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**BAE SYSTEMS ENVIRONMENTAL  
AIR MONITORING PROGRAMME FOR THE PROPOSED  
REGENERATION OF THE ROYAL ORDNANCE SITE,  
BISHOPTON**



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**Prepared by:**

**Rebecca Sturrock – Senior Consultant**

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**Directed, reviewed and approved by:**

**Dr Mark Broomfield – Technical Director**

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**Client Address:**

BAE Systems Environmental  
Station Road  
Bishopton  
Renfrewshire  
PA7 5NJ

Graham Vincent, Business Manager – Scotland

**Enviros Contact Details:**

Enviros Consulting Ltd  
61 The Shore  
Leith  
Edinburgh  
EH6 6RA

Rebecca Sturrock – Senior Consultant

Tel 0131 555 9543  
Fax 0131 555 9515  
Email [rebecca.sturrock@enviros.com](mailto:rebecca.sturrock@enviros.com)  
Web [www.enviros.com](http://www.enviros.com)

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## 1. INTRODUCTION

Enviros Consulting Ltd was commissioned by BAE Systems Environmental (BAE) to prepare an air quality monitoring programme for the former Royal Ordnance Factory Site during its regeneration and development. This programme will be used as a protocol to ensure a standard; consistent approach is applied to the monitoring process and will be included within the overall site remediation / construction method statement.

References throughout this document to an “EHO” refer to an Environmental Health Officer or other individual to be nominated by Renfrewshire Council.

The site is located within a predominantly rural area on the outskirts of the main residential area of Bishopton, which is the main existing settlement close to the site. Bishopton, which is located adjacent to the eastern site boundary, is separated from the site by a railway line that runs to and from Glasgow and the West Coast. The site was historically a WWI munitions filling factory and WWII manufacturing facility for military gun and rocket propellant. There are remnants from this past use across the site, the majority of which are in the form of unused and derelict buildings. The proposals are for long term remediation/regeneration and development of the site for mixed uses including residential, employment and recreational.

This document is designed to provide an appropriate air quality monitoring programme at the Bishopton site, to provide the required level of assurance to Renfrewshire Council that there are no significant adverse effects on human health or the environment as a result of emissions to air from the building decontamination programme.

This document sets out the parameters to be monitored, the survey methods and the survey duration. It also provides a protocol for data handling, review and interpretation, along with an action plan that sets out the appropriate steps which will be taken in the light of the ongoing survey results.

## 2. MONITORING SURVEY SPECIFICATION

### 2.1 Monitoring Locations

The decontamination through burning will take place at the identified buildings detailed in the report Bishopton Remediation Strategy B0064-0C-R1 (BAE Systems Environmental 2009). The decontamination strategy describes the approach to minimisation of air quality and other impacts by reference to consideration of building types/locations and associated risks of pollution. It describes the measures used to control emissions during each individual burn, and sets out how the burn events will be geographically spaced in order to minimise the potential for concentrated impacts on air quality. . More general decontamination, remediation and civil engineering activities will also take place on site during the decontamination period.

The proposed air quality monitoring locations are shown in **Figure 1**, as follows:

- ◆ An immediate downwind location from the various buildings as they are being burnt, at a location where it is safe to do so (AQ1);
- ◆ A number of site boundary monitors which will vary with the parameters to be considered (AQ2 to AQ5).
- ◆ An offsite monitoring location to determine a representative background concentration for the relevant parameters. The exact location will depend on who conducts the monitoring and factors including security, electricity supply and access rights (AQ6).

**Figure 1** shows the offsite monitoring location, which will be agreed between BAE Systems and Renfrewshire Council Environmental Services (RCES) once a suitable location has been identified. **Figure 1** will then be reviewed again prior to the commencement of monitoring and will be reviewed as part of the regular meetings in light of monitored results and phasing of work activities.

### 2.2 Suite of Parameters

The following parameters will be measured at the locations shown in Figure 1, as agreed during a meeting held on the 22nd of April between representatives from BAE Systems, RCES and their advisors.

- ◆ Fine Particulates (PM<sub>10</sub>, PM<sub>2.5</sub> and TSP)
- ◆ Nitrogen Dioxide (NO<sub>2</sub>);
- ◆ Dust deposition;
- ◆ Polycyclic Aromatic Hydrocarbons (PAHs);
- ◆ Lead; and
- ◆ Formaldehyde.

