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Project **FORTH REPLACEMENT CROSSING**

Document title

**AIR QUALITY MONITORING REPORT MAY 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 May 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 May
M1	Whinny Hill	Frisbee	21/03/12	<ul style="list-style-type: none"> <li>• Rock Trimming/Breaking/Crushing</li> <li>• Earth Works/Fill Placement</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/Cleaning at Pier S2</li> <li>• Underwater concrete pour 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/Cleaning at Pier S2</li> <li>• Underwater concrete pour 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, snagging and bearing installation</li> <li>• Assembling and fixing rebar and formwork works at Pier S3</li> <li>• Concrete pouring at Pier S3</li> <li>• Excavation/Cleaning at Pier S2</li> <li>• Underwater concrete pour 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 works, snagging 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 works, snagging 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 works, snagging and bearing installation</li> </ul>
M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> <li>• Launch – Painting works, snagging and bearing installation</li> </ul>



		Automatic light scatter meter	10/11/11	<ul style="list-style-type: none"> <li>• Earthworks on mainline</li> <li>• Wall Construction</li> </ul>
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>• Cabling work at ESQ04</li> <li>• Soil stripping on mainline</li> </ul>
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	<ul style="list-style-type: none"> <li>• Construction of road formation, drainage and surfacing from Dundas to Queensferry gyratory</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 May 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. However, it is noted that on a couple of occasions levels registered close to the action level. All monitors registered increased levels on the 11-16<sup>th</sup>, 20-21<sup>st</sup>, 23<sup>rd</sup> and 25<sup>th</sup> – 26<sup>th</sup> May although the action level was never reached. In addition, increased levels were also recorded at Scotstoun on 1<sup>st</sup> and 7<sup>th</sup> May and at Clufflat Brae on 7<sup>th</sup> May.

**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 May was largely driven by regional changes in air quality rather than by construction related activities. The increases at Scotstoun and Clufflat Brae on 1<sup>st</sup> and 7<sup>th</sup> May did not correspond to high TEOM results.

**3.1.3.** Though the TEOM monitors also saw increases they tended not to be as large as those recorded on some of the light scatter monitors. This combined with the fact the higher results coincided with dry periods may suggest that these increases, including the Clufflat Brae result on 7<sup>th</sup> May, are dust related from bare ground areas on the site. As the action level was never reached at any monitor, and dust suppression measures were in place, it appears that mitigation methods have been effective across site.

**3.1.4.** During May 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 location. This means that this monitor is essentially on-site and that operations are now closer to some receptors. Although results are widely in line with other monitors, and there were no construction related exceedances during May, the monitor generally registered some of the highest levels across site during May. 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 May 2015 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during May were found to be generally low with a few exceptions (Scotstoun and Inchgarvie Lodge). However, all results were below the Action Level. All locations across the site were mostly found to follow a similar pattern, similar to that observed for PM<sub>10</sub> levels, with the

exception of the few areas where higher levels were obtained. As mentioned in 3.1.4. the Scotstoun monitor is currently located immediately adjacent to work activities which are being monitored closely at present. The higher readings at Inchgarvie occur during periods of general higher levels of PM<sub>10</sub>. Although no reading was above the Action Level FCBC will ensure these locations are monitored closely during June. 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, rather than construction works.

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

- 3.3.1.** The Frisbee dust deposition results for May 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 May, on the 6<sup>th</sup> and 20<sup>th</sup>. The next collection will take place on the 3<sup>rd</sup> June 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 May there were no exceedances of either the site review or action levels.

