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Project

**FORTH REPLACEMENT CROSSING**

Document title

**AIR QUALITY MONITORING REPORT  
 JUNE 2015**

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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 June 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 (these 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 to determine if any actions are 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 June
M1	Whinny Hill	Frisbee	21/03/12	<ul style="list-style-type: none"> <li>• Earth Works/Fill Placement</li> <li>• New Ferrytoll Road</li> <li>• FT03 &amp; FT04 deck works</li> <li>• FT09 Works</li> <li>• FT19 Retaining Wall</li> <li>• Road works</li> </ul>
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	<ul style="list-style-type: none"> <li>• Pier S1 rebar, formwork &amp; concrete works</li> <li>• Pier S2 foundation work</li> <li>• Central Tower rebar, formwork, concreting works, deck table installation works</li> <li>• South Tower rebar, formwork, concreting works, deck table installation works</li> </ul>
M8	Barracks West	Frisbee	31/08/11	<ul style="list-style-type: none"> <li>• Pier S1 rebar, formwork &amp; concrete works</li> <li>• Pier S2 foundation work</li> <li>• Central Tower rebar, formwork, concreting works, deck table installation works</li> <li>• South Tower rebar, formwork, concreting works, deck table installation works</li> </ul>
M9	Barracks East	Frisbee	31/08/11	
M10	Inchgarvie Lodge	Frisbee	22/08/11	<ul style="list-style-type: none"> <li>• Launch – snagging and bearing installation</li> <li>• Pier S1 rebar, formwork &amp; concrete works</li> <li>• Pier S2 foundation work</li> <li>• Central Tower rebar, formwork, concreting works, deck table installation works</li> <li>• South Tower rebar, formwork, concreting works, deck table installation works.</li> <li>• Main carriageway earthworks</li> </ul>
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	<ul style="list-style-type: none"> <li>• Launch – snagging and bearing installation</li> <li>• Main carriageway earthworks</li> </ul>
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	<ul style="list-style-type: none"> <li>• Launch – snagging and bearing</li> </ul>

M13	Clufflat Brae	Frisbee	21/09/11	<ul style="list-style-type: none"> <li>installation</li> <li>Main carriageway earthworks</li> </ul>
		Automatic light scatter meter	24/10/11	
M14	Springfield	Frisbee	15/08/11	<ul style="list-style-type: none"> <li>Launch – snagging and bearing installation</li> <li>Main carriageway earthworks</li> </ul>
M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> <li>Launch – snagging and bearing installation</li> <li>Main carriageway earthworks</li> </ul>
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	<ul style="list-style-type: none"> <li>Arup Access works</li> <li>Footpath works</li> <li>Utility works</li> <li>Concrete finishing works at ESQ04</li> <li>B800 North road works including bridge works (these works are directly in the location of the meter which now sits within the construction boundary).</li> </ul>
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	<ul style="list-style-type: none"> <li>Utility works</li> <li>Concrete finishing works at ESQ04</li> <li>B800 South road works including bridge works</li> <li>Main carriageway works</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 June 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 mostly below threshold levels throughout the month with the exception of three periods (4<sup>th</sup>, 18<sup>th</sup> and 30<sup>th</sup> June). Linn Mill registered above the action level on the 4<sup>th</sup> and 30<sup>th</sup> June, and also showed an increase on the 12<sup>th</sup> June (although still below the action level on this date). The other light scatter meters in the vicinity (Inchgarvie and

Clufflat Brae) do not show a similar increase on these days, with the exception of Inchgarvie on the 29<sup>th</sup> and 30<sup>th</sup> June. All monitors registered increased levels on the 18th June and the Inchgarvie results reached the action level on that day. These dates all correspond with dry weather conditions. Increased PM<sub>10</sub> levels were also recorded at Scotstoun on 1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup>, 18<sup>th</sup> and 30<sup>th</sup> June with the action level reached on the 30th June. This is likely to be because the PM<sub>10</sub> monitor is now located within the area where works are being carried out (see 3.1.3).