## 2.3 Monitoring Methods

### 2.3.1 Fine particulate matter (PM<sub>10</sub>, PM<sub>2.5</sub> and TSP)

There are a number of different methods for sampling airborne particulate matter and PM<sub>10</sub>. The strategy adopted in this study is to use a method which meets the "equivalence criteria" (as described in Section 3.31 and following of Technical Guidance Note TG (09)<sup>1</sup>) for measuring the PM<sub>10</sub> fraction of airborne particulate matter at one survey location. At the other locations, a light diffraction system will be used to measure a wider range of particulate matter fractions.

It is proposed to use a beta-attenuation monitor (BAM) to measure PM<sub>10</sub> levels at Location AQ3 on the site boundary adjacent to the closest properties to the site. This technique is classified as meeting the equivalence criteria, with appropriate corrections. A BAM draws an air sample at a constant rate through a section of paper tape, on which particles from the air are collected. The transmission of beta particles through the tape is measured at the beginning and end of the sample period. The difference between the two measurements is used to determine the concentration. The instrument results can be used to provide a continuous dataset, with an averaging period typically of 1 to 24 hours.

To support the BAM measurements, Osiris samplers will be used at the remaining locations AQ1, AQ2, AQ4, AQ5 and AQ6. The Osiris sampler to be used for this study is a real time portable monitor that is capable of measuring fine particles in a range of fractions as fine as PM<sub>1</sub>. This instrument is widely used by local authorities and organisations to monitor long term particulate levels in ambient air, and has been successfully used during trial decontamination burns at the Bishopton and Chorley sites. The Osiris uses a light diffraction technology to measure three different particle sizes (PM<sub>10</sub>, PM<sub>2.5</sub> and PM<sub>1</sub>) with a detection limit of 0.01µg/m<sup>3</sup>. The Osiris has a low sample volume of around 600 cc per minute, and has the benefits of real time logging and display.

### 2.3.2 Polycyclic Aromatic Hydrocarbons

The HiVol PUF sampler is designed to enable a high volume of air to be sampled, with collection of particulate matter on a glass fibre filter and polyurethane foam (PUF) cartridge. The sampling methodology will follow the US EPA Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air - Second Edition, January, 1999, Method TO-9A. This is a widely used method of ambient air monitoring.

A large volume of air (typically around 1-2m<sup>3</sup> per minute) is drawn through the sampling media. For the measurement of poly-aromatic hydrocarbons such as benzo[a]pyrene poly urethane foam (PUF) sampling is used, where air is drawn initially through a filter to trap pollutants in particulate form, and secondly through an activated foam cartridge to capture pollutants in gaseous form. Measurements will be carried out at locations AQ2 to AQ6

Once sampling is completed the filters and activated foam are analysed together by gas chromatography at a suitable accredited laboratory to give the concentration per cubic metre of air.

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<sup>1</sup> Department for Environment, Scottish Government and devolved authorities, "Local Air Quality Management: Technical Guidance LAQM.TG(09)," February 2009

### 2.3.3 Lead

Lead will be measured using the HiVol sampling technology as described in section 2.3.2. Particulate matter collected on the filter will be analysed at an appropriately accredited laboratory using an Inductively Coupled Plasma technique.

### 2.3.4 Nitrogen Dioxide

There are two widely used methods for the measurement of ambient nitrogen dioxide. Passive sampling is carried out with diffusion tubes, and provides long-term mean concentrations, typically averaged over a period of about 1 month. Continuous sampling is carried out using a chemiluminescence analyser. This instrument provides measurements typically averaged over a period of 1 hour or less. Statutory guidance confirms that "*this is defined by the EU as the reference method for NO<sub>2</sub>, and is the recommended method where accurate NO<sub>2</sub> monitoring is necessary.*"<sup>1</sup> Both approaches are in use throughout the United Kingdom as part of the national air monitoring network.

For the measurement survey at Bishopton, it will be important to measure nitrogen dioxide on a continuous basis. Consequently, it is proposed to install continuous chemiluminescence nitrogen dioxide analysers at four of the six survey locations (AQ1, AQ3, AQ5 and AQ6).

