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Project **FORTH REPLACEMENT CROSSING**

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**AIR QUALITY MONITORING REPORT  
JUNE 2016**

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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 2016.
  
- 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**

**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>• Earthworks/Fill Placement</li> <li>• Hope Street roadworks</li> <li>• Bridge works at Ferrytoll</li> <li>• Main carriageway roadworks</li> <li>• Rock crushing</li> <li>• Ferrytoll bridge demolition</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 rebar, formwork &amp; concrete works</li> <li>• Pier S3 hydro demolition</li> <li>• South Tower rebar, formwork, concreting works, deck segment lifts, 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 rebar, formwork &amp; concrete works</li> <li>• Pier S3 hydro demolition</li> <li>• South Tower rebar, formwork, concreting works, deck segment lifts, deck table installation works</li> </ul>
M10	Inchgarvie Lodge	Frisbee	22/08/11	<ul style="list-style-type: none"> <li>• AVS Scaffolding, shuttering and reinforcement to deck</li> <li>• Main carriageway earthworks</li> <li>• Pier S1 rebar, formwork &amp; concrete works</li> <li>• Pier S2 formwork and concrete works</li> <li>• Pier S3 hydro demolition</li> <li>• South Tower rebar, formwork, concreting works, deck segment lifts, deck table installation works</li> </ul>
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	<ul style="list-style-type: none"> <li>• AVS Scaffolding, shuttering and reinforcement to deck</li> <li>• Main carriageway earthworks</li> <li>• Pier S1 rebar, formwork &amp; concrete works</li> <li>• Pier S2 formwork and concrete works</li> <li>• Pier S3 hydro demolition</li> <li>• Excavating SUDS detention basin</li> </ul>
		Automatic light scatter meter	06/12/11	



M12	Clufflat	Frisbee	29/08/11	<ul style="list-style-type: none"> <li>• AVS Scaffolding, shuttering and reinforcement to deck</li> <li>• Main carriageway works</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>• AVS Scaffolding, shuttering and reinforcement to deck</li> <li>• Main carriageway works</li> </ul>
M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> <li>• AVS Scaffolding, shuttering and reinforcement to deck</li> <li>• 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>• Utility works</li> <li>• Main carriageway works</li> <li>• North-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>• Utility works</li> <li>• Main carriageway works</li> <li>• North-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 June 2016 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 June with the exception of Linn Mill on the 4<sup>th</sup> and 6<sup>th</sup> June and Scotstoun on the 27<sup>th</sup> June. All monitors generally follow the same pattern throughout the month, with the exception of Linn Mill which also shows increases on the 9<sup>th</sup> and 16<sup>th</sup> June (although below the threshold level on these dates). With the exceedance on the 4<sup>th</sup> June, all monitors show an increase on this day which suggests this was due to regional air quality. With regards to the exceedance on the 6<sup>th</sup> June 2016 at Linn Mill, the light scatter meter



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registered 15 minute exceedances for  $PM_{10}$ . The FCBC Environmental Coordinator investigated the area and confirmed that conditions were not dusty and that sufficient mitigation was in place. However, it was noted that excavation had taken place in this area with works occurring within 10m of the monitor. The majority of the excavation for the SUDS detention basin at this location is now completed. On the 27<sup>th</sup> and 28<sup>th</sup> June 2016, the light scatter meter registered 15 minute exceedances for  $PM_{10}$  at Scotstoun. The FCBC Environmental Coordinator investigated the area and confirmed that conditions were not dusty and that sufficient mitigation was in place. However, it was noted that earthworks were taking place at the central reservation on the mainline to the south of this area which may have been a source of airborne particles. In addition, as noted in previous reports, other construction work (not project related) is ongoing in the Scotstoun area and is located closer to the air quality monitoring equipment. Weather conditions were dry on these days. FCBC will continue to monitor Forth Replacement Crossing construction closely in this area and provide mitigation when necessary.

- 3.1.2.** The  $PM_{10}$  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, although the light scatter meter results indicate some higher peaks of  $PM_{10}$  throughout June at Linn Mill and Scotstoun, notably the 6<sup>th</sup>, 9<sup>th</sup>, 16<sup>th</sup> and 22<sup>nd</sup> June at Linn Mill and 22<sup>nd</sup> and 27<sup>th</sup> June at Scotstoun.

## **3.2. Total Suspended Particles**

- 3.2.1.** The TSP results for June 2016 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations



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during June were found to be 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). As with PM<sub>10</sub> it is considered that the TSP levels across site were generally influenced by regional changes in TSP levels, with the exception of results corresponding with the higher peaks noted in 3.1.2 above.