- 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 and St Leonards, Edinburgh (an urban background site). The TEOM at Newton was installed by West Lothian Council, facilitated by FCBC, during June 2012. The comparison between the light scatter and TEOM results demonstrates that both sets of results generally follow the same pattern, indicating that the pattern observed throughout June was largely driven by regional changes in air quality, with the exception of increases observed for Linn Mill, Inchgarvie, Clufflat Brae and Scotstoun during the month. In particular, the increases at Linn Mill on the 4<sup>th</sup> June, Linn Mill and Inchgarvie on the 30<sup>h</sup> June and Scotstoun throughout the month did not correspond to high TEOM results. The elevated levels of PM<sub>10</sub> at Linn Mill and Inchgarvie may be due partly to construction activities, particularly the main carriageway earthworks or dust arising from bare ground areas during dry conditions. Increased inspections will be carried out in this area to ensure any dust generating activities are adequately mitigated.
- 3.1.3.** During June, site operations continued around the B800 north of the bridge over the A90. These works currently extend up to the fence line where the Scotstoun PM<sub>10</sub> monitor is located. These works include landscaping, surfacing and earthworks in the vicinity of the monitor. This means that the monitor is essentially on-site and that operations are now closer to some receptors. Although results are widely in line with

other monitors, with the exception of the increases noted in 3.1.1, the monitor generally registered some of the highest levels across site during June. This is likely due to the construction works being undertaken directly adjacent to the monitor and would not reflect migration of dust beyond the immediate works area. FCBC will continue to monitor this area closely over the next few months as works in this area progress.

### **3.2. Total Suspended Particles**

**3.2.1.** The TSP results for June 2015 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during June were found to be generally low and all within the threshold level. All locations across the site were mostly found to follow a similar pattern (similar to that observed for PM<sub>10</sub> levels) but with higher levels noted at a few locations. As mentioned in 3.1.3. the Scotstoun monitor is currently located immediately adjacent to work activities which are being monitored closely at present. As with PM<sub>10</sub> it is considered that, in general, the TSP levels across site were influenced by regional changes in TSP levels, with the exception of the increases corresponding to the higher PM<sub>10</sub> levels noted in 3.1.2..

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

**3.3.1.** The Frisbee dust deposition results for June 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. Three collections were made to cover the results for June; these occurred on the 3<sup>rd</sup> and 17<sup>th</sup> June and the 1<sup>st</sup> July 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 June there were no exceedances of either the site review or action levels, although it is noted that the result for Scotstoun for the fortnight ending 3<sup>rd</sup> July indicates higher dust deposition than at the other locations (see 3.1.3).

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

**3.4.1.** A summary of the daily dust log for May 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 carried out.



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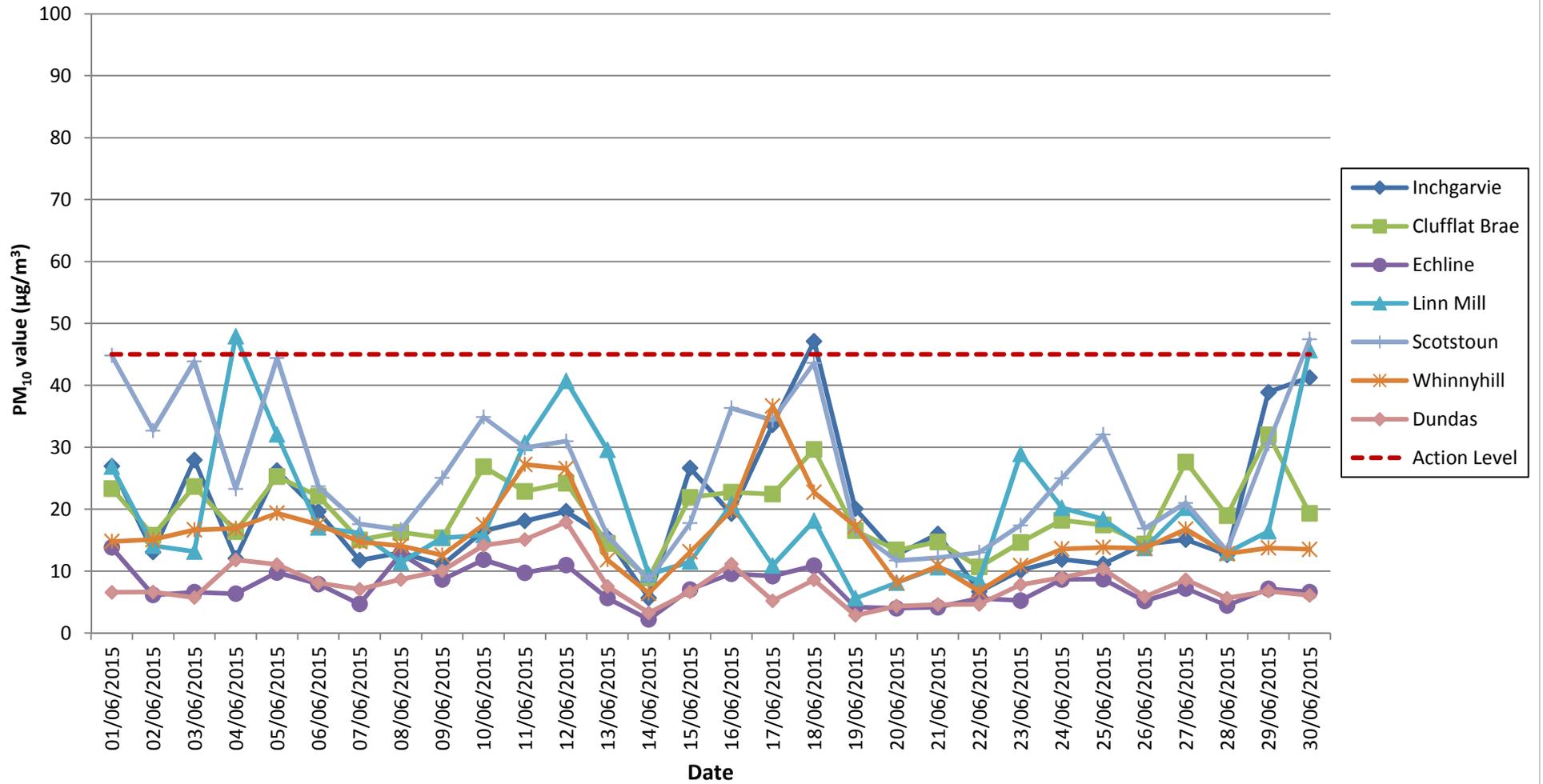
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## **APPENDIX A: LIGHT SCATTER METER RESULTS**