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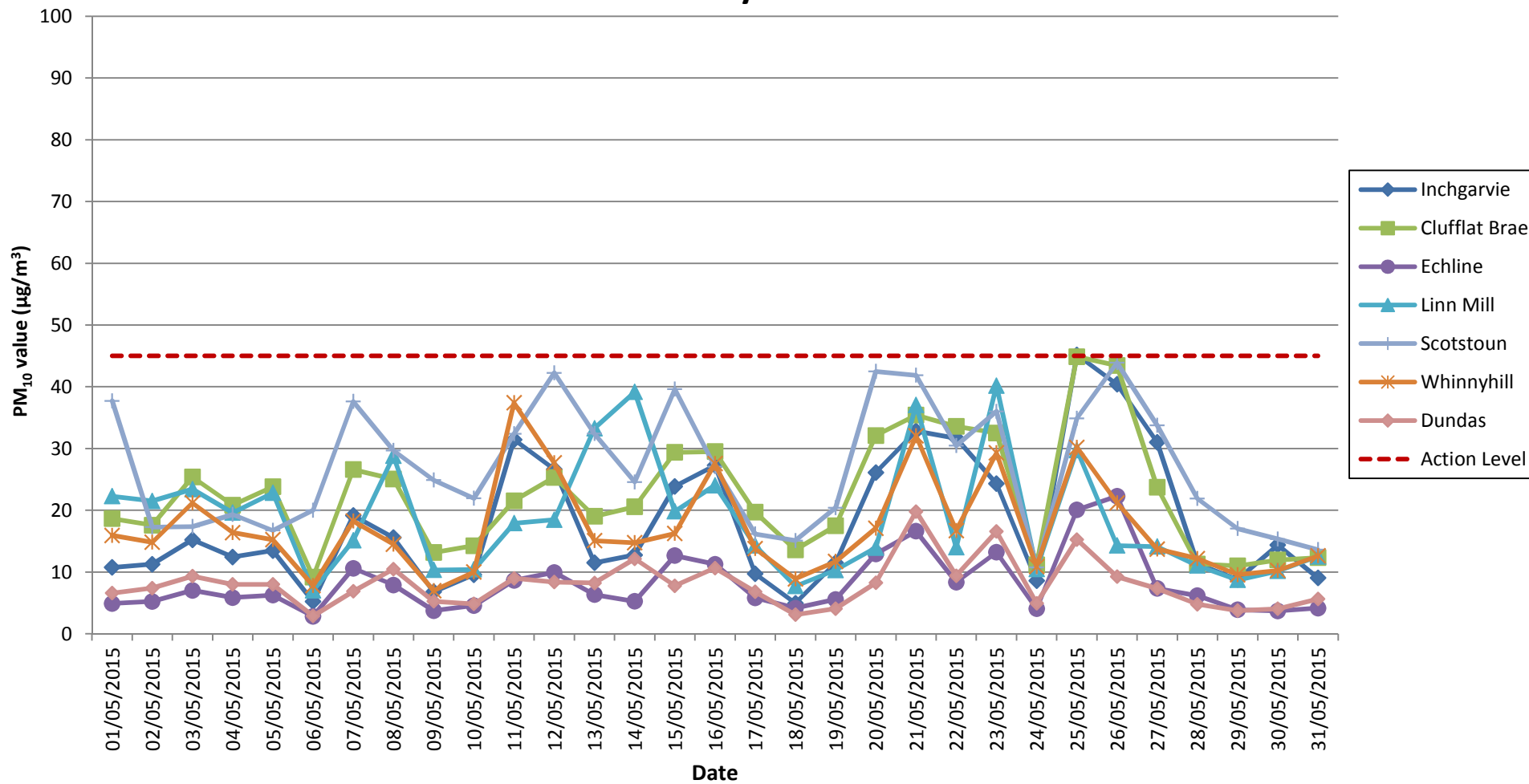
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## **APPENDIX A: LIGHT SCATTER METER RESULTS**

