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Project **FORTH REPLACEMENT CROSSING**

Document title

**AIR QUALITY MONITORING REPORT  
FEBRUARY 2015**

00	05/03/2015	First revision	SSN	KHN	SSN
<b>Rev</b>	<b>Rev. Date</b>	<b>Purpose of revision</b>	<b>Made</b>	<b>Checked</b>	<b>Reviewed</b>

Document status

**FOR REVIEW**

Made by Stuart Swainson	Checked By: Kathryn Hamilton
Initials: SSN	Initials: LSN

Document number	Rev
<b>REP -00217</b>	<b>00</b>

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**Distribution**

Name	Email Address	Copy Sent (Y/N)
Michael Martin	<a href="mailto:Michael.martin@fbcjv.co.uk">Michael.martin@fbcjv.co.uk</a>	

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## **1. INTRODUCTION**

**1.1.** Air quality monitoring is being undertaken by FCBC during the construction of the Forth Replacement Crossing and the associated road network. This report details the air quality monitoring that is currently being undertaken across the site and presents the monitoring results for February 2015.

**1.2.** Air quality monitoring during this period has been undertaken in accordance with the Code of Construction Practice (CoCP) and the Dust and Air Quality Management Plan (DAQMP) contained within the Environmental Management Plan (EMP).

## **2. MONITORING EQUIPMENT AND LOCATIONS**

**2.1.** Air quality is being monitored on site using both automatic light scatter dust meters and Frisbee gauge dust deposition monitoring. Thirteen Frisbee gauges are set up at sensitive locations across the site to measure dust deposition rates (Figure 1). Seven automatic light scatter meters have also been installed at various sensitive locations to measure real time particulate matter (PM<sub>10</sub>) concentrations and the Total Suspended Particle (TSP) concentrations (Figure 2). These meters are calibrated annually. Table 1 lists the air quality monitoring equipment present at each monitoring location, including the date it was installed.

**2.2.** Light scatter type monitoring equipment have been selected as a site monitoring tool to create a live network which assesses the levels of fugitive particulate matter, principally airborne dust. These monitors require less space, maintenance and power than other real time monitors such as a Tapered Element Oscillating Microbalance (TEOM) which is used and designed to measure particulate levels to exceedingly high standards, including measuring long-term compliance to statutory limits. Light scatter meters are more practicable to deploy. However, the meters do generally record levels higher than those measured by the TEOM. The meters can also be affected by atmospheric moisture content which further increases reported levels. Accordingly, any elevations of statutory limits should be treated as precautionary exceedances. The monitors are reliable for on-site monitoring and the establishment of action thresholds to ensure unforeseen activities generating significant dust are identified and suitably controlled. Light scatter meters are becoming the construction and waste industries norm for particulate dust monitoring.

**2.3.** In association with air quality monitoring across the site, temperature and relative humidity are also continually measured by the light scatter meters at Inchgarvie Lodge and Clufflat Brae. Weather stations, located at the sound level meters at Echline and Linn Mill which are adjacent to the light scatter

meters at these monitoring locations, also continually record weather data, including temperature, relative humidity, wind speed and wind direction.

**2.4.** In addition to the fixed monitoring equipment used at sensitive locations across the site, a daily dust log for both the North and South sites has been kept by the FCBC Environmental Department. This daily dust inspection is used to identify any dust occurring as a result of construction works and any actions required. This log also provides a visual record of the weather conditions at the time of the inspection, including conditions that can affect readings, such as fog.

**2.5.** Frequent environmental site inspections are also undertaken by members of the FCBC Environmental Department. These inspections include a dust check to assess the following:

- dust levels on site;
- suppression/dampening down; and
- transportation of materials.

In relation to these inspections, the FCBC Environmental Department register any environmental issues using a QMT (Quality Management Tool). Any issues relating to air quality can therefore be noted and closed out appropriately.



