



Contractor



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Project **FORTH REPLACEMENT CROSSING**

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**AIR QUALITY MONITORING REPORT  
FEBRUARY 2017**

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## **Contents**

- 1. Introduction**
- 2. Monitoring Equipment and Locations**
- 3. Air Quality Monitoring Results**
  - 3.1. Automatic Light Scatter Meter Particulate Matter Monitoring Results**
  - 3.2. Total Suspended Particle Results**
  - 3.3. Frisbee Dust Deposition Results**
  - 3.4. Daily Dust Log and Weekly Environmental Inspections**

## **Appendices:**

- Appendix A: Particulate Matter Results**
- Appendix B: Total Suspended Particle Results**
- Appendix C: Frisbee Dust Deposition Results**
- Appendix D: Daily Dust Log Summary**



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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 2017.
  
- 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).



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## 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. Twelve Frisbee gauges are currently 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.



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**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, Linn Mill and Whinnyhill (these are adjacent to the light scatter meters at these monitoring locations), 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.



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



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



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**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>• Earthworks/Fill Placement</li> <li>• Bridge works at Ferrytoll</li> <li>• Main carriageway roadworks</li> </ul>
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	<ul style="list-style-type: none"> <li>• AVS concrete works</li> <li>• Waterproofing on deck</li> <li>• Wind shield installation</li> <li>• Scour protection</li> <li>• South Tower deck section lifts and stay cable installation works</li> <li>• Bridge deck works</li> </ul>
M8	Barracks West	Frisbee	31/08/11	<ul style="list-style-type: none"> <li>• AVS concrete works</li> <li>• Waterproofing on deck</li> <li>• Wind shield installation</li> <li>• Scour protection</li> <li>• South Tower deck section lifts and stay cable installation works</li> <li>• Bridge deck works</li> </ul>
M10	Inchgarvie Lodge	Frisbee	22/08/11	<ul style="list-style-type: none"> <li>• Minor main carriageway works</li> <li>• SUDS detention basin works</li> <li>• AVS concrete works on deck</li> <li>• Waterproofing on deck</li> <li>• Wind shield installation</li> <li>• Scour protection</li> <li>• South Tower deck section lifts and stay cable installation works</li> <li>• Bridge deck works</li> <li>• South abutment works</li> </ul>
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	<ul style="list-style-type: none"> <li>• Minor main carriageway works</li> <li>• SUDS detention basin works</li> <li>• AVS concrete works on deck</li> <li>• Waterproofing on deck</li> <li>• Wind shield installation</li> <li>• Scour protection</li> <li>• South Tower deck section lifts and stay cable installation works</li> <li>• Bridge deck works</li> <li>• South abutment works</li> </ul>
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	<ul style="list-style-type: none"> <li>• Minor main carriageway works</li> <li>• SUDS detention basin works</li> </ul>
M13	Clufflat	Frisbee	21/09/11	



	Brae	Automatic light scatter meter	24/10/11	<ul style="list-style-type: none"> <li>• AVS concrete works on deck</li> <li>• Waterproofing on deck</li> <li>• Wind shield installation</li> <li>• Scour protection</li> <li>• South Tower deck section lifts and stay cable installation works</li> <li>• Bridge deck works</li> <li>• South abutment works</li> </ul>
M14	Springfield	Frisbee	15/08/11	<ul style="list-style-type: none"> <li>• Minor main carriageway works</li> <li>• SUDS detention basin works</li> <li>• AVS concrete works on deck</li> <li>• Waterproofing on deck</li> <li>• Wind shield installation</li> <li>• Scour protection</li> <li>• South Tower deck section lifts and stay cable installation works</li> <li>• Bridge deck works</li> <li>• South abutment works</li> </ul>
M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> <li>• Minor main carriageway works</li> </ul>
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	<ul style="list-style-type: none"> <li>• Main carriageway works</li> <li>• South-bound bus link</li> </ul>
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	<ul style="list-style-type: none"> <li>• Main carriageway works</li> <li>• South-bound bus link</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 2017 have been presented in a monthly chart; this can be found in Appendix A. Results show that the



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PM<sub>10</sub> levels follow a similar pattern and were below threshold levels throughout the month with the exception of the 13<sup>th</sup> - 15<sup>th</sup> February, where some monitors showed an exceedance. As all monitors recorded a significant increase over this time period it is concluded that these exceedances were caused by regional air quality.