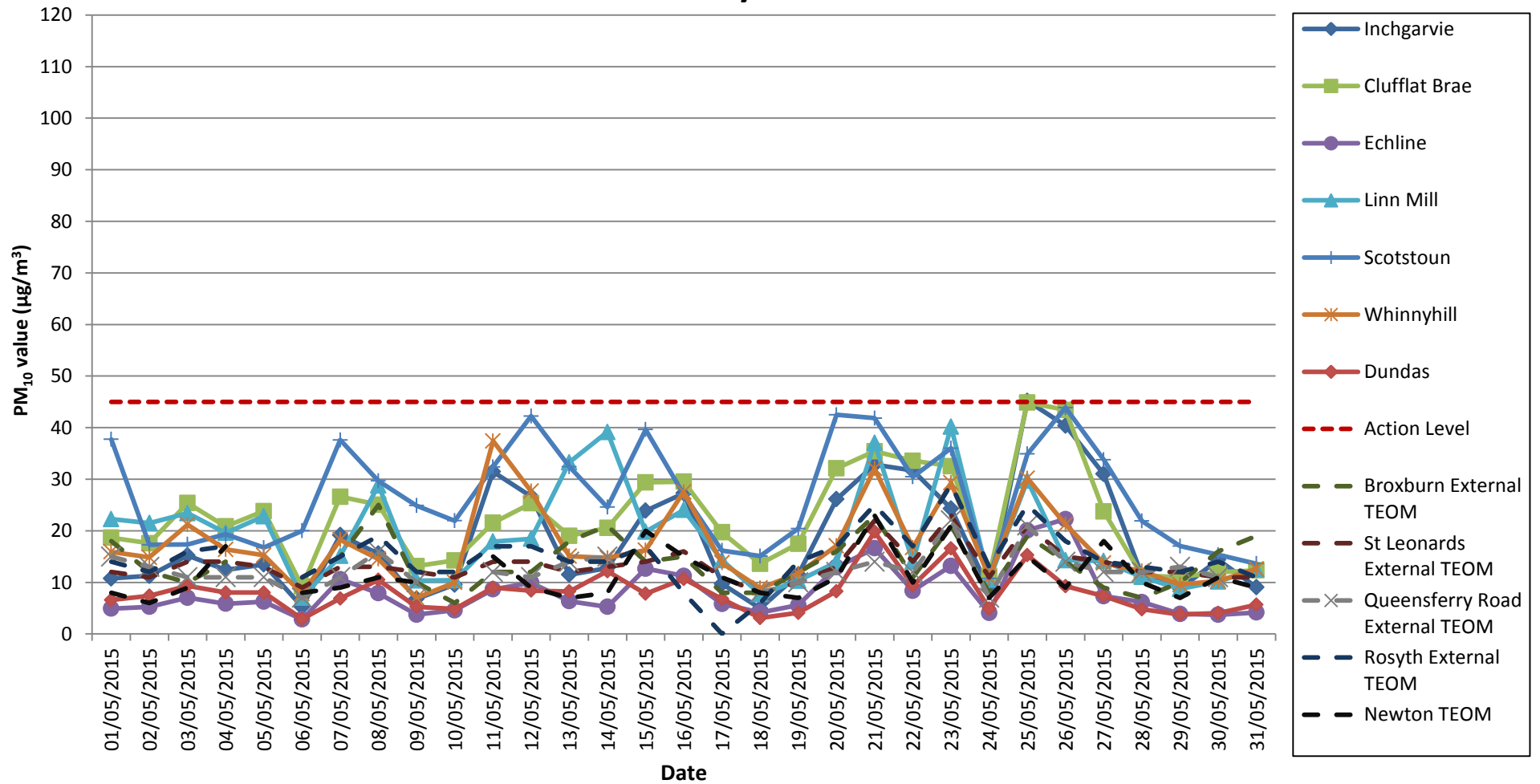
# Air Quality Monitoring

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

### May 2015



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