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**Figure 1: Example of an Installed Frisbee Gauge Meter**



**Figure 2: Example of an installed Automatic Light Scatter Dust Meter**

**Table 1: Air Quality Monitoring Locations**

Ref:	Monitoring Location	Monitoring Equipment	Installation Date	Construction Activities in February
M1	Whinny Hill	Frisbee	21/03/12	<ul style="list-style-type: none"> <li>• Rock Trimming/Breaking</li> <li>• Earth Works</li> <li>• CMC Piles</li> </ul>
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	<ul style="list-style-type: none"> <li>• Marine works</li> <li>• Assembling and fixing rebar and formwork works at Pier S3</li> <li>• Concrete pouring at Pier S3</li> <li>• Excavation at Pier S2</li> </ul>
M8	Barracks West	Frisbee	31/08/11	<ul style="list-style-type: none"> <li>• Marine works</li> <li>• Assembling and fixing rebar and formwork works at Pier S3</li> <li>• Concrete pouring at Pier S3</li> <li>• Excavation at Pier S2</li> </ul>
M9	Barracks East	Frisbee	31/08/11	
M10	Inchgarvie Lodge	Frisbee	22/08/11	<ul style="list-style-type: none"> <li>• Launch – Painting works and snagging</li> <li>• Assembling and fixing rebar and formwork works at Pier S3</li> <li>• Concrete pouring at Pier S3</li> <li>• Excavation at Pier S2</li> </ul>
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	<ul style="list-style-type: none"> <li>• Launch – Painting work and paint removal and bearing installation</li> </ul>
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	<ul style="list-style-type: none"> <li>• Launch – Painting work and paint removal and bearing installation</li> </ul>
M13	Clufflat Brae	Frisbee	21/09/11	
		Automatic light scatter meter	24/10/11	
M14	Springfield	Frisbee	15/08/11	<ul style="list-style-type: none"> <li>• Launch – Painting work and paint removal and bearing installation</li> </ul>
M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> <li>• Launch – Painting work and removal and bearing installation</li> <li>• Paving, cabling and soiling at A904 &amp; B924 link</li> </ul>
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	<ul style="list-style-type: none"> <li>• Earthworks at B800</li> </ul>

		Automatic light scatter meter	14/02/12	<ul style="list-style-type: none"> <li>• Utility works</li> <li>• Drainage works</li> </ul>
M17	Dundas Home Farm	Frisbee	29/08/11	<ul style="list-style-type: none"> <li>• Construction of road formation from Dundas to Queensferry gyratory</li> <li>• Gantry foundations</li> </ul>
		Automatic light scatter meter	23/02/12	
M18	Newton	Frisbee	22/08/11	<ul style="list-style-type: none"> <li>• None</li> </ul>
		TEOM	23/05/12	

### 3. AIR QUALITY MONITORING RESULTS

#### 3.1. Automatic Light Scatter Dust Meter Monitoring Results

**3.1.1.** Light scatter results for February 2015 have been presented in a monthly chart; this can be found in Appendix A. Results show that the PM<sub>10</sub> levels were below threshold levels throughout the month with the exception of the 13<sup>th</sup> and 14<sup>th</sup> February. On these dates the monitors at Whinnyhill, Linn Mill and Scotstoun registered levels above the action level. In addition, the Clufflat Brae monitor recorded an exceedance of the action level on the 13<sup>th</sup> February. During the period 13<sup>th</sup> – 15<sup>th</sup> February all seven monitors registered increased levels.

**3.1.2.** The PM<sub>10</sub> results have also been compared to the daily mean results obtained from the TEOM air quality monitoring stations located in Newton, Rosyth, and Broxburn, and from the TEOM FDMS station located at Queensferry Road, Edinburgh. The TEOM at Newton was installed by West Lothian Council, facilitated by FCBC, during May 2012. The comparison between the light scatter and TEOM results demonstrates that both sets of results generally follow the same pattern, including an increase in levels over the period 13<sup>th</sup> – 15<sup>th</sup> February, indicating that the pattern observed throughout February was largely driven by regional changes in air quality rather than being caused by construction related activities.

**3.1.3.** During February, rock breaking and trimming activities have been ongoing between Castlandhill Road and the A90. These works will continue to progress north towards Whinny Hill over the coming few months. Localised dust creation is associated with these activities. Though this has not caused an issue so far and has required no mitigation, FCBC are monitoring the situation closely to ensure that as the works get close to Whinny Hill, and as the weather improves, these activities continue to have no measurable impacts on the local air quality and are mitigated appropriately where necessary.

