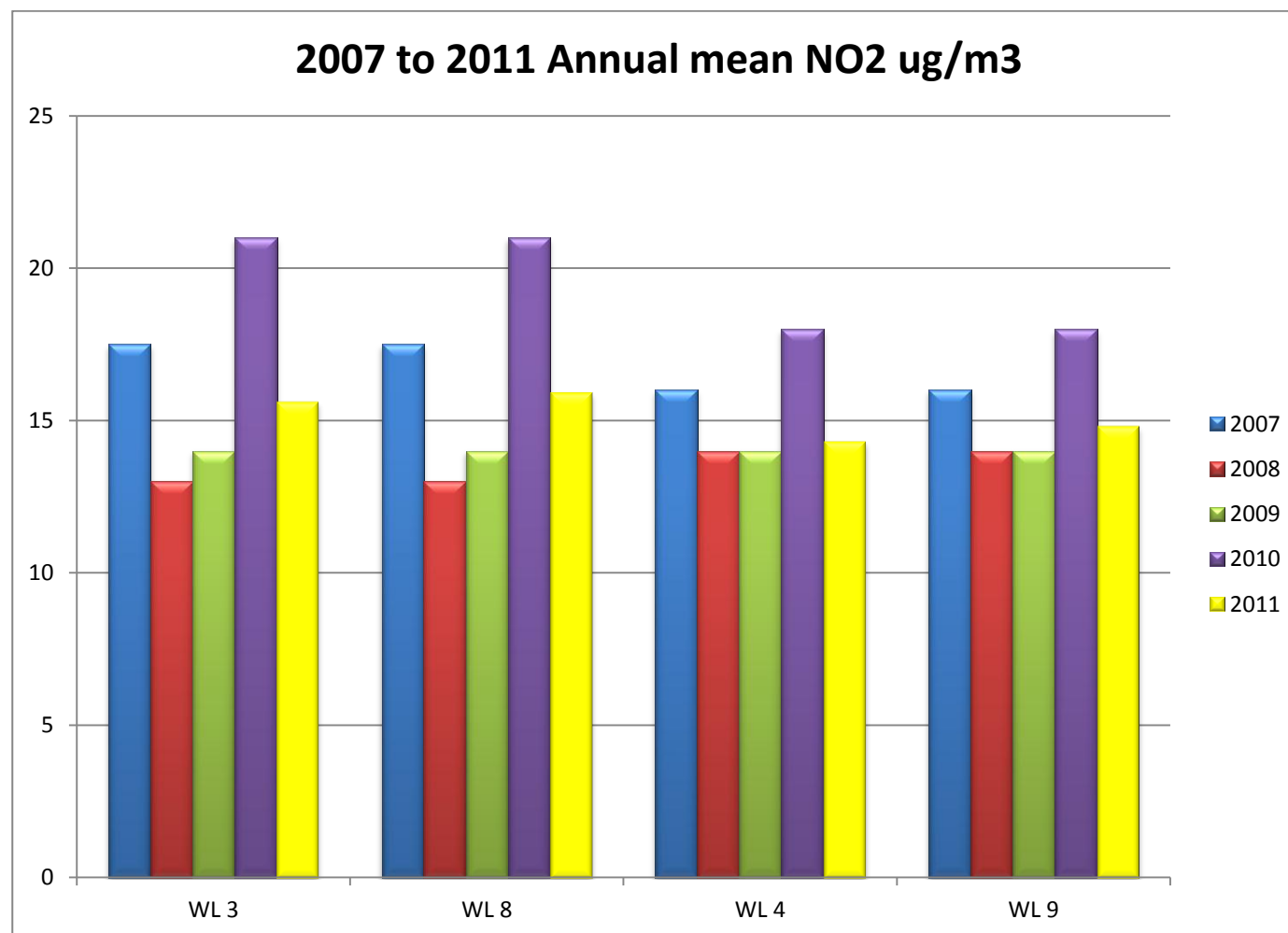


Figure 2.2 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Urban Background Diffusion Tube Monitoring Sites



The results indicate a downward trend in measured NO₂ concentrations at roadside sites between 2010 and 2011. Measured concentrations however were typically higher in 2011 than during the period 2007-2009. Considered over the longer period the measured concentrations appear to show an upward trend in annual mean concentrations from 2007 to 2011. A similar trend was experienced at urban background sites.

There were no exceedences measured at any of the diffusion tube sites. A significant reduction in measured concentrations were measured at other diffusion tube sites within the Broxburn AQMA, namely at East Main Industrial Estate.

Measured annual mean concentrations in Whitburn and Bathgate displayed a significant reduction in measured concentrations.

There were no sites out with the Broxburn AQMA where the measured annual mean concentrations were in excess of the annual mean NO₂ objective in 2011.

2.2.2 PM₁₀

The measured annual mean and 24-hour mean PM₁₀ concentrations for 2011 and previous years are presented in Tables 2.7 and 2.8 respectively. Measured and predicted exceedences of NAQS objectives are highlighted in bold. The data capture rate of all the PM₁₀ analysers was good, with greater than 90% capture rate at Broxburn and Linlithgow, and over 80% at Whitburn.