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

- 3.3.1.** The Frisbee dust deposition results for June 2016 have been presented in a chart and can be found in Appendix C. Two collections were made in June; these occurred on the 8<sup>th</sup> and 22<sup>nd</sup> June 2016.
- 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 was one exceedance of the review level at Springfield for the fortnight concluding 22<sup>nd</sup> June. Ground conditions in this period were mostly wet/damp. This exceedance was likely caused by organic material from a nearby tree that was found on the filter during collection.

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

- 3.4.1.** A summary of the daily dust log for June 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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**3.4.3.** As noted in 3.1.1, on the 6<sup>th</sup> June there were 15 minute exceedances at Linn Mill which were investigated by the environmental team. However no dust was visible during site inspections and the bowser was active along the access track throughout the day. There were also 15 minute exceedances at Scotstoun on the 27<sup>th</sup> and 28<sup>th</sup> June which were inspected. Similarly, no dust was visible at the time of the inspections. Site teams were requested to continue dust suppression when necessary.



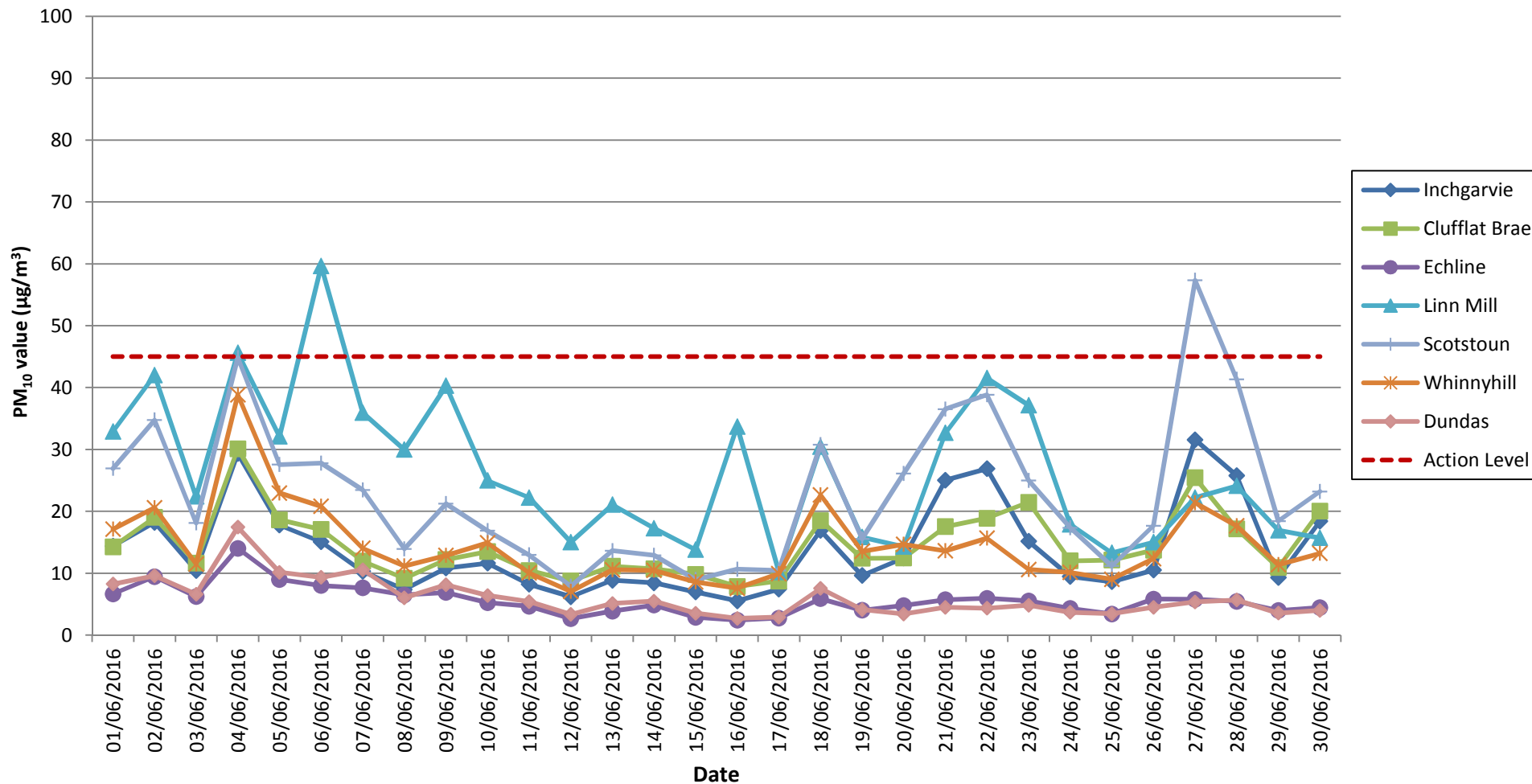
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## **APPENDIX A: LIGHT SCATTER METER RESULTS**