# Air Quality Monitoring

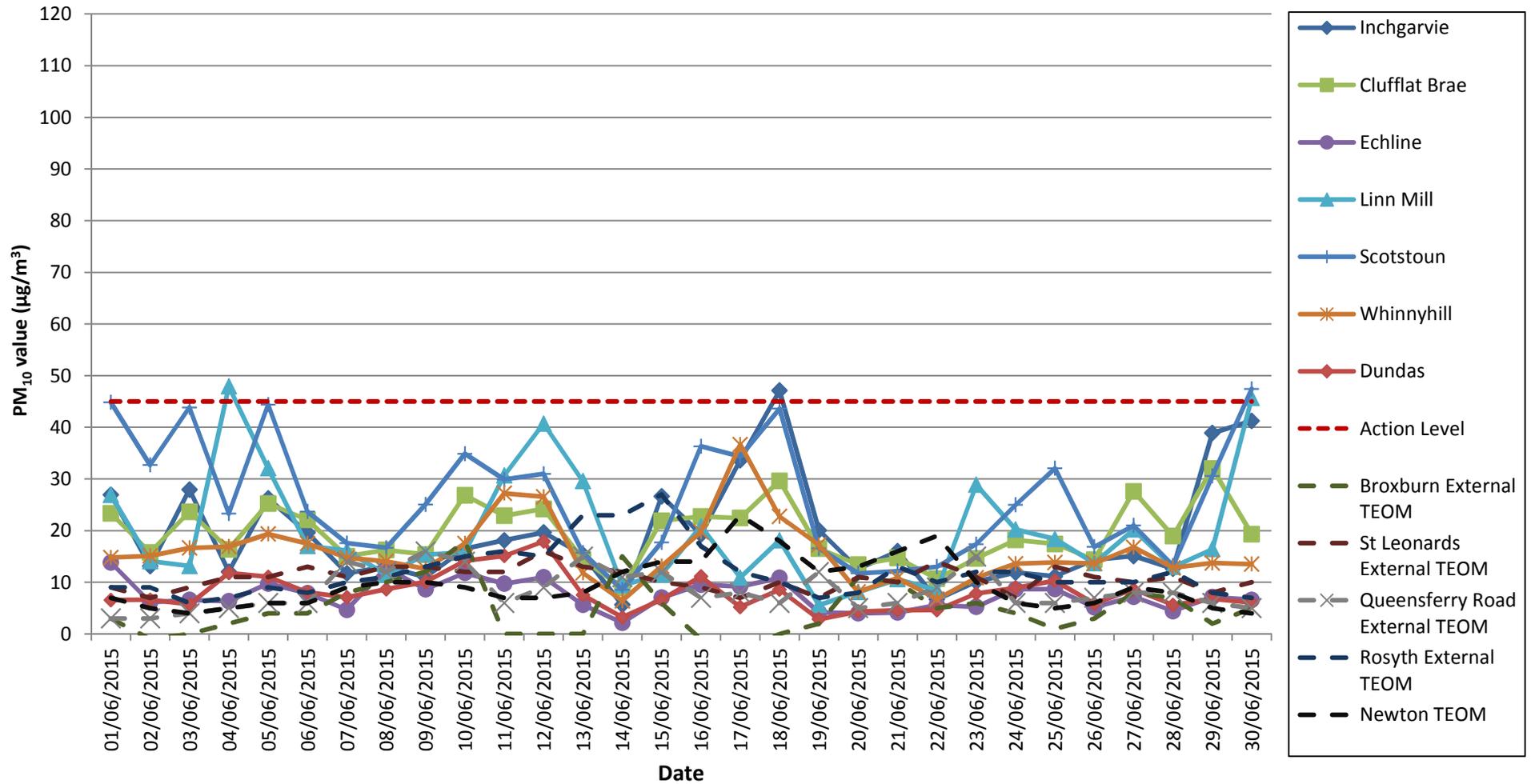
## Particulate Matter (PM10) Results for all Monitoring Locations