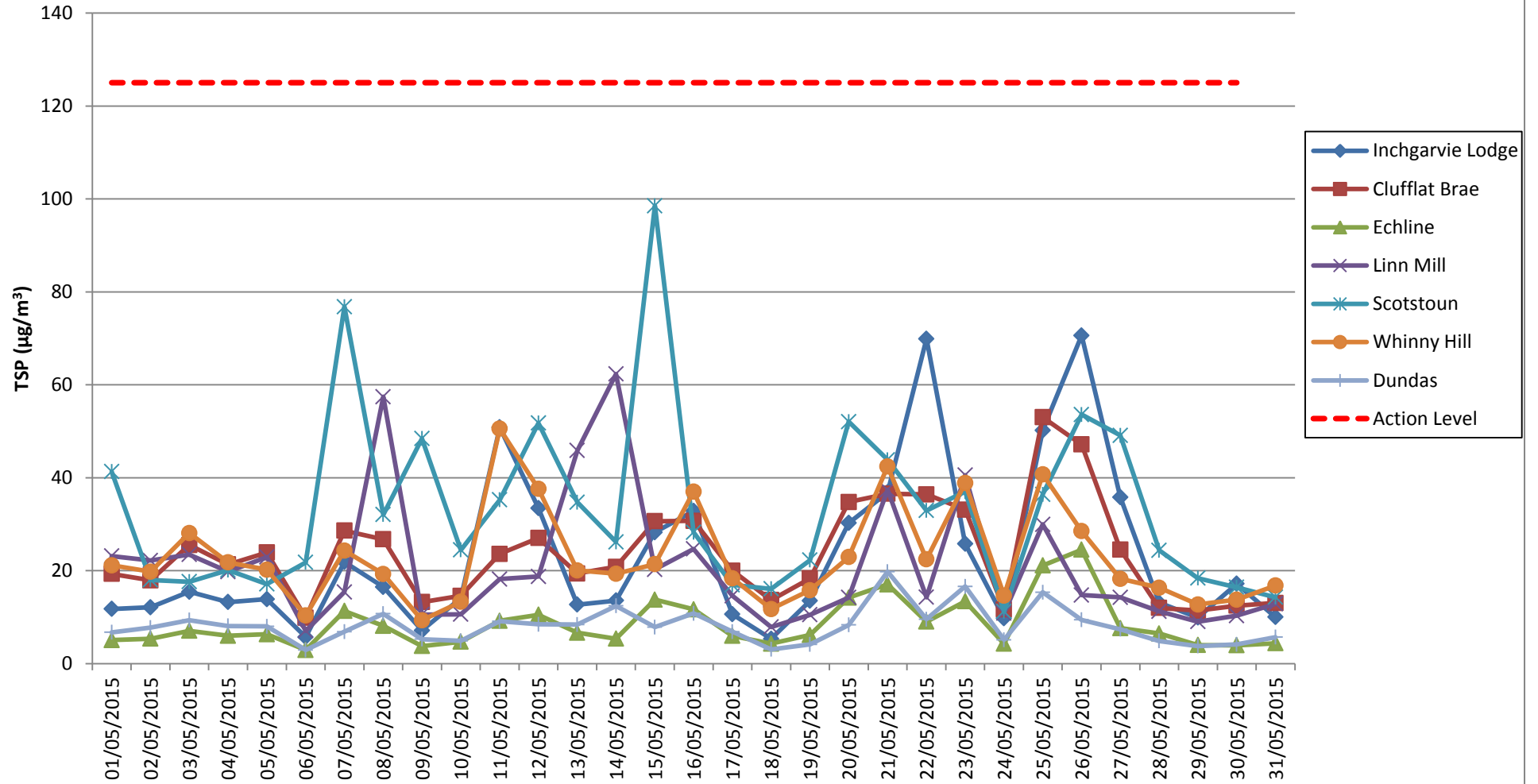
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## **APPENDIX B: TOTAL SUSPENDED PARTICLES**