Table 2.7 Results of Automatic Monitoring of PM₁₀: Comparison with Annual Mean Objective

| Site ID | Site Type | Within AQMA? | Valid Data Capture for monitoring Period % ^a | Valid Data Capture 2011 % ^b | Confirm Gravimetric Equivalent (Y or NA) | Annual Mean Concentration µg/m ³ | | | | |
|------------|-----------|--------------|---|--|--|---|--------------------|--------------------|--------------------|-------------------|
| | | | | | | 2007 ^{*c} | 2008 ^{*c} | 2009 ^{*c} | 2010 ^{*c} | 2011 ^c |
| Broxburn | Roadside | Y | 94.1 | 94.1 | Y | N/A | 16.4 | 19 | 21 | 18 |
| Linlithgow | Roadside | N | 94.2 | 94.2 | Y | 18.4 | 16 | 18 | 12 | 13 |
| Whitburn | Roadside | N | 82 | 82 | Y | N/A | N/A | N/A | 14 | 13 |

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%.)

^c Means should be “annualised” as in Box 3.2 of TG(09), if monitoring was not carried out for the full year.

* Optional

Table 2.8 Results of Automatic Monitoring for PM₁₀: Comparison with 24-hour mean Objective

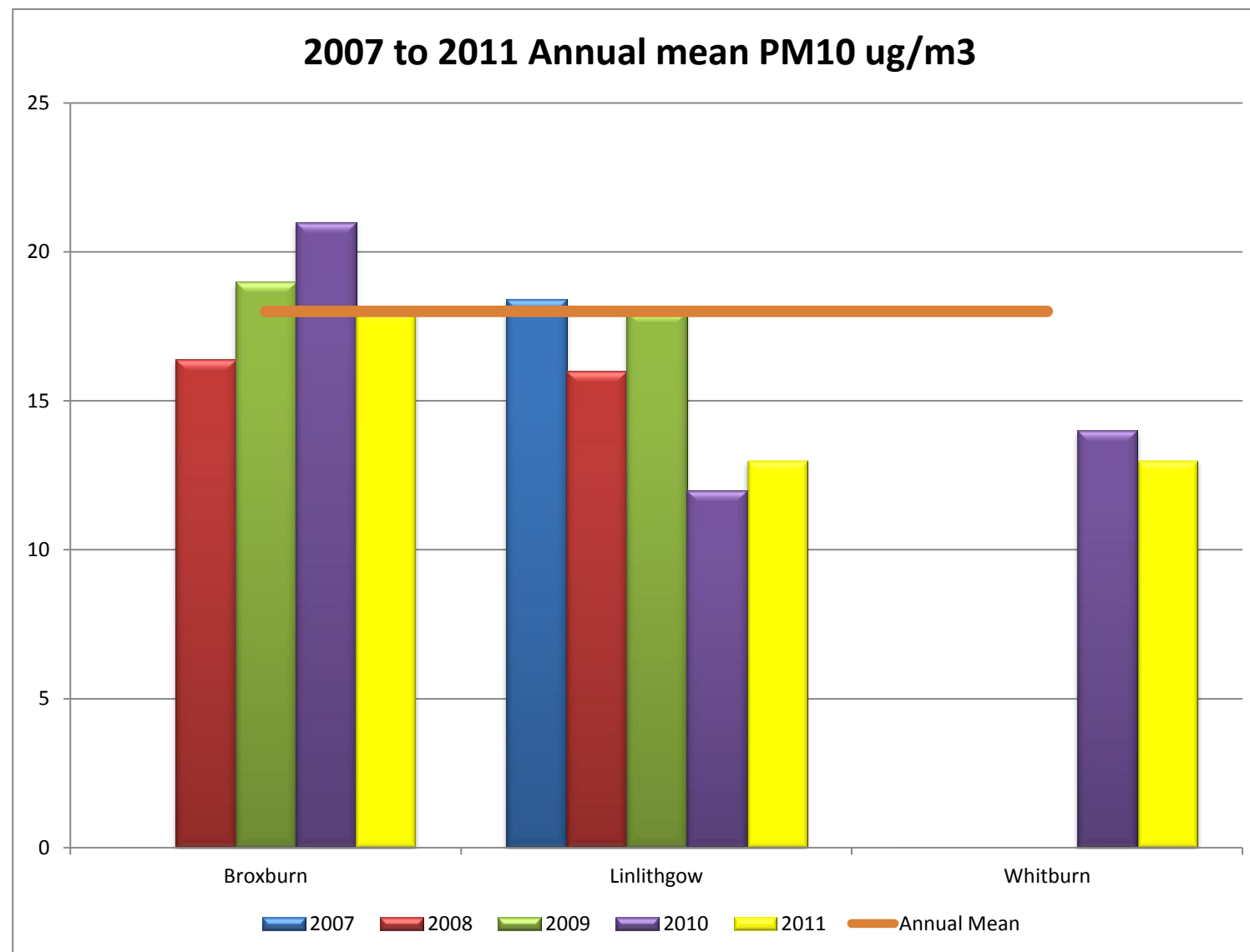
| Site ID | Site Type | Within AQMA? | Valid Data Capture for monitoring Period % ^a | Valid Data Capture 2011 % ^b | Confirm Gravimetric Equivalent | Number of Exceedences of 24-Hour Mean (50 µg/m ³) | | | | |
|------------|-----------|--------------|---|--|--------------------------------|---|-------------------|-------------------|-------------------|------|
| | | | | | | 2007 [*] | 2008 [*] | 2009 [*] | 2010 [*] | 2011 |
| Broxburn | Roadside | Y | 94.1 | 94.1 | Y | N/A | 1 (37) | 5 | 4 | 3 |
| Linlithgow | Roadside | N | 94.2 | 94.2 | Y | 5 | 2 (41) | 2 | 0 (30) | 1 |
| Whitburn | Roadside | N | 82 | 82 | Y | N/A | 0 | 1 (30) | 0 (37) | 2 |