### June 2015



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

## JUNE 2015



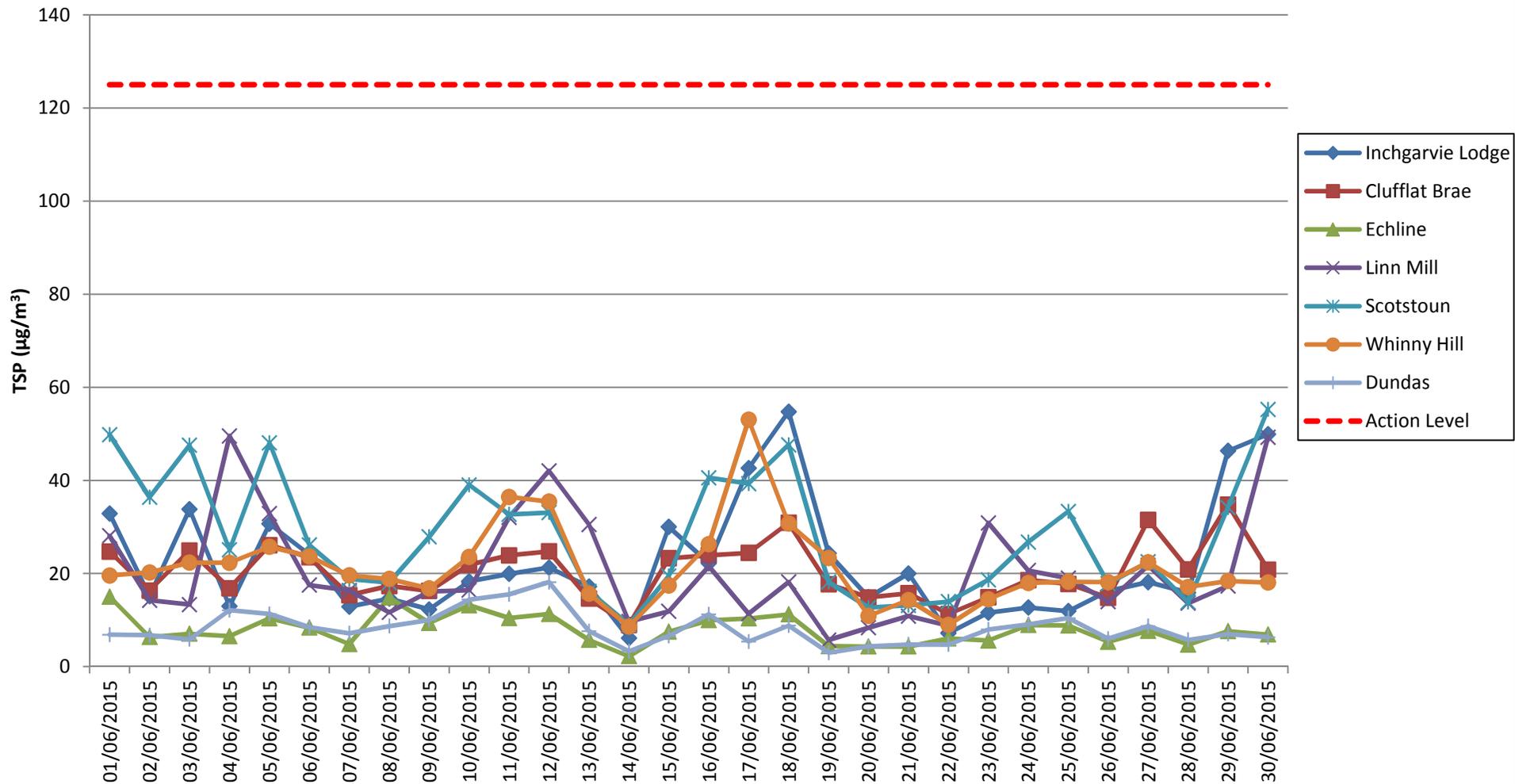


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## **APPENDIX B: TOTAL SUSPENDED PARTICLES**