## **3.2. Total Suspended Particles**

**3.2.1.** The TSP results for February 2015 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during February were found to be low and all within the threshold level. All locations across the site were mostly found to follow a similar pattern, including an increase during the 13<sup>th</sup>-15<sup>th</sup> February, similar to that observed for PM<sub>10</sub> levels. This demonstrates that, in general, the levels were influenced by regional changes in TSP levels, rather than construction works.

## **3.3. Frisbee Dust Deposition Results**

**3.3.1.** The Frisbee dust deposition results for February 2015 have been presented in a chart and can be found in Appendix C. This includes an additional Frisbee (Echline Corner) currently located south of the A904 in proximity to the Echline monitor. This temporary Frisbee is used to provide additional information and its results are presented alongside the 13 permanent monitors. Frisbee dust deposition results were collected fortnightly, and the results averaged over this fortnight period to give a daily dust deposition rate. Two collections were made in February, on the 11<sup>th</sup> and 25<sup>th</sup>. The collection on the 11<sup>th</sup> February represents the period covering the previous 21 days. The delay was

due to a logistical problem with the courier returning sample bottles from the testing laboratory. The next collection will take place on the 11<sup>th</sup> March 2015.

- 3.3.2.** The site action level for the dust deposition rate has been set at 250 mg/m<sup>2</sup>/day. Exceedances of this level are treated as a potential incident and a review of the works in the vicinity of the site is instigated. A lower site review level has been set at 140 mg/m<sup>2</sup>/day. Where concentrations exceed the lower review threshold the site works are reviewed to ensure good practice is implemented; it is essentially a warning that additional controls may be required.
- 3.3.3.** During February there were two exceedances of the site review level and no exceedances of the action level (see Table 2).

**Table 2: Exceedances of the dust deposition thresholds**

<b>Fortnight ending</b>	<b>Threshold Exceeded</b>	<b>Monitoring Location</b>	<b>Considerations</b>	<b>Weather conditions during period</b>
25/01/2015	Review	Butlaw Fisheries	No dust generating construction activities in the area	Generally windy and wet
25/02/2015	Review	Echline	No dust generating construction activities in the area, but localised minor works occurring directly adjacent to monitor.	Generally windy and wet

- 3.3.4.** For the exceedances of the review level a review of the works in each of the areas, weather conditions, and the mitigation measures in place was undertaken. Other considerations were also made, such as where the gauge is located. Where available, the Frisbee gauge results were

also considered alongside the particulate matter data for the same period.

**3.3.5.** During the period ending the 25<sup>th</sup> February the Echline gauge registered dust deposition results above the review level. During this time the gauge was located immediately adjacent to minor works occurring on along the B924. A review of these works has therefore been undertaken. Although there were no activities that would give rise to any significant dust generation taking place in the area, work was ongoing in direct proximity to the gauge, including soiling the adjacent verge area. No dust was observed migrating from these works during this period. Two other gauges are located in close proximity to this monitor (Echline Corner and Springfield). Both of these gauges registered levels below the review level during the period. PM<sub>10</sub> and TSP data were low for the period at the locations in close proximity (Echline, Clufflat and Inchgarvie) with the exception of the 13<sup>th</sup> - 15<sup>th</sup> (See section 3.1.1). After a thorough review it was concluded that the raised levels may have been a result of the Frisbee gauge being located directly within the verge soiling works during this period but any dust created was contained to site and not allowed to migrate beyond this. It should be noted that even with the gauge being located within the works, dust deposition levels were still well below the action level. Works in the immediate proximity to the gauge were completed in early March.

**3.3.6.** During the period ending the 25<sup>th</sup> February the Butlaw gauge registered above the review level. However, a review of works was undertaken and it was found that no construction activities that would be likely to give rise to dust took place in the area during this period. PM<sub>10</sub> and TSP data were very low at the closest monitors (Clufflat and Inchgarvie). After a thorough review it was concluded that the results cannot be explained by FCBC construction activities undertaken during this period.