### 2.3.5 Dust deposition

Dust deposition rates will be measured at five locations in accordance with industry best practice, as set out by the Stockholm Environmental Institute.<sup>2</sup> This is an improvement to the method described in British Standard BS 1747 (1969) "*Methods for the measurement of air pollution Part 1: Deposit gauges.*" The technique is designed to measure the rate of dust deposition per unit area, measured in units of milligrams per square metre per day (mg/m<sup>2</sup>-day).

The measurements will be carried out using a dust collector shaped similar to an inverted "frisbee". The collector is mounted horizontally on a pole 1.75m above the ground. The gauge will be installed at the sampling location for a period of approximately one month. Dust deposited on the gauge during this period is washed into a collection bottle by precipitation (rainfall, dew etc) during the course of the survey. At the end of the survey period, any residual dust in the bowl is washed into the collection bottle using de-ionised water. The amount of suspended solids in the bottle will be analysed at a suitable accredited laboratory in accordance with British Standard BS 2690 "*Methods of testing water used in industry*" Part 120: "*Suspended solids: gravimetric method*" (1981).

Measurements will be carried out at locations AQ2 to AQ6, subject to guidance relevant to dust deposition (e.g. need to avoid shielding by any large objects/buildings or overhangs such as tree branches and overhead power/telephone lines).

### 2.3.6 Formaldehyde

Formaldehyde will be measured by drawing an air sample through an appropriate sorbent tube. The sorbent tube contains a glass tube containing a granular adsorbent material (DMPH – dinitrophenyl hydrazine) and glass wool filter. It is

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<sup>2</sup> Stockholm Environment Institute, "*Protocol for using the dry Frisbee (with foam insert) dust deposit gauge,*" February 1995

suitable for carrying out external monitoring for formaldehyde and is used with an active pump sampling method, drawing a maximum of 36 litres through the filter.

The tubes will be located at locations AQ2 to AQ6 and sampling will be carried out over the period of a working day. The tubes will then be sent to a suitably accredited laboratory (UKAS Accredited) for analysis via HPLC (High Pressure Liquid Chromatography).

## 2.4 Calibration and Certification

All equipment will be calibrated in accordance with manufacturer recommendations and will be appropriately certified. In the case of the Osiris / BAM / chemiluminescence and HiVol samplers, a certificate of calibration will be held onsite.

## 2.5 Summary of monitoring locations and parameters

A summary of the suite of parameters and the monitoring locations is provided in Table 1.

Table 1 Monitoring Locations & Parameters

Monitoring Locations	Parameters				
	Fine Particulates (PM <sub>10</sub> , PM <sub>2.5</sub> , TSP)	PAHs Lead	Nitrogen Dioxide (NO <sub>2</sub> )	Formaldehyde	Dust deposition
AQ1 (mobile)	Osiris		Chemi-luminescence		
AQ2	Osiris	High Volume sampler		Sorbent Tube/HPLC	Frisbee Gauge
AQ3	BAM	High Volume sampler	Chemi-luminescence	Sorbent Tube/HPLC	Frisbee Gauge
AQ4	Osiris	High Volume sampler		Sorbent Tube/HPLC	Frisbee Gauge
AQ5	Osiris	High Volume sampler	Chemi-luminescence	Sorbent Tube/HPLC	Frisbee Gauge
AQ6 (offsite)	Osiris	High Volume sampler	Chemi-luminescence	Sorbent Tube/HPLC	Frisbee Gauge

## 2.6 Limit of Detection

The anticipated limits of detection for continuous monitoring equipment and sampling/laboratory analysis techniques will be confirmed following onsite operational and calibration experience prior to any decontamination activities.

A verification test of all equipment is proposed prior to commencement of remediation activities to ensure a detection limit of less than 20% of the air quality standard or guideline is achieved. Alternative strategies will be proposed if this proved not to be the case. The limit of detection threshold for each parameter that represents 20% of the relevant air quality objective or guideline is included in Table 2.