# Total Suspended Particles (TSP) Results June 2015



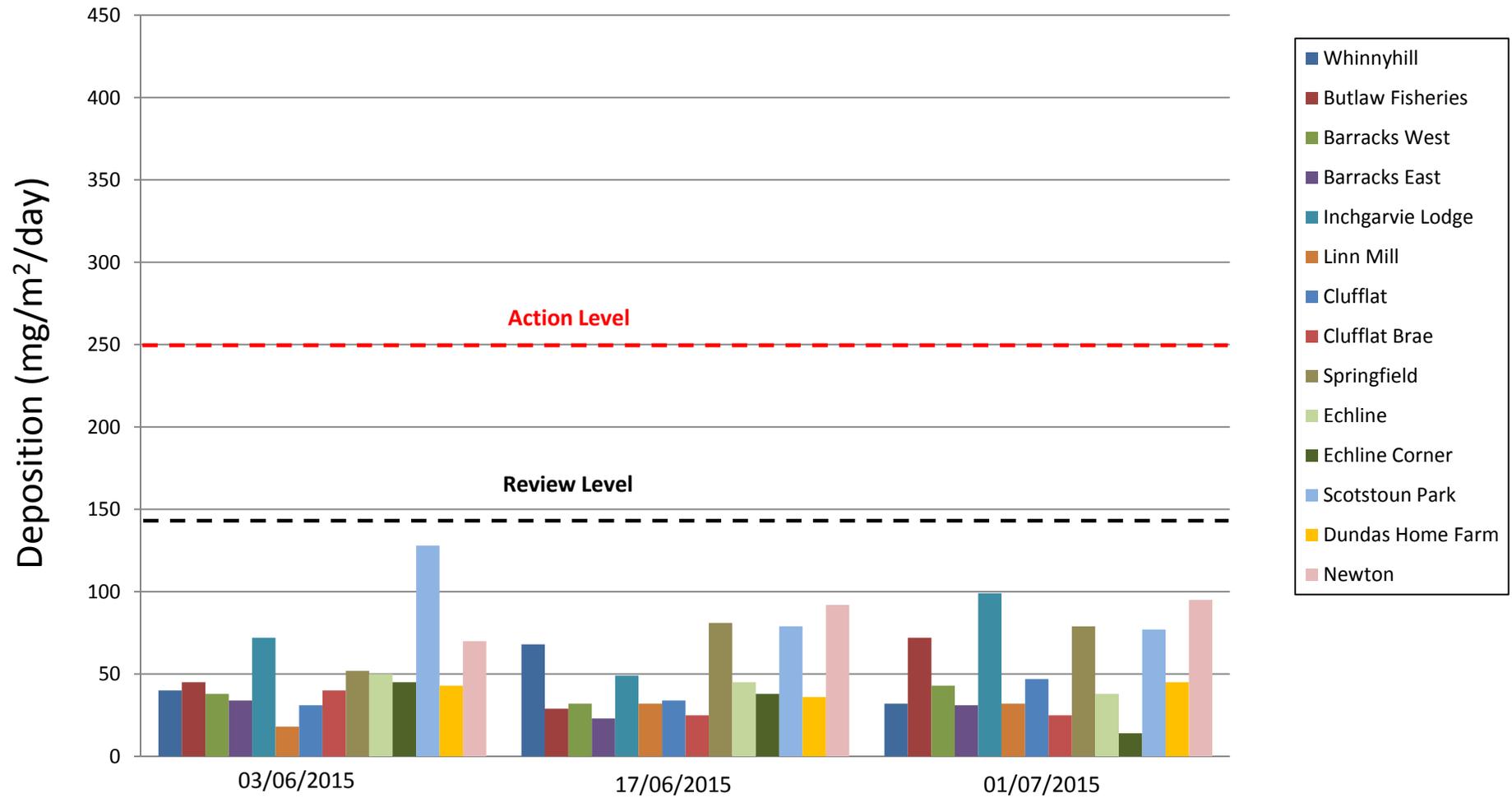


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## **APPENDIX C: FRISBEE GAUGE RESULTS**