#### **3.4. Daily Dust Log and Environmental Inspections**

- 3.4.1.** A summary of the daily dust log for February can be found in Appendix D. No instances of dust relating to FCBC works were noted on site.
- 3.4.2.** During this period full environmental inspections were also undertaken across the site and covered areas where works were being undertaken. In February, localised dust was noted around rock breaking activities adjacent to Castlandhill Road (See Section 3.1.3.).



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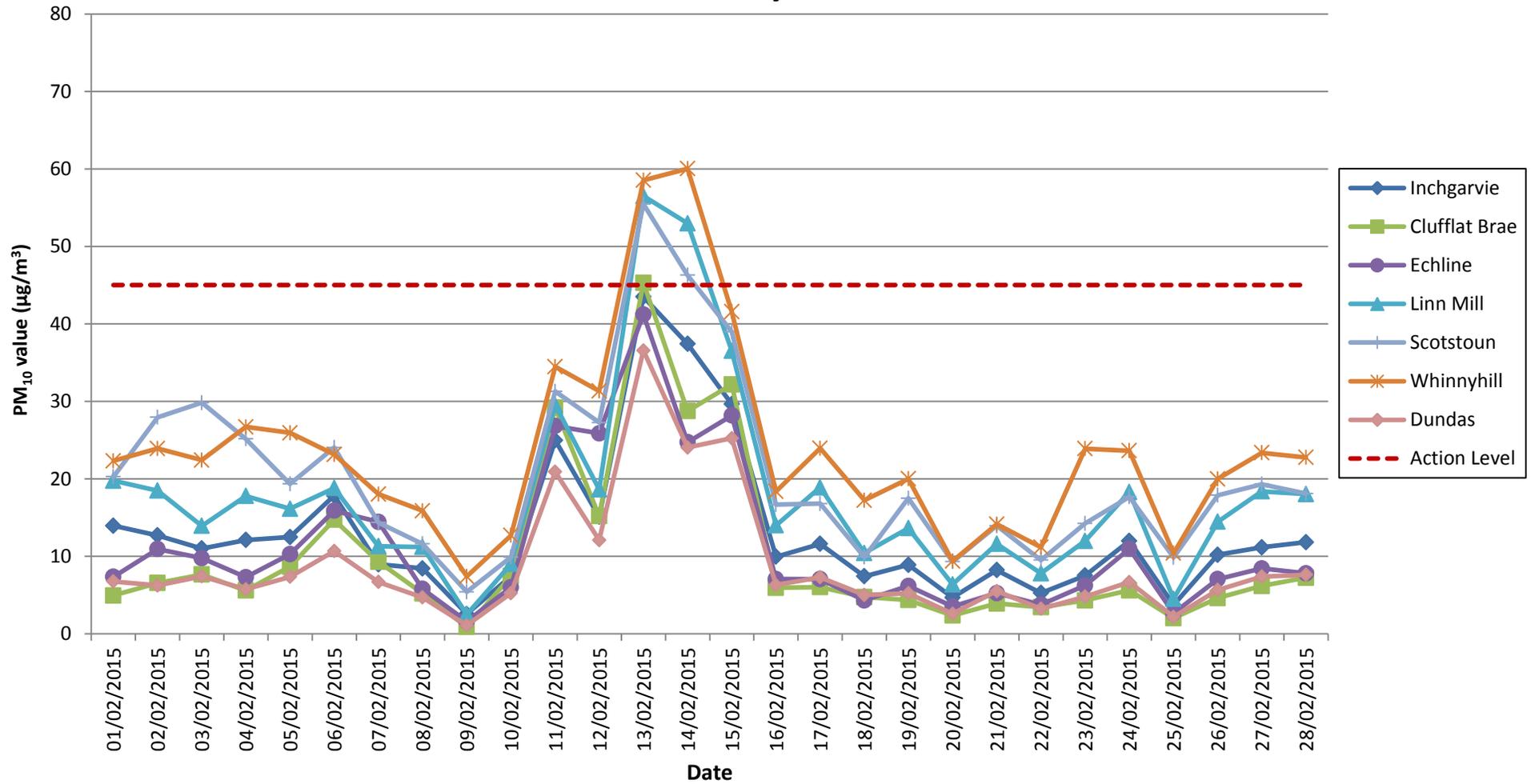
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## **APPENDIX A: LIGHT SCATTER METER RESULTS**