- 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 January 2012. The comparison between the light scatter and TEOM results demonstrates that both sets of results generally follow the same pattern throughout the month, including during the time period of the exceedances noted in 3.1.1.

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

- 3.2.1.** The TSP results for February 2017 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 generally low and all within the threshold. All locations across the site were found to follow a similar pattern (similar to that observed for PM<sub>10</sub> levels), including an increase between 13<sup>th</sup> – 15<sup>th</sup> February. As with PM<sub>10</sub> it is considered that the TSP levels across site were influenced by regional changes in TSP levels.

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

- 3.3.1.** The Frisbee dust deposition results for February 2017 have been presented in a chart and can be found in Appendix C. Two collections were made in February; these occurred on the 8<sup>th</sup> and 22<sup>nd</sup> February 2017.



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- 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 was one exceedance of the site review and no exceedances of the action level. The Barracks West monitor recorded an exceedance of the review level for the period ending 8<sup>th</sup> February. This is considered likely to have been caused by concrete finishing work, which included sanding, on Pier S6 on 6<sup>th</sup> February 2017. The monitor is located on site in close proximity to Pier S6. The dust is considered to be very localised and there is no indication from the other monitors nearby to indicate that dust from this activity had migrated off-site.

### **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.
- 3.4.2.** During this period, full environmental inspections were also undertaken across the site and covered areas where works were being carried out.



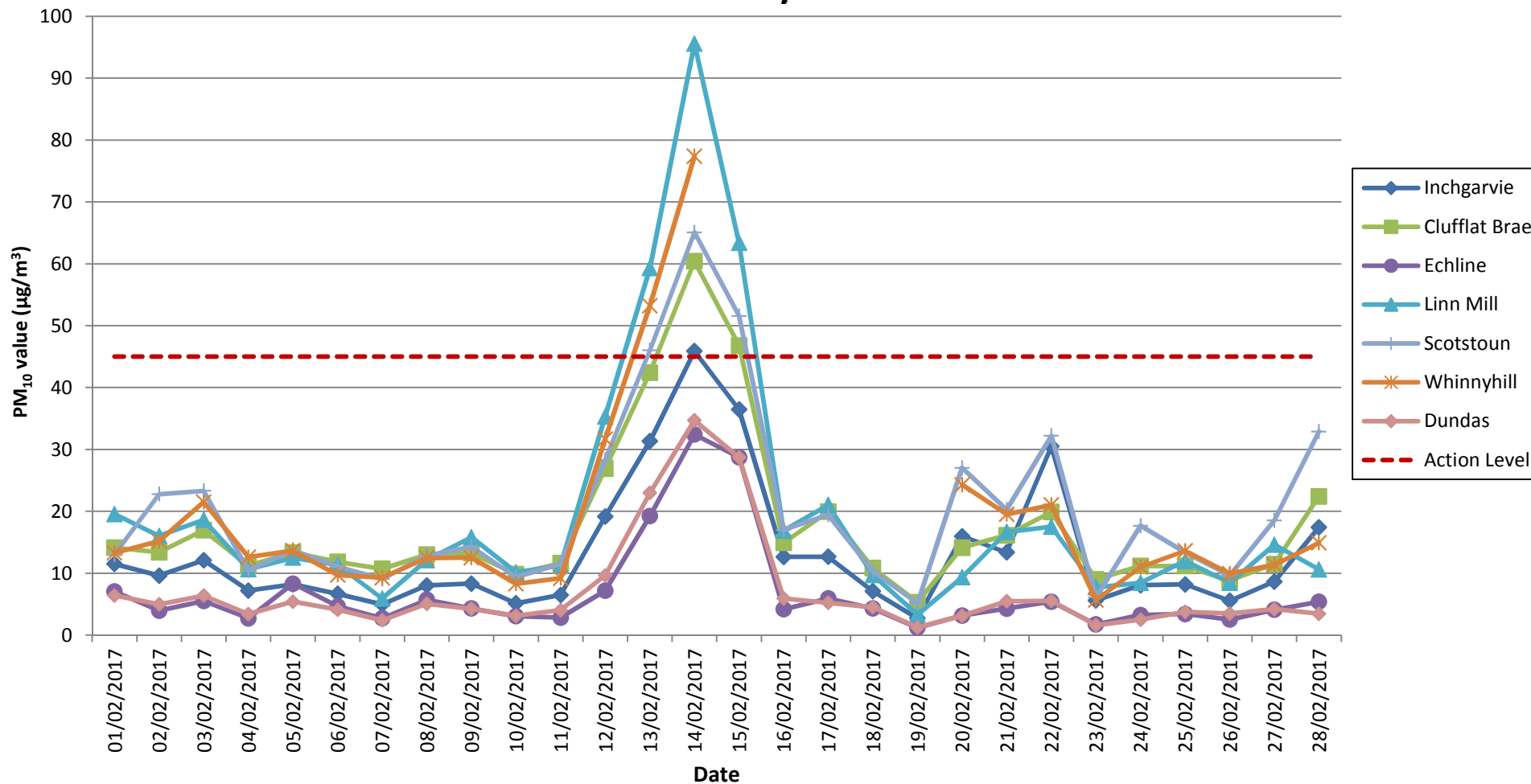
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## **APPENDIX A: LIGHT SCATTER METER RESULTS**