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%.)

^c if data capture is less than 90%, include the 90th percentile of 24-hour means in brackets

* Optional

Figure 2.3 Trends in Annual Mean PM₁₀ Concentrations

The measured annual mean PM₁₀ concentrations during 2011 indicate that PM₁₀ concentrations at Broxburn monitoring site were above the annual mean objective level. Measured concentrations have reduced since 2010 and display an overall downward trend from 2009, however remain marginally above the objective level.

Measured concentrations at both Linlithgow and Whitburn were well below the annual mean objective level, and are displaying a continual downward trend in measured concentrations.

Elevated levels of the daily mean PM₁₀ concentrations were measured at all three sites, with six exceedences of the daily mean objective measured in total. The number of measured exceedences at each site were below the seven permitted in the objective.

2.2.3 Other pollutants monitored

No monitoring was undertaken by the Council of any other pollutants in 2011.

2.2.4 Summary of Compliance with AQS Objectives

West Lothian Council has examined the results from monitoring in the district. Measured concentrations at sites outside of existing AQMAs are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

3 Road Traffic Sources

The Road Transport team in West Lothian Council were contacted to provide traffic data to complete the following section. The Council advised that they no longer carry out road traffic counts due to budget cuts and could not advise on exact traffic flow volumes. The following section has been completed based on the best available information and local knowledge.

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

West Lothian Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

West Lothian Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGVs.

In the 2009 USA a location was identified, at the east end of East Main Street in Broxburn at the entrance to East Mains Industrial Estate, as experiencing high flows of buses and/or HGVs. Since then the Council has declared an AQMA which encompasses this area and the contribution of emissions from buses and/or HGVs will be assessed as part of the Further Assessment which is currently being undertaken.

West Lothian Council confirms that there are no new/newly identified roads with high flows of buses/HGVs which require further assessment.

3.4 Junctions

West Lothian Council confirms that there are no new/newly identified busy junctions/busy roads which require further assessment.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

The proposed Forth Road Crossing development, although outwith West Lothian, will have an impact on vehicle traffic on the local road network, particularly at Newton village and Winchburgh which lies within West Lothian. Potential air quality impacts may occur both during construction and post development phase.

An air quality impact assessment was undertaken in support of the planning submission for the development. The assessment concluded that there would be no exceedences of the NO₂ and PM₁₀ annual mean objectives, with the predicted increase in pollutant concentrations in Newton categorised as extremely small and the significance negligible.

West Lothian Council has assessed new/proposed roads meeting the criteria in Section A.5 of Box 5.3 in TG (09), and concluded that it will not be necessary to proceed to a Detailed Assessment.

3.6 Roads with Significantly Changed Traffic Flows

West Lothian Council Transportation department no longer carry out annual traffic surveys therefore it is not known if any roads have significantly changed traffic flows. Subjective assessment of local roads indicated that no roads were expected to have experienced significantly changed traffic flows in 2011.

West Lothian Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

West Lothian Council confirms that there are no relevant bus stations which meet the specified criteria within the local authority area.

4 Other Transport Sources

4.1 Airports

West Lothian Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

West Lothian Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

The Edinburgh to Glasgow line passes through Linlithgow and there is relevant exposure within 30m at some locations. Screening assessment of the potential impact, in line with LAQM technical guidance however identified that the estimated background annual mean NO₂ concentration is not greater than 25 µg/m³, thus the potential for exceedences of the objectives is limited and there is no requirement to proceed to a Detailed Assessment.

West Lothian Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

West Lothian Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

The Scottish Environment Protection Agency (SEPA) were contacted to determine if there have been any new or significantly changed industrial processes in the area which may impact on air quality.

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

West Lothian Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

West Lothian Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

West Lothian Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.2 Major Fuel (Petrol) Storage Depots

West Lothian Council confirms that there are no major fuel (petrol) storage depots within the Local Authority area.

5.3 Petrol Stations

West Lothian Council confirms that there are no petrol stations meeting the specified criteria within the local authority area.

5.4 Poultry Farms

The 2009 USA identified a poultry farm with operating capacity greater than the criteria specified in LAQM technical guidance, however following advice from Scottish Government no further assessment was undertaken.

SEPA public registers were consulted with regard to permitted poultry farms within the West Lothian area.

West Lothian Council confirms that there are no new poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

The Council Planning Services were consulted with regards to any new or changed commercial and domestic sources. No new commercial biomass combustion sources were identified. No new areas of domestic fuel burning were identified.