Table 2 Target detection limits

Substance	Air quality objective/ guideline	Target detection limit
PM <sub>10</sub>	18 / 50 µg/m <sup>3</sup>	3.6 µg/m <sup>3</sup>
PM <sub>2.5</sub>	12 µg/m <sup>3</sup>	2.4 µg/m <sup>3</sup>
Nitrogen Dioxide	40 / 200 µg/m <sup>3</sup>	8 µg/m <sup>3</sup>
Dust deposition	200 mg/m <sup>2</sup> -day	40 mg/m <sup>2</sup> -day
Polycyclic Aromatic Hydrocarbons (PAHs)	0.25 ng/m <sup>3</sup>	0.05 ng/m <sup>3</sup>
Lead	0.25 µg/m <sup>3</sup>	0.05 µg/m <sup>3</sup>
Formaldehyde	5 / 100 µg/m <sup>3</sup>	1 µg/m <sup>3</sup>

## 2.7 Monitoring Programme

The monitoring programme identified in Table 1 will be carried out two months prior to the commencement of decontamination activities, throughout the duration of activity on site and two months following completion of the site works to provide baseline data without such works being carried out. The scope of post decontamination works, frequency of monitoring and final duration will however be agreed between BAE Systems and RCES in light of monitoring results during the final phase of remediation.

The frequency for each of the parameters is provided below;

- ◆ Fine particulate (PM<sub>10</sub> and PM<sub>2.5</sub>) – continuous throughout the decontamination programme;
- ◆ PAHs and lead – Four samples of approximately 1 week duration consecutively at the outset of the monitoring programme. These samples will reduce to monthly or quarterly samples of approximately 1 week duration, provided the results from the first four weeks are satisfactory.
- ◆ Nitrogen dioxide – continuous throughout the decontamination programme;
- ◆ Dust deposition – monthly samples throughout the decontamination programme; and
- ◆ Formaldehyde – Four samples of approximately 1 day duration during the first four weeks of the monitoring programme. These samples will reduce to monthly or quarterly samples of approximately 1 day duration, provided the results from the first four weeks are satisfactory.

## 2.8 Management plan

Action trigger thresholds have been set at 70% of the short-term (24 hour or less) air quality objective or guideline value. These identify the threshold level at which mitigation will be required or work activities modified to ensure measured ambient air quality levels return below the action trigger threshold. This provides a proactive mechanism to prevent the air quality objective or guideline being exceeded. These thresholds apply to measurements at locations AQ2, AQ3, AQ4 and AQ5.

If the measured levels are above the short-term air quality objective or guideline, this will result in a cessation of activity. Works will not recommence until either (a) or (b) below has been achieved:

- (a) Confirmation of a minimal impact from site activities through consideration of background levels of airborne pollutants, based on data from the offsite monitoring location AQ6; or
- (b) Changes to working practices or environmental conditions have taken place which gives a high degree of confidence that the short-term air quality objectives/guidelines will not be exceeded.

Long-term mean (i.e. annual mean) levels of airborne pollutants will be reviewed on a monthly basis, or more frequently if appropriate. If measurements indicate a risk of an exceedance of a long-term mean air quality objective/guideline, at location AQ2 AQ3, AQ4 or AQ5 due to emissions from the decontamination programme, revisions to working practices will be specified. These will be designed to reduce long-term mean levels of the measured substances. A major review will be carried out at six monthly intervals. If this indicates a significant risk of exceeding a long-term air quality objective/guideline, this will result in a cessation of activity. Works will not recommence until either (c) or (d) below has been achieved:

- (c) Confirmation of a minimal impact from site activities through consideration of background levels of airborne pollutants based on data from the offsite monitoring location AQ6; or
- (d) Changes to working practices or environmental conditions have taken place which gives a high degree of confidence that the long-term mean air quality objectives/guidelines will not be exceeded.

The action trigger levels and absolute threshold levels for measured parameters are identified in Table 3.



AIR MONITORING PROGRAMME FOR THE PROPOSED REGENERATION OF THE ROYAL ORDNANCE SITE,  
BISHOPTON

Table 3 Monitoring assessment thresholds

Parameter	Technique	Long or Short Term Assessment Period	Continuous or Averaged Measurement	Long term threshold (annual) ( $\mu\text{g}/\text{m}^3$ )	Short term threshold (1 hr to 24 hrs) $\mu\text{g}/\text{m}^3$	
					Absolute Threshold	Action Trigger Threshold
PM <sub>10</sub>	BAM or Osiris	Short term	Continuous		50	35
PM <sub>10</sub>	BAM or Osiris	Long term	Continuous	18		
PM <sub>2.5</sub>	Osiris	Long term	Continuous	12		
Benzo[a]pyrene	High Volume sampler	Long term	1 week average	0.00025		
Nitrogen Dioxide	Chemiluminescence analyser	Short term	Continuous		200	140
Nitrogen Dioxide	Chemiluminescence analyser	Long term	Continuous	40		
Dust Deposition	Frisbee Gauge	Long period	1 month average	200 ( $\text{mg}/\text{m}^2\text{-day}$ )		
Lead	High Volume sampler	Long term	1 week average	0.25		
Formaldehyde	Diffusion Tube	Short term	1 day average	5	100	70