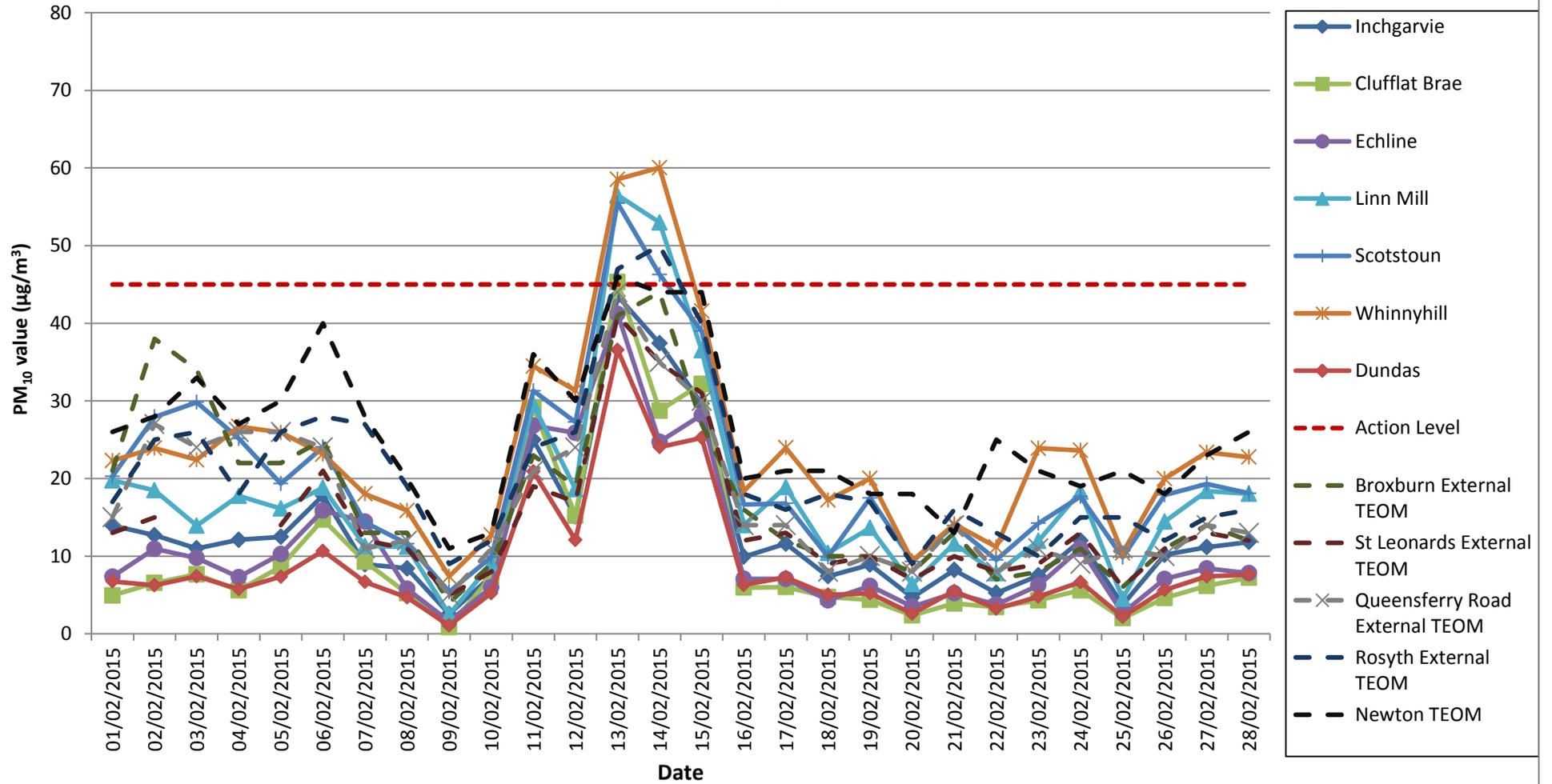
# Air Quality Monitoring

## Particulate Matter (PM10) Results for all Monitoring Locations

### February 2015



# Air Quality Monitoring: Particulate Matter (PM10) Results for all Monitoring Locations, including TEOM data February 2015