6.1 Biomass Combustion – Individual Installations

West Lothian Council confirms that there are no new commercial biomass combustion plants in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

West Lothian confirms that no combined impacts from biomass combustion plant have been identified in the Local Authority area.

6.3 Domestic Solid-Fuel Burning

West Lothian Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

7 Fugitive or Uncontrolled Sources

SEPA were consulted in relation to any changed waste, landfill or quarry processes identified in the public registers. There have been no significant changes to existing process emissions and no new fugitive sources identified.

West Lothian Council confirms that there are no potential sources of fugitive particulate matter emissions in the local authority area.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The measured annual mean NO₂ concentration within the Broxburn AQMA in 2011 remained above the annual mean objective level. Measured concentrations at diffusion tube locations within the AQMA also were above the annual mean objective level. There were no measured exceedences of the 1-hour objective for NO₂.

No further exceedences of NO₂ objectives were measured at other automatic monitoring stations. Furthermore, there were no measured exceedences of the annual mean NO₂ objective diffusion tube monitoring sites out with the AQMA.

Typically, measured NO₂ concentrations in 2011 were lower than in 2010, however indicate a longer term upward trend in measured concentrations.

Measured annual mean PM₁₀ concentrations at the Broxburn monitoring site during 2011 were above the annual mean objective level. Measured concentrations at both Linlithgow and Whitburn were well below the annual mean objective.

Whilst exceedences of the daily mean PM₁₀ objective level were measured at all three sites, the numbers of measured exceedences were below the levels permitted under the NAQS objective at each site.

8.2 Conclusions from Assessment of Sources

No new sources were identified for which there was a need to proceed to a Detailed Assessment

8.3 Proposed Actions

No new areas of concern have been identified by the USA.

The Council should continue to monitor both PM₁₀ and NO₂ concentrations within the Broxburn AQMA, with Further Assessment required to apportion the source(s) of emissions and to advise the development of an air quality Action Plan.

West Lothian Council

The Council should prepare an annual Progress Report on monitored pollutant concentrations and progress with the Broxburn Action Plan in 2013.

Appendices

Appendix A

QA/QC Data

Factor from Local Co-location Studies (if available)

The laboratory analysis of the passive diffusion tubes used by the Council is undertaken by Analytical and Scientific Services of Edinburgh City Council. Edinburgh Scientific Services is a UKAS accredited laboratory with documented Quality Assurance/Quality Control (QA/QC) procedures for diffusion tube analysis. The laboratory prepares the diffusion tubes using the 50% triethanolamine (TEA) in acetone method.

Edinburgh Scientific Services public analyst participates in the AEA inter-comparison scheme, with bias correction factors calculated and applied annually. The laboratory analyses results from co-location studies at various locations.

The laboratory co-location factors are presented in Table A.1.

| Site Name | Study duration | Bias (B) | Tube Precision | Bias correction factor |
|---|----------------|----------|----------------|------------------------|
| Marylebone Road Intercomparison | 12 | 3.2% | Good | 0.97 |
| East Ayrshire Council | 11 | -4.1% | Good | 1.04 |
| Overall factor from Edinburgh Scientific Services co-location studies | | | | 1.01 |

*Diffusion_Tube_Bias_Factors-v03_12

Factor from Local Co-location Studies (if available)

The results for the co-location study carried out by West Lothian Council at Linlithgow are presented in Figure A.1. The figure indicates the precision, accuracy and locally derived bias correction factor of the co-location study.

The analysis indicates an overall good precision and accuracy. The analysis has calculated a locally derived bias factor of 1.04, which was applied to all diffusion tube site data.

Checking Precision and Accuracy of Triplicate Tubes

| Diffusion Tubes Measurements | | | | | | | | | |
|------------------------------|--------------------------|------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------|-----------------------|-------------------------------------|-------------------|
| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 μgm^{-3} | Tube 2 μgm^{-3} | Tube 3 μgm^{-3} | Triplicate Mean | Standard Deviation | Coefficient of Variation (CV) | 95% CI of mean |
| 1 | 06/01/2011 | 03/02/2011 | 53.1 | 56.1 | 48.6 | 53 | 3.8 | 7 | 9.4 |
| 2 | 03/02/2011 | 01/03/2011 | 38.3 | 40.2 | 39.4 | 39 | 1.0 | 2 | 2.4 |
| 3 | 01/03/2011 | 31/03/2011 | 38.6 | 39.0 | 41.9 | 40 | 1.8 | 5 | 4.5 |
| 4 | 31/03/2011 | 27/04/2011 | 49.3 | 51.8 | 46.4 | 49 | 2.7 | 5 | 6.7 |
| 5 | 27/04/2011 | 31/05/2011 | 34.0 | 34.5 | 29.7 | 33 | 2.6 | 8 | 6.6 |
| 6 | 31/05/2011 | 29/06/2011 | 37.4 | 35.5 | 42.9 | 39 | 3.8 | 10 | 9.5 |
| 7 | 29/06/2011 | 02/08/2011 | 42.6 | 43.9 | 38.7 | 42 | 2.7 | 6 | 6.7 |
| 8 | 02/08/2011 | 30/08/2011 | 43.6 | 41.8 | 42.6 | 43 | 0.9 | 2 | 2.2 |
| 9 | 30/08/2011 | 28/09/2011 | 35.7 | 36.3 | 34.6 | 36 | 0.9 | 2 | 2.1 |
| 10 | 28/09/2011 | 02/11/2011 | 36.2 | 33.0 | 33.7 | 34 | 1.7 | 5 | 4.2 |
| 11 | 02/11/2011 | 02/12/2011 | 48.6 | 38.6 | 49.0 | 45 | 5.9 | 13 | 14.6 |
| 12 | 02/12/2011 | 06/01/2012 | 29.6 | 31.7 | 32.1 | 31 | 1.3 | 4 | 3.3 |
| 13 | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