### 3. ROLES AND RESPONSIBILITIES

#### 3.1 Record Keeping and Reporting

An air quality file will be maintained on site containing all monitoring results in chronological order (**see Appendix 2**). These would be available for audit by RCES to verify compliance with the action trigger and absolute threshold levels.

The results would be compiled into short monthly reports that would be submitted to RCES for their own records. Additional reports will be produced in the event of the trigger thresholds being exceeded. These reports will set out the analysis carried out and any actions taken.

#### 3.2 Public involvement

It is proposed that all monitoring results will be published in an appropriate way on a weekly basis. A monthly report (or at other suitable intervals where remediation burning has been taking place) will be prepared for the EHO or RCES representative. These reports can also be made available to members of the public if required.

#### 3.3 Response Procedures

Response procedures will be as outlined in Figure 2 based on the continuous monitoring results. If the action trigger thresholds are exceeded the appropriate response will be agreed between BAE Systems and the EHO. The implementation of these measures will be enforceable by BAE Systems on their contractors with verification by the EHO. Such responses will depend on the nature of remediation activity being undertaken but can include options to temporarily cease activities, or reduce the scale/duration of proposed decontamination. If the absolute threshold were reached, there will be a cessation of activity and work will only recommence following agreement with the EHO.

#### 3.4 Instrumentation Malfunction

Where practicable back-up equipment will be maintained onsite and in the event of a failure, to an item of monitoring equipment identified as critical to the assessment of short-term concentrations, work may be stopped until equipment operation is restored using the back-up equipment, or other means. A maintenance contract will be established by BAE Systems for the equipment specified in **Section 2.3** to ensure correct operation

#### 3.5 Role of the appointed supervisor

BAE Systems will appoint from their site management team a qualified engineer to act as the monitoring supervisor, who will be permanently onsite during working hours. The supervising engineer will report directly to a senior member of the site management team. The engineer will manage the monitoring exercise and audit responses onsite, for compliance with the air quality protocols. The engineer will have direct authority to stop any works which are liable to cause infringement of agreed thresholds.

The supervising engineer will liaise with the EHO and notify of any infringements of protocol and the actions taken to resolve. Weekly/monthly reports verifying the monitoring carried out, results/analysis, interpretation and any action implemented will be prepared by the supervising engineer and presented to the EHO.

The EHO will be able to conduct spot checks on the air quality survey work at any time during the decontamination programme. In the event of an exceedance of action trigger thresholds (set at 70% of the air quality objective/guideline value as described in Table 3), BAE Systems will implement and enforce appropriate mitigation such as the reduction in working area or cessation of the decontamination activity. No work would recommence without the approval of the EHO in the event of a breach of the absolute threshold.

### **3.6 Supervising Engineer's Record Keeping and Reports**

The supervising engineer will maintain records of incidents, all audits and any subsequent corrective actions employed. These will be available to the EHO and the Council when requested.

### **3.7 Modification of the AQMP**

The AQMP will be reviewed and modified on an ongoing basis in discussion between BAE Systems and RCES, in the light of the monitoring results and site observations. It is initially envisaged a review will be carried out on a monthly basis or in the event of a breach of any air quality standard or guideline.

### **3.8 Arbitration**

In the event of an irreconcilable disagreement between parties, an independent arbitrator from an approved Institute (for example, the Royal Environmental Health Institute of Scotland) will review the information and provide recommendations that must be adopted by BAE Systems and RCSE as appropriate. Such recommendations will be incorporated into a revised AQMP Interpretation Protocol.