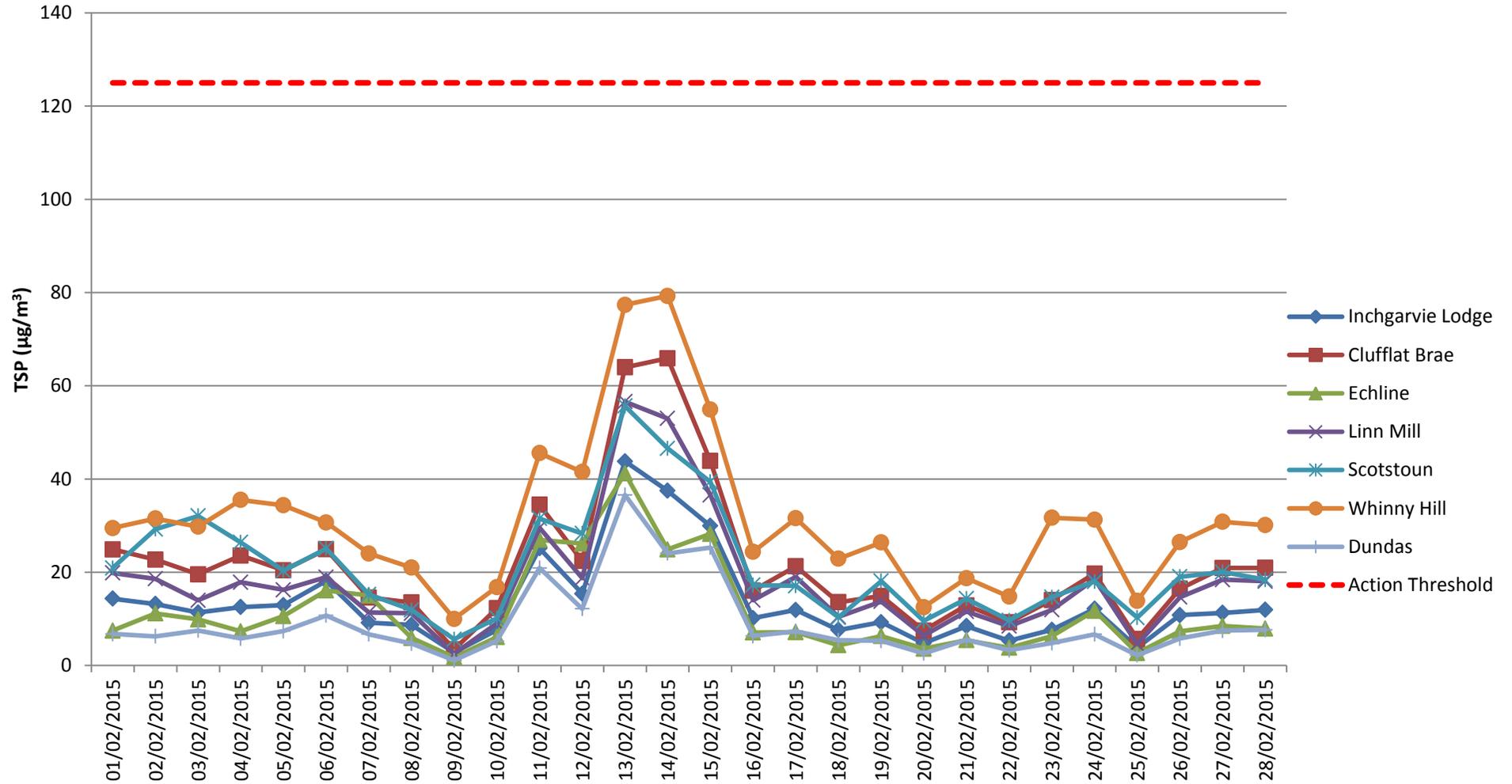


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## **APPENDIX B: TOTAL SUSPENDED PARTICLES**