# Air Quality Monitoring

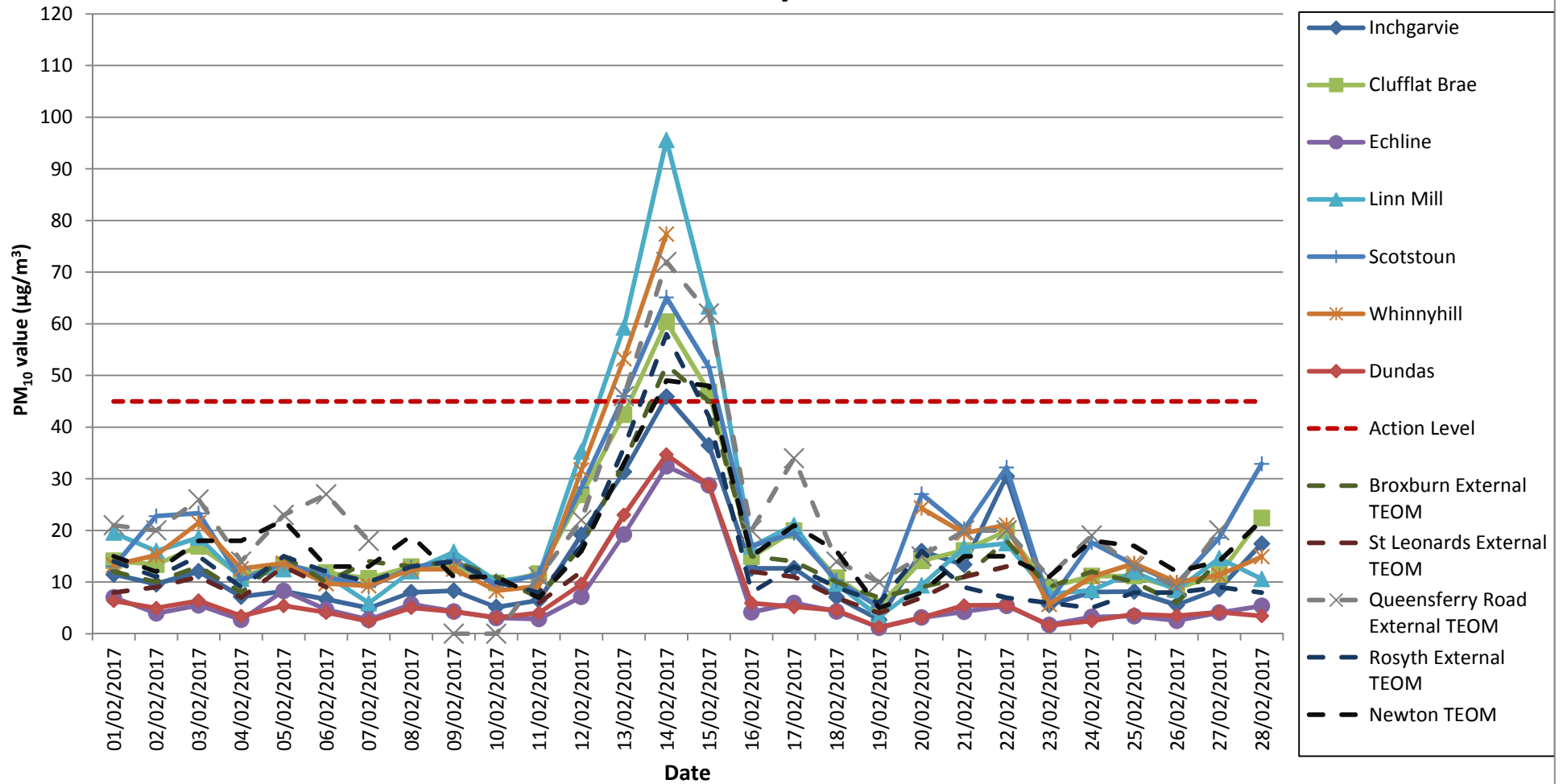
## Particulate Matter (PM10) Results for all Monitoring Locations