# Total Suspended Particles (TSP) Results May 2015



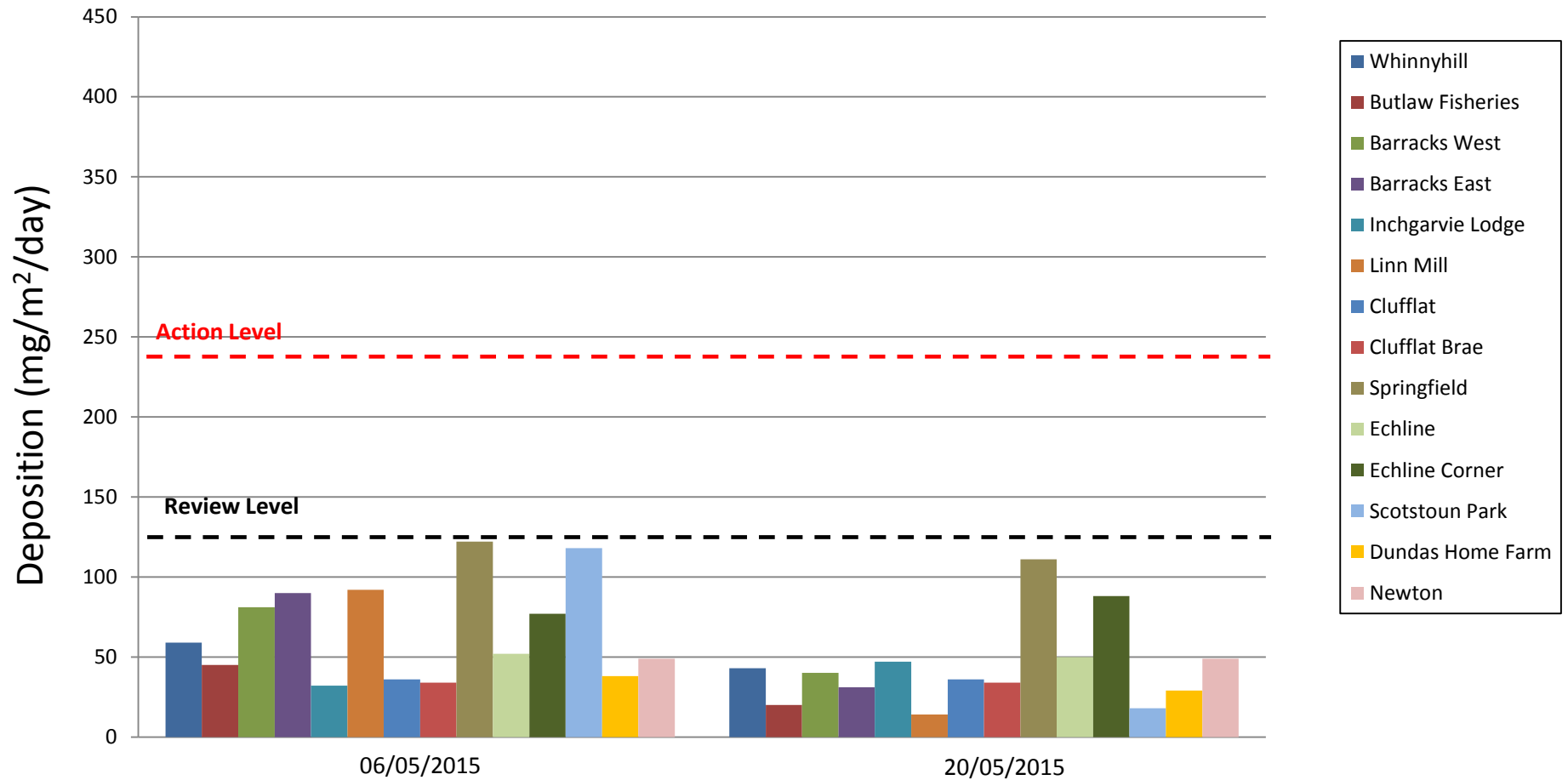


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## **APPENDIX C: FRISBEE GAUGE RESULTS**