## Frisbee Dust Deposition Results: June 2015





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

### Daily Dust Log - North - June 2015

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/06/2015	N	MEDIUM	SW	DAMP	N			
02/06/2015	N	STRONG	SW	DAMP	N			
03/06/2015	N	MEDIUM	SW	DRY	N			
04/06/2015	N	LIGHT	NE	DRY	N			
05/06/2015	N	LIGHT	NE	DRY	N			
06/06/2015	N	STRONG	SW	DRY	N			
07/06/2015	N	MEDIUM	SW	DAMP	N			
08/06/2015	N	LIGHT	SW	DRY	N			
09/06/2015	N	LIGHT	SW	DRY	N			
10/06/2015	N	LIGHT	SW	DRY	N			
11/06/2015	N	LIGHT	SW	DRY	N			
12/06/2015	N	LIGHT	SW	DRY	N			
13/06/2015	N	LIGHT	NE	DRY	N			
14/06/2015	N	LIGHT	NE	DAMP	N			
15/06/2015	N	LIGHT	SW	DRY	N			
16/06/2015	N	LIGHT	NE	DRY	N			
17/06/2015	N	MEDIUM	SW	DRY	N			
18/06/2015	N	MEDIUM	SW	DRY	N			
19/06/2015	N	MEDIUM	SW	DRY	N			
20/06/2015	N	LIGHT	SW	DRY	N			
21/06/2015	N	MEDIUM	SW	DRY	N			
22/06/2015	N	LIGHT	SW	DRY	N			
23/06/2015	N	LIGHT	NE	DRY	N			
24/06/2015	N	LIGHT	SW	DAMP	N			
25/06/2015	N	LIGHT	NE	DRY	N			
26/06/2015	N	LIGHT	SW	DRY	N			
27/06/2015	N	LIGHT	SW	DRY	N			
28/06/2015	N	MEDIUM	SW	WET	N			
29/06/2015	N	LIGHT	SW	DRY	N			
30/06/2015	N	LIGHT	S	DRY	N			

### Daily Dust Log - South - June 2015

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/06/2015	S	MEDIUM	SW	DAMP	N			
02/06/2015	S	STRONG	SW	DAMP	N			
03/06/2015	S	MEDIUM	SW	DRY	N			
04/06/2015	S	LIGHT	NE	DRY	N			
05/06/2015	S	LIGHT	NE	DRY	N			
06/06/2015	S	STRONG	SW	DRY	N			
07/06/2015	S	MEDIUM	SW	DAMP	N			
08/06/2015	S	LIGHT	SW	DRY	N			
09/06/2015	S	LIGHT	SW	DRY	N			
10/06/2015	S	LIGHT	SW	DRY	N			
11/06/2015	S	LIGHT	SW	DRY	N			
12/06/2015	S	LIGHT	SW	DRY	N			
13/06/2015	S	LIGHT	NE	DRY	N			
14/06/2015	S	LIGHT	NE	DAMP	N			
15/06/2015	S	LIGHT	SW	DRY	N			
16/06/2015	S	LIGHT	NE	DRY	N			
17/06/2015	S	MEDIUM	SW	DRY	N			
18/06/2015	S	MEDIUM	SW	DRY	N			
19/06/2015	S	MEDIUM	SW	DRY	N			
20/06/2015	S	LIGHT	SW	DRY	N			
21/06/2015	S	MEDIUM	SW	DRY	N			
22/06/2015	S	LIGHT	SW	DRY	N			
23/06/2015	S	LIGHT	NE	DRY	N			
24/06/2015	S	LIGHT	SW	DAMP	N			
25/06/2015	S	LIGHT	NE	DRY	N			
26/06/2015	S	LIGHT	SW	DRY	N			
27/06/2015	S	LIGHT	SW	DRY	N			
28/06/2015	S	MEDIUM	SW	WET	N			
29/06/2015	S	LIGHT	SW	DRY	N			
30/06/2015	S	LIGHT	S	DRY	N			