## 4. ACTION PLAN

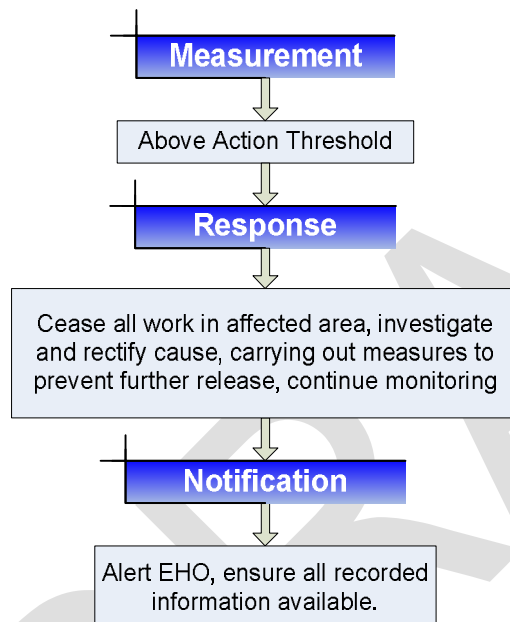
### 4.1 Introduction

The aim of this programme is to ensure that the appropriate steps are taken during the decontamination of the buildings on the Bishopton site to avoid adverse impacts upon the local population as a result of air pollution.

### 4.2 Action Plan

Figure 2 provides a series of stages that will be followed throughout the monitoring programme to ensure that the appropriate response is undertaken.

Figure 2 Air Monitoring Response Flow Chart



### 4.3 Mitigation Measures

The mitigation measures to be used will correspond with the monitoring results. These have been split into three separate situations below.

#### 4.3.1 Below the Short-term Trigger Threshold (<70%)

There are a number of standard housekeeping/best practice mitigation measures that will be in operation on site from the beginning of the development. These are set out in the draft Working Plan.

#### 4.3.2 Above the Short-term Trigger Threshold (>70% but <100%)

If the site makes a significant contribution to measured levels, this will indicate that normal best practice measures are not sufficient to prevent a detectable effect on air quality. Under these circumstances, further measures such as the following will be considered and implemented by site operatives where applicable;

- ◆ Check meteorological conditions and cease/reduce operations until more favourable conditions occur;
- ◆ Where practicable, moving of site activities to an alternative building, if site and weather conditions permit;
- ◆ Assessment of the key source of the emissions and the relevant background levels (see **Appendix 1**).

#### **4.4 Above the Short-term Absolute Threshold (>100%)**

If the site makes a significant contribution to measured levels, this will indicate that upgraded control measures are not sufficient to prevent an exceedance of air quality standards and guidelines. Under these circumstances, further measures will be implemented by site operatives where applicable;

- ◆ Cessation of the operations;
- ◆ Review decontamination procedures and programme;
- ◆ Reconsider buildings identified to be decontaminated by burning;
- ◆ Await more favourable meteorological conditions

#### **4.5 Above the Long-term standard/guideline**

If measured levels are above the long-term standard/guideline at the monthly review stage with a significant site contribution, measures such as those set out in Section 4.3 will be considered and implemented as appropriate.

If measured levels are above the long-term standard/guideline at the six monthly review stages with a significant site contribution, measures such as those set out in Section 4.4 will be implemented as appropriate.



## FIGURES

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Figure 1 Map showing monitoring locations