## Frisbee Dust Deposition Results: May 2015





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

### Daily Dust Log - North - May 2015

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/05/2015	N	LIGHT	NE	DRY	N			
02/05/2015	N	MEDIUM	NE	DRY	N			
03/05/2015	N	MEDIUM	NE	DAMP	N			
04/05/2015	N	MEDIUM	SW	DRY	N			
05/05/2015	N	MEDIUM	NE	DAMP	N			
06/05/2015	N	LIGHT	W		N			
07/05/2015	N	MEDIUM	SW		N			
08/05/2015	N	LIGHT	NW	DRY	N			
09/05/2015	N	LIGHT	NE	DRY	N			
10/05/2015	N	MEDIUM	S	DAMP	N			
11/05/2015	N	MEDIUM	S	DAMP	N			
12/05/2015	N	STRONG	SW	DRY	N			
13/05/2015	N	MEDIUM	SW		N			
14/05/2015	N	LIGHT	NE		N			
15/05/2015	N	LIGHT	SW	DRY	N			
16/05/2015	N	MEDIUM	SW	DRY	N			
17/05/2015	N	MEDIUM	SW	DRY	N			
18/05/2015	N	LIGHT	SW	DAMP	N			
19/05/2015	N	MEDIUM	SW	DRY	N			
20/05/2015	N	MEDIUM	SW		N			
21/05/2015	N	MEDIUM	SW		N			
22/05/2015	N	MEDIUM	SW	DRY	N			
23/05/2015	N	LIGHT	SW	DRY	N			
24/05/2015	N	MEDIUM	SW	DRY	N			
25/05/2015	N	MEDIUM	SW	DRY	N			
26/05/2015	N	MEDIUM	SW	DRY	N			
27/05/2015	N	MEDIUM	SW		N			
28/05/2015	N	MEDIUM	SW		N			
29/05/2015	N	MEDIUM	SW	DRY	N			
30/05/2015	N	MEDIUM	SW	DRY	N			
31/05/2015	N	MEDIUM	SW	DAMP	N			

### Daily Dust Log - South - May 2015

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/05/2015	S	LIGHT	NE	DRY	N			
02/05/2015	S	MEDIUM	NE	DRY	N			
03/05/2015	S	MEDIUM	NE	DAMP	N			
04/05/2015	S	MEDIUM	SW	DRY	N			
05/05/2015	S	MEDIUM	NE	DAMP	N			
06/05/2015	S	LIGHT	W		N			
07/05/2015	S	MEDIUM	SW		N			
08/05/2015	S	LIGHT	NW	DRY	N			
09/05/2015	S	LIGHT	NE	DRY	N			
10/05/2015	S	MEDIUM	S	DAMP	N			
11/05/2015	S	MEDIUM	S	DAMP	N			
12/05/2015	S	STRONG	SW	DRY	N			
13/05/2015	S	MEDIUM	SW		N			
14/05/2015	S	LIGHT	NE		N			
15/05/2015	S	LIGHT	SW	DRY	N			
16/05/2015	S	MEDIUM	SW	DRY	N			
17/05/2015	S	MEDIUM	SW	DRY	N			
18/05/2015	S	LIGHT	SW	DAMP	N			
19/05/2015	S	MEDIUM	SW	DRY	N			
20/05/2015	S	MEDIUM	SW		N			
21/05/2015	S	MEDIUM	SW		N			
22/05/2015	S	MEDIUM	SW	DRY	N			
23/05/2015	S	LIGHT	SW	DRY	N			
24/05/2015	S	MEDIUM	SW	DRY	N			
25/05/2015	S	MEDIUM	SW	DRY	N			
26/05/2015	S	MEDIUM	SW	DRY	N			
27/05/2015	S	MEDIUM	SW		N			
28/05/2015	S	MEDIUM	SW		N			
29/05/2015	S	MEDIUM	SW	DRY	N			
30/05/2015	S	MEDIUM	SW	DRY	N			
31/05/2015	S	MEDIUM	SW	DAMP	N			