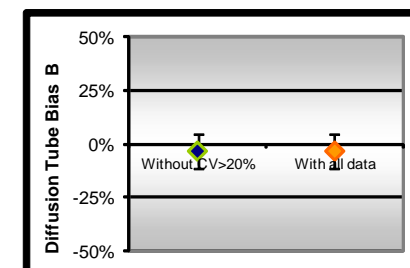
| Automatic Method | | Data Quality Check | |
|--------------------|---------------------------|-----------------------------|------------------------------|
| Period Mean | Data Capture (% DC) | Tubes Precision Check | Automatic Monitor Data |
| 50.5 | 99.7 | Good | Good |
| 49.4 | 100 | Good | Good |
| 49.8 | 98.8 | Good | Good |
| 43.7 | 100 | Good | Good |
| 56 | 25 | Good | or Data Capture |
| 44 | 77.4 | Good | Good |
| 46 | 99.8 | Good | Good |
| 39 | 100 | Good | Good |
| 33 | 100 | Good | Good |
| 36 | 100 | Good | Good |
| 43.2 | 100 | Good | Good |
| 35.1 | 100 | Good | Good |
| | | | |
| Overall survey --> | | Good precision | Good Overall DC |

(Check average CV & DC from
Accuracy calculations)

| | |
|--|----------------------------------|
| Site Name/ ID: | Broxburn Unit |
| Accuracy (with 95% confidence interval) | |
| without periods with CV larger than 20% | |
| Bias calculated using 11 periods of data | |
| Bias factor A | 1.04 (0.96 - 1.14) |
| Bias B | -4% (-12% - 4%) |
| Diffusion Tubes Mean: | 41 μgm^{-3} |
| Mean CV (Precision): | 6 |
| Automatic Mean: | 43 μgm^{-3} |
| Data Capture for periods used: | 98% |
| Adjusted Tubes Mean: | 43 (39 - 47) μgm^{-3} |

Precision 12 out of 12 periods have a CV smaller than 20%

| | |
|--|----------------------------------|
| Accuracy (with 95% confidence interval) | |
| WITH ALL DATA | |
| Bias calculated using 11 periods of data | |
| Bias factor A | 1.04 (0.96 - 1.14) |
| Bias B | -4% (-12% - 4%) |
| Diffusion Tubes Mean: | 41 μgm^{-3} |
| Mean CV (Precision): | 6 |
| Automatic Mean: | 43 μgm^{-3} |
| Data Capture for periods used: | 98% |
| Adjusted Tubes Mean: | 43 (39 - 47) μgm^{-3} |



Jaume Targa, for AEA
Version 04 - February 2011

Figure A.1 Linlithgow High Street Co-location Study

Discussion of Choice of Factor to Use

The Council have chosen to use the local bias adjustment factor. The laboratory bias adjustment factor is mainly made up of results from monitoring undertaken from only two sites, one of which is the local study. Whilst both studies reflected sites with good precision and accuracy, the local study is considered to be most representative of the area, considering the high concentrations measured at Marylebone. The local factor is slightly higher, therefore will provide a more conservative estimate of NO₂ concentrations within the Council area.

PM Monitoring Adjustment

West Lothian Council monitor PM10 using a Tapered Element Oscillating Microbalance (TEOM) with a Filter Dynamics Measurement System (FDMS). The TEOM FDMS is equivalent to the European Reference Sampler and the results are therefore fully comparable to the AQS objectives, with no need for adjustment.

Short-term to Long-term Data adjustment

Data capture rates in excess of 90% were measured at all monitoring sites, with the exception of the Whitburn PM10 analyser. No adjustments were necessary on any data from automatic monitoring sites.

QA/QC of automatic monitoring

The automatic monitoring stations were subject to site audits undertaken by AEA Technology, including calibration checks every 6 months. Data Validation and Ratification is also undertaken by AEA Technology.

Analyser Maintenance and calibration is undertaken by Air Monitors Ltd. Weekly quality control/quality assurance procedures are in place to ensure data validity. Records are kept of new gas cylinder installations, filter changes and other site visits. Calibration of real-time analysers, using scrubbed air and Nitric oxide, are undertaken to the data is valid. Gas cylinders are supplied by Air Liquide.

The Council also undertake manual calibrations on a fortnightly basis, with the results recorded to establish any drift. Where drift between measured span and reference are noted, indicative of a fault, a reported is generated to Air Monitors Ltd.