# Total Suspended Particles (TSP) Results February 2014



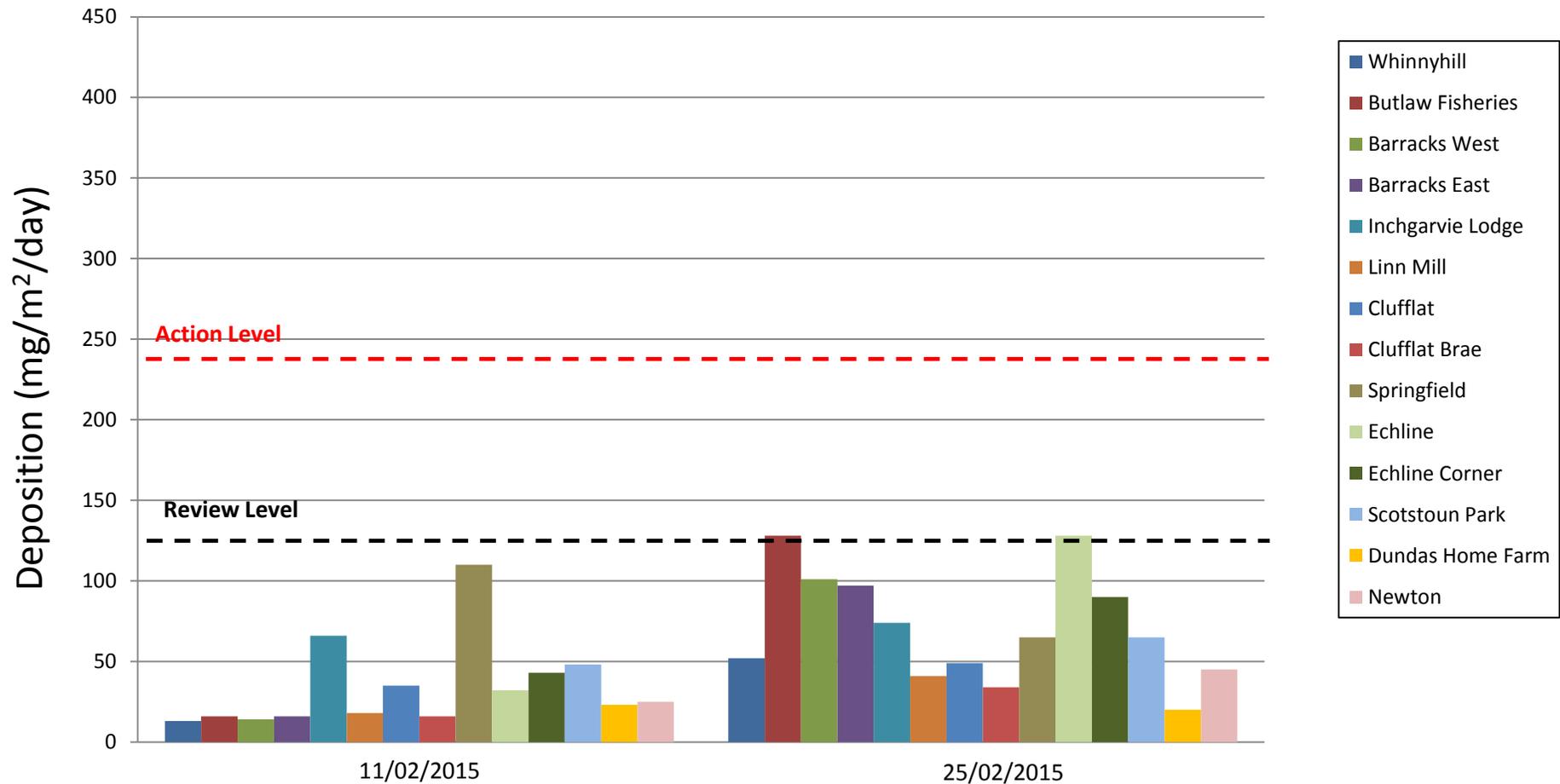


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## **APPENDIX C: FRISBEE GAUGE RESULTS**

## Frisbee Dust Deposition Results: February 2015



**Note:** The collection on the 11<sup>th</sup> February represents the period covering the previous 21 days. The delay was due to a logistical problem with the courier returning sample bottles from the testing laboratory.