### February 2017



**Note:** There is no data at the Whinnyhill monitor between 15/02/2017 and 19/02/2017 due to a electrical problem at the monitor.

## Air Quality Monitoring: Particulate Matter (PM10) Results for all Monitoring Locations, including TEOM data February 2017



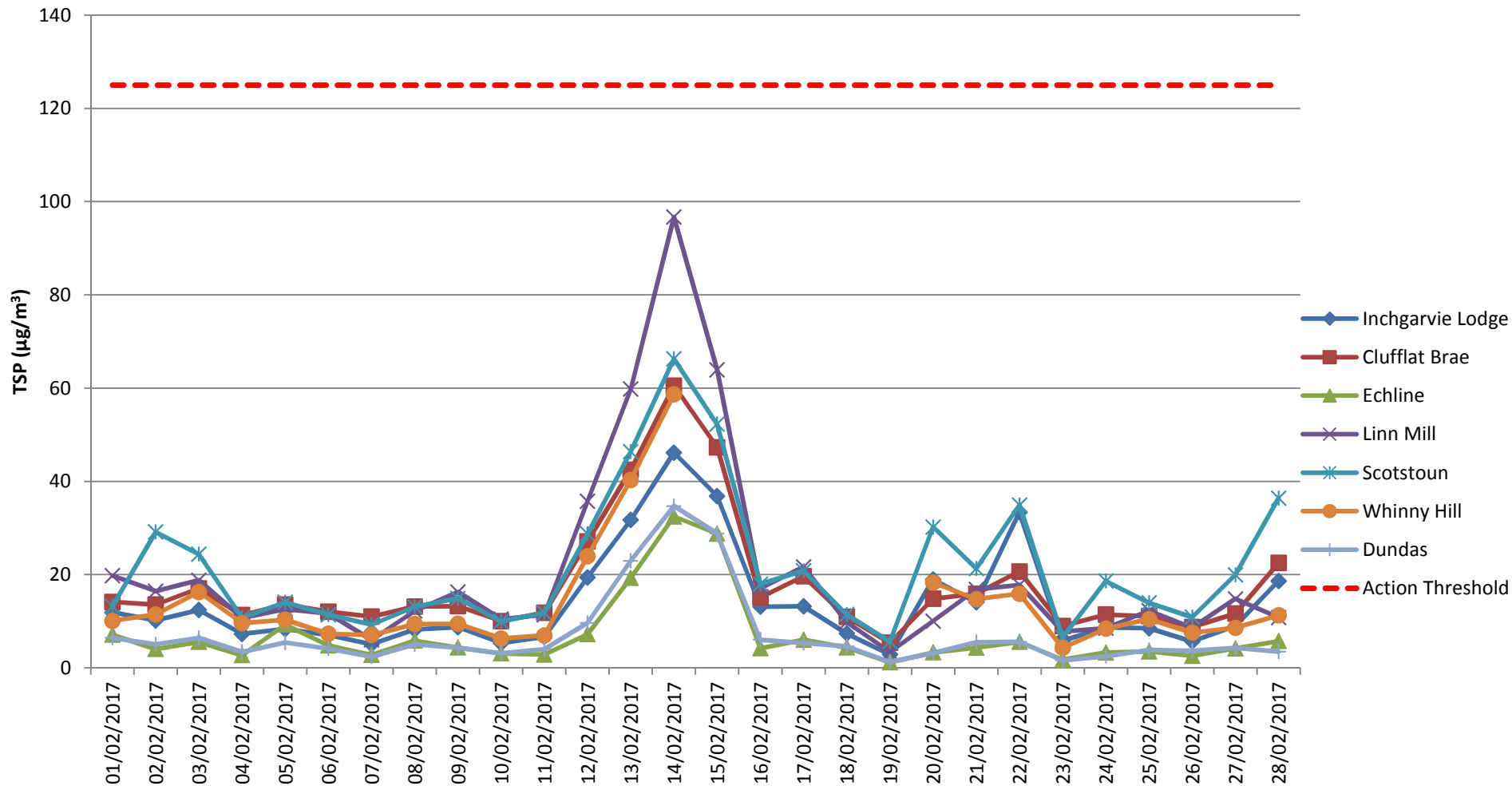
**Note:** There is no data at the Whinnyhill monitor between 15/02/2017 and 19/02/2017 due to a electrical problem at the monitor.