The filter in the TEOM is changed before the lifetime of the filter reaches 90%. Before the filter is changed, a pre-calibration checklist is completed. Once the filter has been changed, a post-calibration checklist is completed one hour later. This reduces the likelihood of faults being induced or associated with the filter change. The TEOM head is also cleaned each time the filter is changed in accordance with reference procedures.

Servicing of analysers at all sites is carried every six months by Air Monitors. Auto calibrations are run daily at each site for all analysers except PM10 monitors. Calibration data is monitored using Air Monitors AQ Web Manager and AQ Web Reports software.

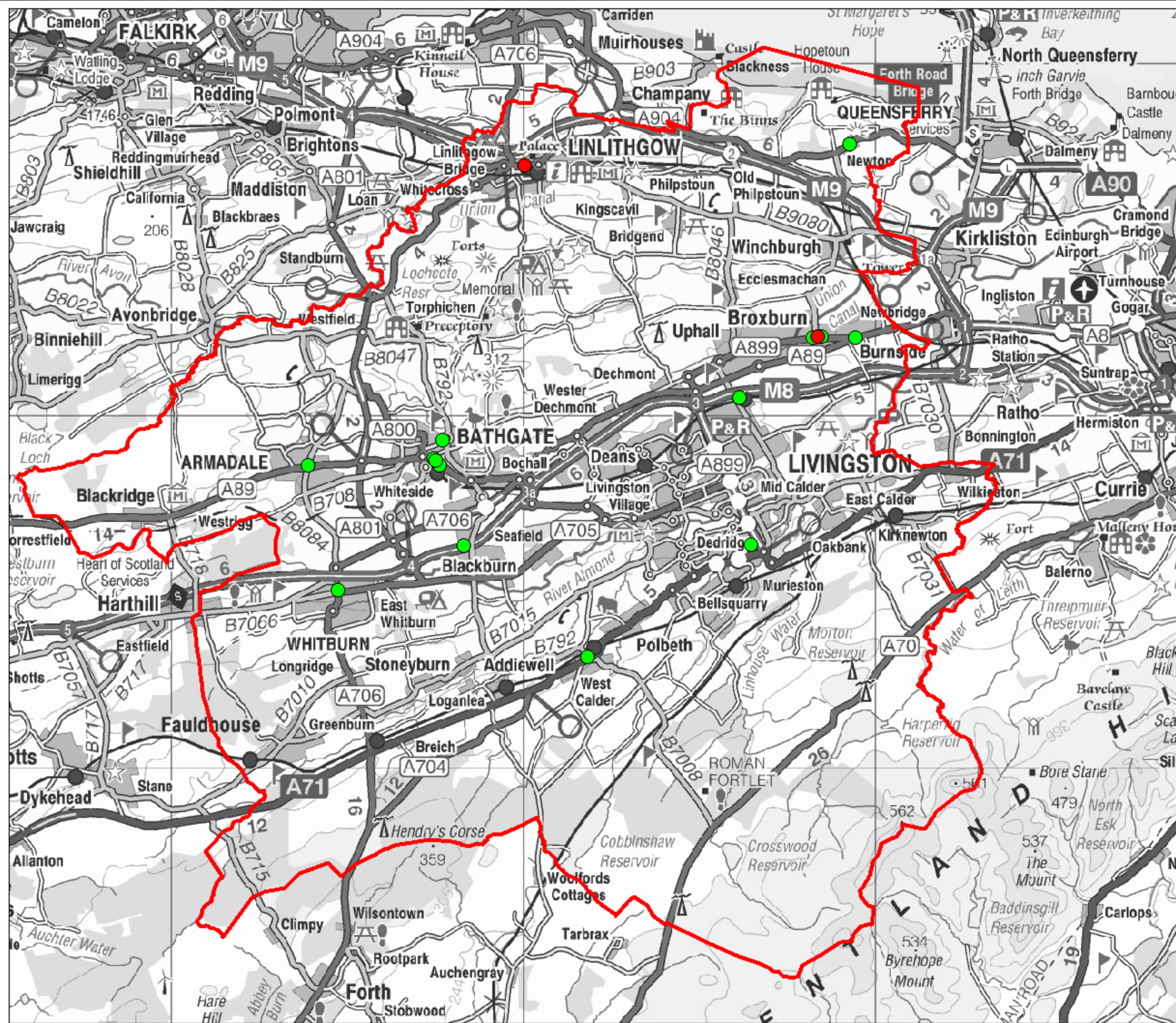
Data Acquisition, Security and Dissemination

All sites now incorporate a web logger allowing data to be viewed, downloaded and reviewed using the associated software, AQ Web Manager, AQ Web Archive and AQ Web Reports.

All West Lothian Council automatic monitoring site data can be accessed via the Scottish Government Air Quality website.