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242000

243000



244000

245000

# KEY

## Air Quality Monitoring Points

### Type

-  FIXED
-  MOBILE



Meters

0 100 200 300 400 500

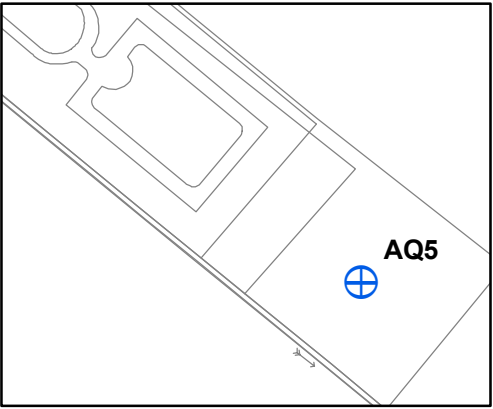
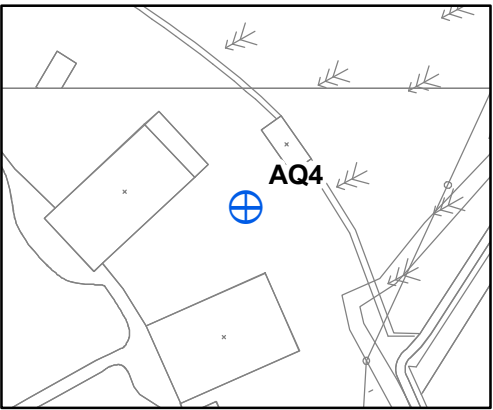
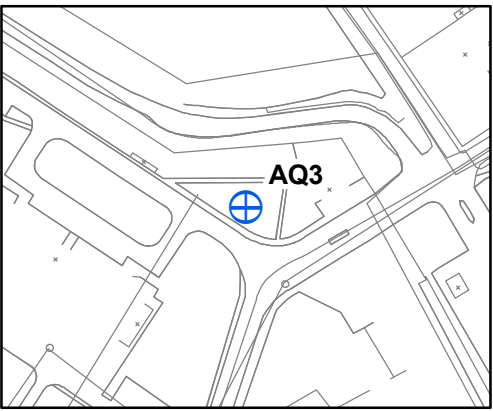
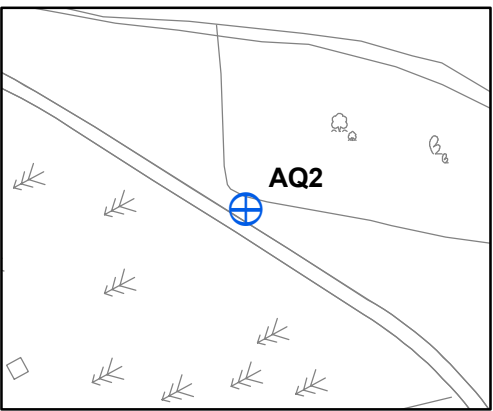
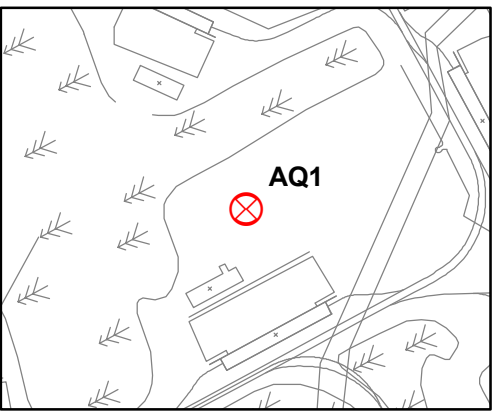


1:10,000

### Provisional Monitoring Locations

MointorID	Type	Easting	Northing
AQ1	MOBILE	Indicative Location only	
AQ2	FIXED	242407	669467
AQ3	FIXED	243650	670433
AQ4	FIXED	243172	670961
AQ5	FIXED	242284	671433
AQ6	OFFSITE	To be confirmed	

Produced By: JG 10/06/09



671000

670000

669000

AQ6



## APPENDICES

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## 1. TREATMENT OF BACKGROUND CONCENTRATIONS

The assessment of measured levels of PM<sub>10</sub>, PM<sub>2.5</sub> and polycyclic aromatic hydrocarbons (PAH) needs to take account of the contribution of other sources to levels of these substances.

Levels of PM<sub>10</sub> will be assessed by the site engineer every morning before a burning remediation event occurs as follows:

- ◆ Calculate the 24-hour mean concentration for the last operational working day at the offsite and onsite monitoring locations.
- ◆ If all measured onsite concentrations are below 35µg/m<sup>3</sup>, then no action is needed.
- ◆ If one or more measured on-site concentration is above 35µg/m<sup>3</sup>, the site contribution will be estimated by subtracting the measured offsite concentration. If this value exceeds 5µg/m<sup>3</sup>, the measures set out in Section 4.4 will be implemented.

Long term mean levels of PM<sub>10</sub>, PM<sub>2.5</sub> and PAHs will be assessed on a monthly basis or more frequently, as follows:

- ◆ If all measured onsite concentrations and the average values measured to date comply with the long-term air quality objectives/guidelines, then no action is needed.
- ◆ If one or more measured onsite concentration of PM<sub>10</sub>, PM<sub>2.5</sub> or benzo(a)pyrene are above the air quality objective/guideline, the site contribution will be estimated by subtracting the measured offsite concentration. If the site contribution is above 10% of the long-term air quality objective/guideline, the measures set out in Section 4.3 will be implemented.