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## **APPENDIX D: DAILY DUST LOG**

### Daily Dust Log - North - February 2015

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/02/2015	N	MEDIUM	NW		N			
02/02/2015	N	LIGHT	W	DAMP	N			
03/02/2015	N	LIGHT	NW	DAMP	N			
04/02/2015	N	LIGHT	W	DAMP	N			
05/02/2015	N	LIGHT	W	DAMP	N			
06/02/2015	N	LIGHT	W	DAMP/WET	N			
07/02/2015	N	MEDIUM	W		N			
08/02/2015	N	MEDIUM	W		N			
09/02/2015	N	MEDIUM	W	DAMP	N			
10/02/2015	N	MEDIUM	W	WET	N			
11/02/2015	N	MEDIUM	W	WET	N			
12/02/2015	N	MEDIUM	SW	WET	N			
13/02/2015	N	MEDIUM	E	WET	N			
14/02/2015	N	MEDIUM	NE		N			
15/02/2015	N	MEDIUM	SE		N			
16/02/2015	N	MEDIUM	SW	WET	N			
17/02/2015	N	STRONG	SW	DAMP/WET	N			
18/02/2015	N	STRONG	SW	DAMP/WET	N			
19/02/2015	N	STRONG	SW	DAMP/WET	N			
20/02/2015	N	STRONG	W	DAMP	N			
21/02/2015	N	STRONG	W		N			
22/02/2015	N	STRONG	SW		N			
23/02/2015	N	STRONG	SW	DAMP/WET	N			
24/02/2015	N	STRONG	W	DAMP/WET	N			
25/02/2015	N	MEDIUM	SW	DAMP/WET	N			
26/02/2015	N	STRONG	SW	DAMP	N			
27/02/2015	N	STRONG	SW	DAMP	N			
28/02/2015	N	STRONG	SW		N			

### Daily Dust Log - South - February 2015

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/02/2015	S	MEDIUM	S		N			
02/02/2015	S	LIGHT	SW	DAMP	N			
03/02/2015	S	LIGHT	SW	DAMP	N			
04/02/2015	S	LIGHT	SW	DAMP	N			
05/02/2015	S	LIGHT	SW	DAMP	N			
06/02/2015	S	LIGHT	SW	DAMP/WET	N			
07/02/2015	S	MEDIUM	SW		N			
08/02/2015	S	MEDIUM	SW		N			
09/02/2015	S	MEDIUM	SW	DAMP	N			
10/02/2015	S	MEDIUM	SW	WET	N			
11/02/2015	S	MEDIUM	SW	WET	N			
12/02/2015	S	MEDIUM	SW	WET	N			
13/02/2015	S	MEDIUM	SW	WET	N			
14/02/2015	S	MEDIUM	SW		N			
15/02/2015	S	MEDIUM	S		N			
16/02/2015	S	MEDIUM	SW	WET	N			
17/02/2015	S	STRONG	SW	DAMP/WET	N			
18/02/2015	S	STRONG	SW	DAMP/WET	N			
19/02/2015	S	STRONG	SW	DAMP/WET	N			
20/02/2015	S	STRONG	NE	DAMP	N			
21/02/2015	S	STRONG	NE		N			
22/02/2015	S	STRONG	SW		N			
23/02/2015	S	STRONG	SW	DAMP/WET	N			
24/02/2015	S	STRONG	SW	DAMP/WET	N			
25/02/2015	S	MEDIUM	SW	DAMP/WET	N			
26/02/2015	S	STRONG	SW	DAMP	N			
27/02/2015	S	STRONG	SW	DAMP	N			
28/02/2015	S	STRONG	SW		N			