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

## Total Suspended Particles (TSP) Results February 2017



**Note:** There is no data at the Whinnyhill monitor between 15/02/2017 and 19/02/2017 due to a electrical problem at the monitor.

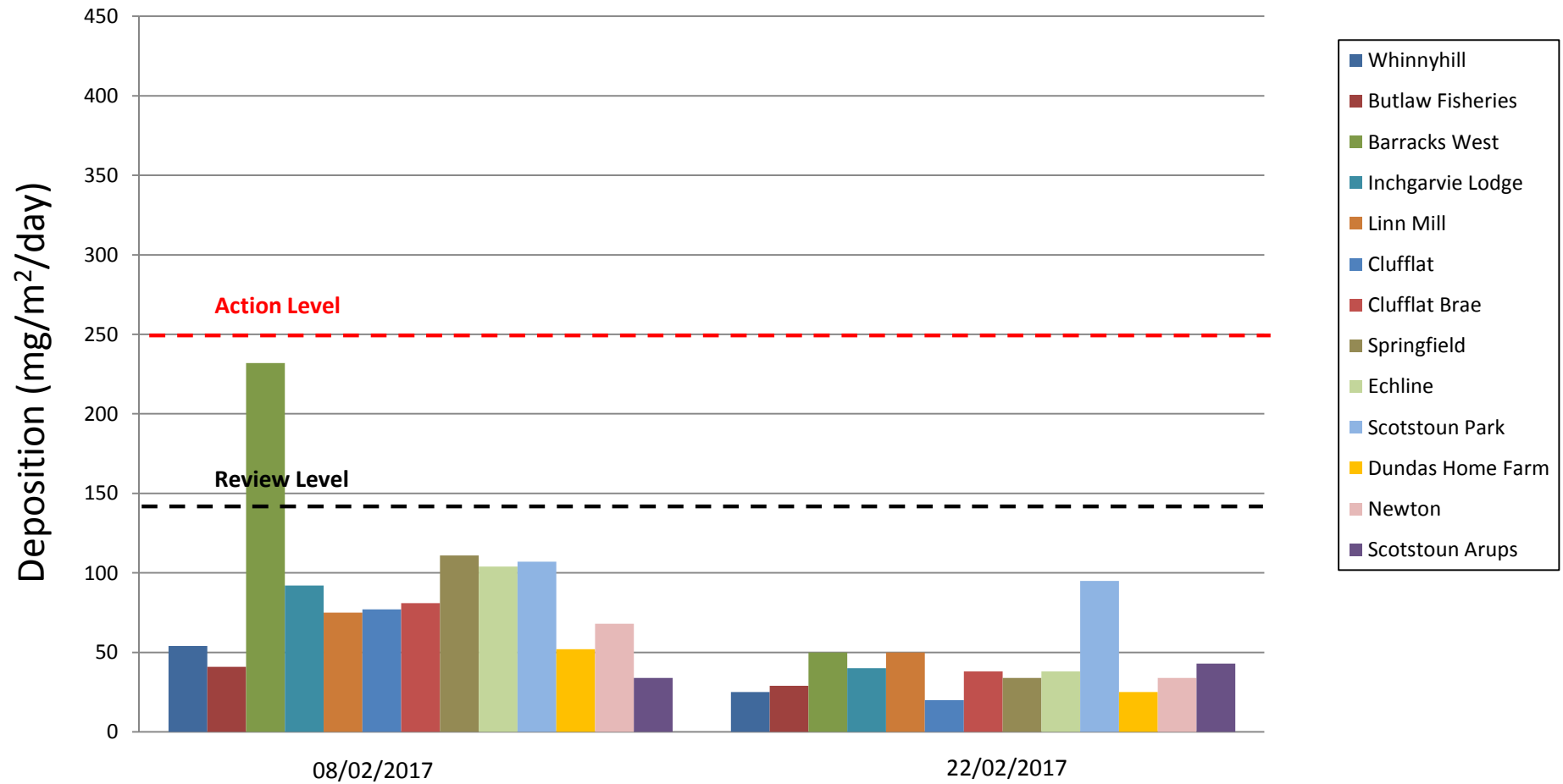




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## **APPENDIX C: FRISBEE GAUGE RESULTS**

# Frisbee Dust Deposition Results: February 2017





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

### Daily Dust Log - North - February 2017

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/02/2017	N	LIGHT	S	DAMP	N			
02/02/2017	N	LIGHT	S	WET	N			
03/02/2017	N	LIGHT	SE	DAMP	N			
04/02/2017								
05/02/2017								
06/02/2017	N	LIGHT	S	WET	N			
07/02/2017	N	LIGHT	SW	WET	N			
08/02/2017	N	LIGHT	S	WET	N			
09/02/2017	N	LIGHT	SW	DRY	N			
10/02/2017	N	LIGHT	SW	WET	N			
11/02/2017								
12/02/2017								
13/02/2017	N	LIGHT	NW	DAMP	N			
14/02/2017	N	LIGHT	W	DRY	N			
15/02/2017	N	LIGHT	S	DRY	N			
16/02/2017	N	LIGHT	SE	DRY	N			
17/02/2017	N	LIGHT	S	DRY	N			
18/02/2017								
19/02/2017								