At the six month stage, if one or more measured onsite concentration of PM<sub>10</sub>, PM<sub>2.5</sub> or benzo(a)pyrene are above the air quality objective/guideline, the site contribution will be estimated by subtracting the measured offsite concentration. If the site contribution is above 10% of the long-term air quality objective/guideline, measures set out in Section 4.5 will be implemented.

The background monitoring site and the onsite monitoring locations will be inspected to identify whether there are any specific sources of PM<sub>10</sub> or PAH (including offsite sources) which could influence the analysis depending on wind direction. The interpretation of measured data will be reviewed in light of these observations and any interpretation of measured data discussed and agreed with the EHO. Sources such as combustion sources including bonfires, BBQ's (potentially influencing PM<sub>10</sub>, PM<sub>2.5</sub> and PAH measurements) and building or construction works (potentially influencing PM<sub>10</sub> and PM<sub>2.5</sub> measurements) occurring in close proximity to any monitoring location could influence measurements.



## 2. EXAMPLE SITE OBSERVATION SHEET

DRAFT

# BISHOPTON RO SITE

Name:  
Position:

AIR MONITORING DAILY RECORD FORM <span style="color: red;">[Commercial in Confidence – FINAL DRAFT - Work in Progress]</span>							
Date		Description of Current Site Activity					
Time							
Site Notes							
Weather Conditions							
Temp °C	Wind Direction (N, E, S, W etc)	Wind Speed (miles/hour)	Humidity (%)	Pressure (mb)	Monthly rainfall (cm)	Ground Conditions (wet/damp/dry)	Cloud Cover (Clear sky, overcast or 1 to 7 oktas) <small>NOTE 1 okta = 1/8</small>

**Osiris Instruments – Visual Inspection**

Unit	Date of last calibration/ Filter change	Measured concentrations at time of visit				Instrument status (battery charge, memory used)	Error messages (if any). Record any action in Notes box	Notes (action taken)
		TSP	PM10	PM2.5	PM1			
AQ1								
AQ2								
AQ3								
AQ4								
AQ5								
AQ6								

### NOx Instruments – Visual Inspection

Unit	Date of last calibration/ Filter change	Measured concentrations at time of visit			Instrument status				Error messages (if any). Record any action in Notes box	Notes (action taken)
		NO	NOx	NO2	PMT Voltage	Rack temp	Pump rate	Etc		
AQ1										
AQ3										
AQ5										
AQ6										

Dust deposition gauge – Visual Inspection			
Unit	Date survey period started	Visual inspection of equipment	Water bottle full or nearly full? If so, replace
AQ2			
AQ3			
AQ4			
AQ5			
AQ6			

### Sampling Instruments – Visual Inspection

Unit	Hi Vol Sampler				Formaldehyde sample			
	Is the unit monitoring?	Survey start date/time	Error messages (if any). Record any action in Notes box	Notes (action taken)	Is the unit monitoring?	Survey start date/time	Error messages (if any). Record any action in Notes box	Notes (action taken)
AQ2								
AQ3								
AQ4								
AQ5								
AQ6								

**Osiris Instruments – Daily Data Evaluation**

Unit	Average PM10 during preceding operational day (µg/m3)	Average background PM10 during preceding operational day (µg/m3) (AQ6)	Average PM10 > 35 µg/m3? If no, no further action needed	Calculate measured level – background level	measured level – background level > 5 µg/m3? If no, no further action needed	Action taken
AQ1			Yes / No		Yes / No	
AQ2			Yes / No		Yes / No	
AQ3			Yes / No		Yes / No	
AQ4			Yes / No		Yes / No	
AQ5			Yes / No		Yes / No	

NOx Analysers – Daily Data Evaluation						
Unit	Maximum 1 hour NO2 during preceding operational day (µg/m3)	Average background NO2 during preceding operational day (µg/m3) (AQ6)	Max 1 hour NO2 > 140 µg/m3? If no, no further action needed	Action taken	Max 1 hour NO2 > 200 µg/m3? If no, no further action needed	Action taken
AQ1			Yes / No		Yes / No	
AQ3			Yes / No		Yes / No	
AQ5			Yes / No		Yes / No	

General Comments/Observations