Appendix B

Figures



LEGEND

- Automatic Monitoring Locations
- Diffusion Tube Monitoring locations
- Council Boundary



**West Lothian
Council**

Project Updating And Screening
Assessment 2012

Title **West Lothian Council Area**

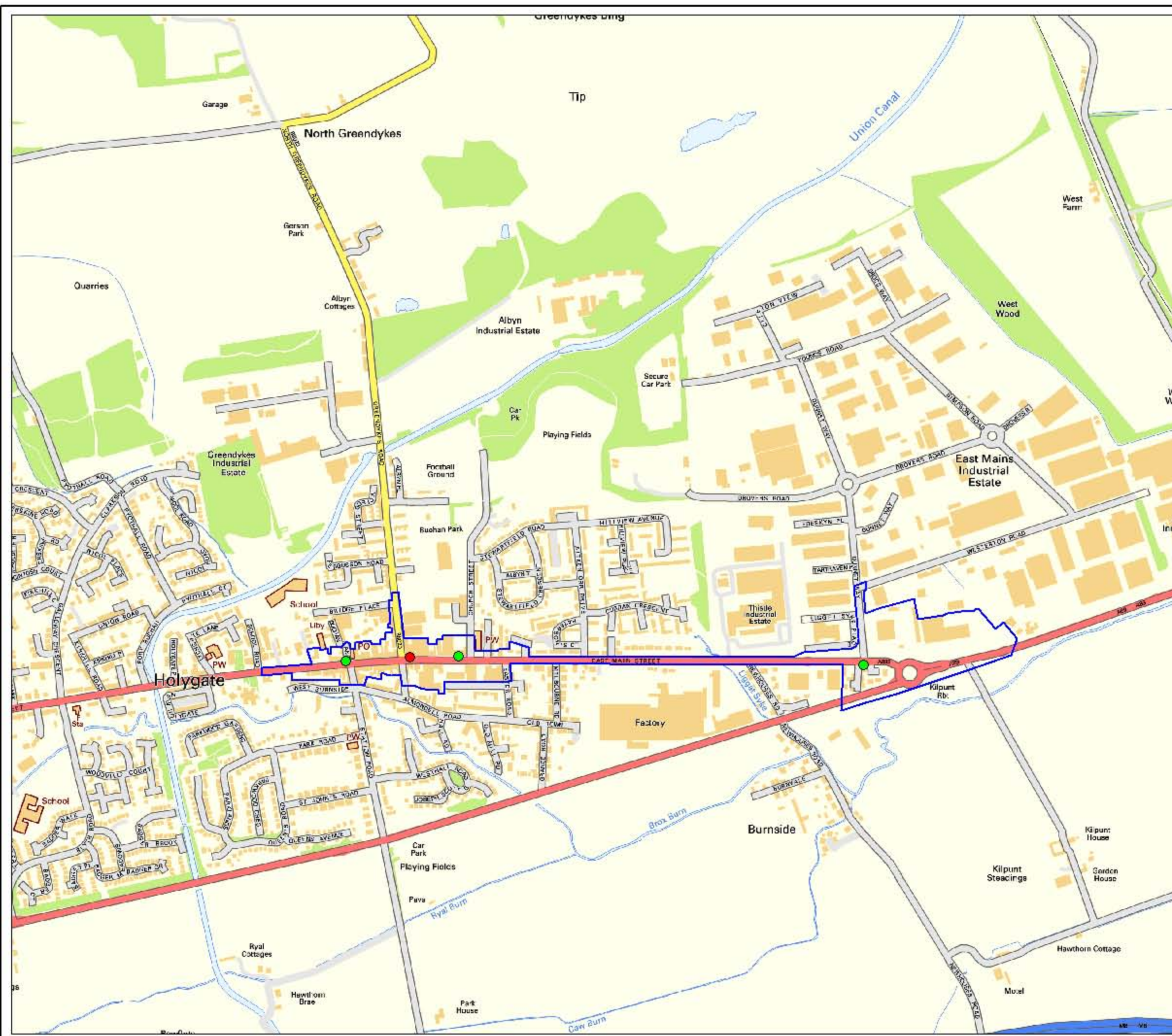
| | | | |
|-----------------|-------------------------|----------|--------------|
| Created by JS | Project Manager BS | Reviewer | Date Sept 12 |
| File No. XXXXXX | Project No. 12514820221 | Status | Draft Issue |

Drawing No. **1**



**Golder
Associates**

Sirius Building
The Clocktower
South Gyle Crescent
Edinburgh
EH12 9LB
UK
+44(0)131 314 5900



LEGEND

- Automatic monitoring station
- Diffusion tube site
- Broxburn AQMA boundary



Project Updating and Screening Assessment 2012

Title Broxburn AQMA

| | | | | | | | |
|------------|--------|-----------------|-------------|----------|-------------|------|-----------|
| Created by | JS | Project Manager | BS | Reviewed | | Date | Sept 2012 |
| File No. | XXXXXX | Project No. | 12514820221 | | | | |
| Site | | Scale | | Issue | Draft Issue | | |