20/02/2017	N	LIGHT	SE	DAMP	N			
21/02/2017	N	LIGHT	SE	DRY	N			
22/02/2017	N	LIGHT	SE	DRY	N			
23/02/2017	N	LIGHT	SW	WET	N			
24/02/2017	N	LIGHT	SW	DRY	N			
25/02/2017								
26/02/2017								
27/02/2017	N	LIGHT	S	WET	N			
28/02/2017	N	LIGHT	SW	DRY	N			

### Daily Dust Log - South - February 2017

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/02/2017	S	LIGHT	S	DAMP	N			
02/02/2017	S	LIGHT	SE	WET	N			
03/02/2017	S	LIGHT	S	DAMP	N			
04/02/2017								
05/02/2017								
06/02/2017	S	LIGHT	W	WET	N			
07/02/2017	S	LIGHT	SW	WET	N			
08/02/2017	S	LIGHT	SE	WET	N			
09/02/2017	S	LIGHT	SW	DRY	N			
10/02/2017	S	LIGHT	SW	WET	N			
11/02/2017								
12/02/2017								
13/02/2017	S	LIGHT	NW	DAMP	N			
14/02/2017	S	LIGHT	W	DRY	N			
15/02/2017	S	LIGHT	S	DRY	N			
16/02/2017	S	LIGHT	SE	DRY	N			
17/02/2017	S	LIGHT	S	DRY	N			
18/02/2017								
19/02/2017								
20/02/2017	S	LIGHT	SW	DAMP	N			
21/02/2017	S	LIGHT	SE	DRY	N			
22/02/2017	S	LIGHT	SE	DRY	N			
23/02/2017	S	LIGHT	SW	WET	N			
24/02/2017	S	LIGHT	SW	DRY	N			
25/02/2017								
26/02/2017								
27/02/2017	S	LIGHT	W	WET	N			
28/02/2017	S	LIGHT	SW	DRY	N			