Drawing No. 2

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LEGEND

Automatic monitoring station



Diffusion tube site



Broxburn AQMA boundary



Project Updating and Screening
Assessment 2012

Title Linlithgow monitoring sites

Created by JS Project Manager BS Reviewer Date **Sept 2012**

File No. XXXXXX Project No. 12514820221

Site Scale Status Draft Issue

Drawing No. 2



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LEGEND

Automatic monitoring station

Diffusion tube site

Broxburn AQMA boundary



Project Progress Report 2011

Title **Monitoring Locations**

| | | | | | |
|------------|-------|-----------------|-------------|--------|---------|
| Created by | JS | Project Manager | BS | Review | Sept 12 |
| File No. | XXXXX | Project No. | 12514820221 | | |
| Sub | Scale | Status | Draft Issue | | |

Drawing No. **4**



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LEGEND

- Automatic monitoring station
- Diffusion tube site
- Broxburn AQMA boundary



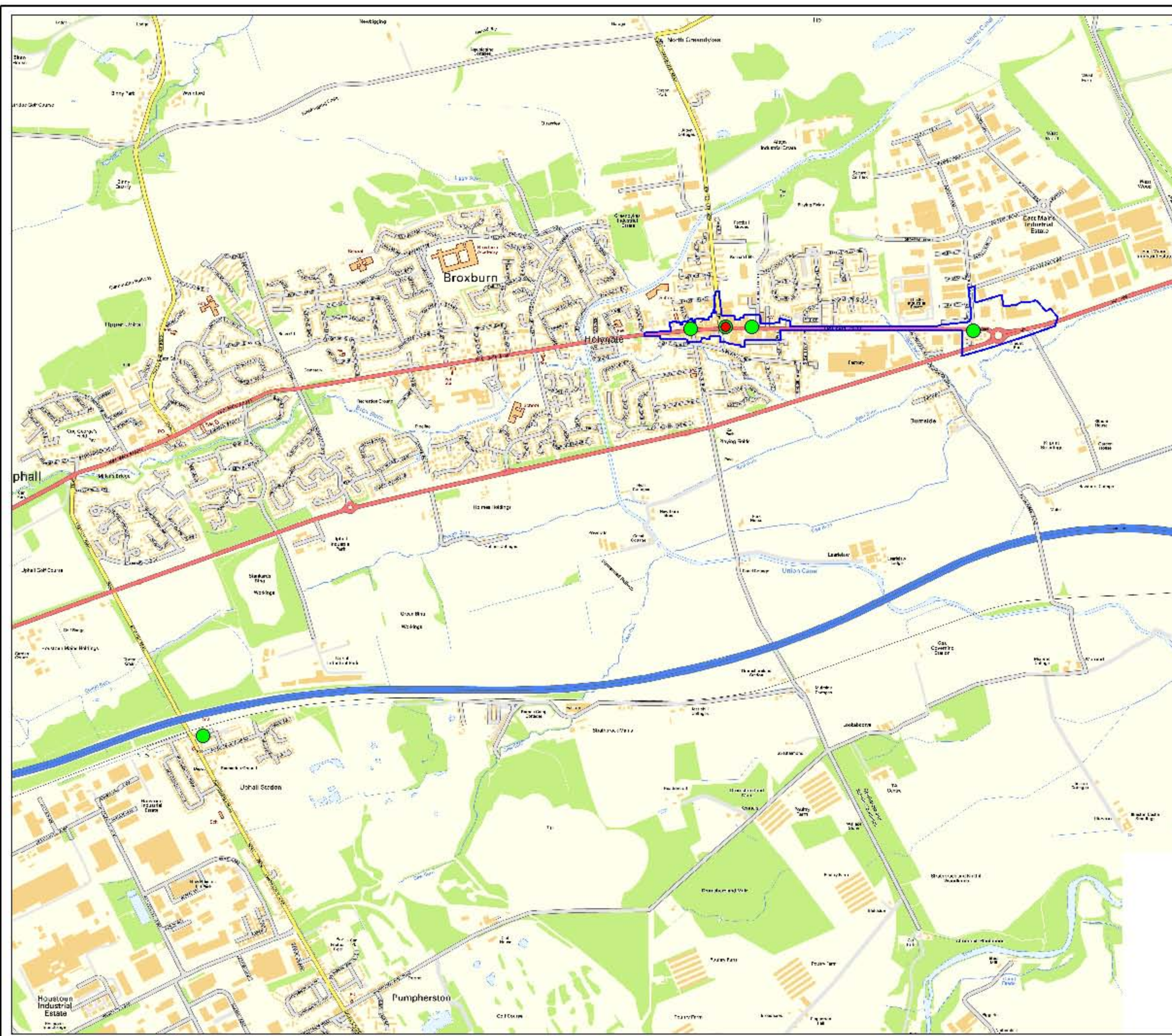
Project Progress Report 2011

Title Monitoring Locations

| | | | |
|----------------|-------------------------|-------------|-------------|
| Created by JS | Project Manager BS | Review Date | Sept 12 |
| File No. 00000 | Project No. 12514820221 | Sub No. | 1 |
| Scale | Scale | Status | Draft Issue |

Drawing No. 5

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LEGEND

Automatic monitoring station



Diffusion tube site



Broxburn AQMA boundary



Project Updating and Screening Assessment 2012

Title Monitoring Locations

Created by JS Project Manager BS Reviewer Date Sept 2012

File No. XXXXXX Project No. 12514820221

Site Scale Status Draft Issue

Drawing No. 6



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