# Air Quality Monitoring

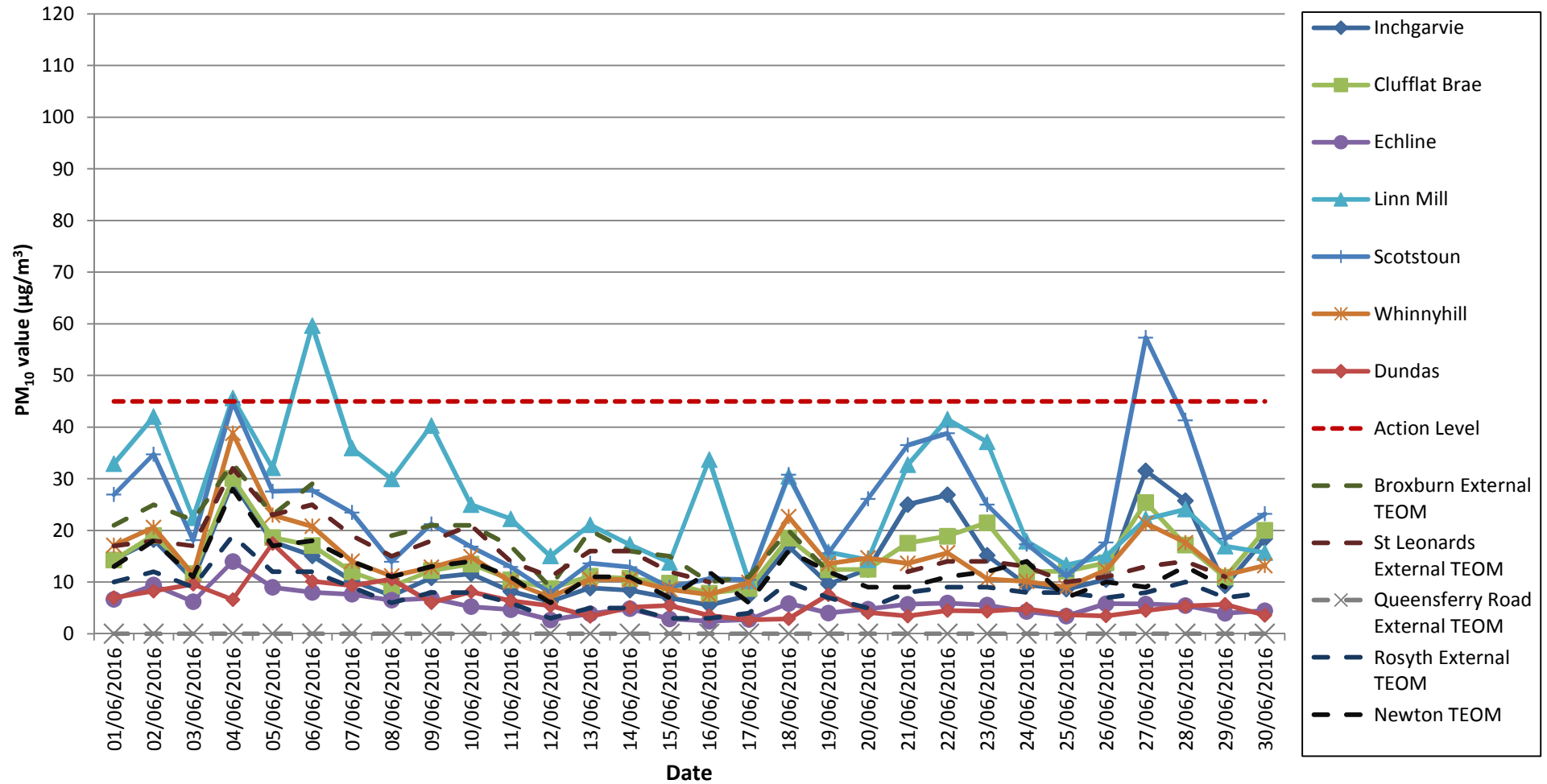
## Particulate Matter (PM10) Results for all Monitoring Locations

### June 2016



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

## JUNE 2016



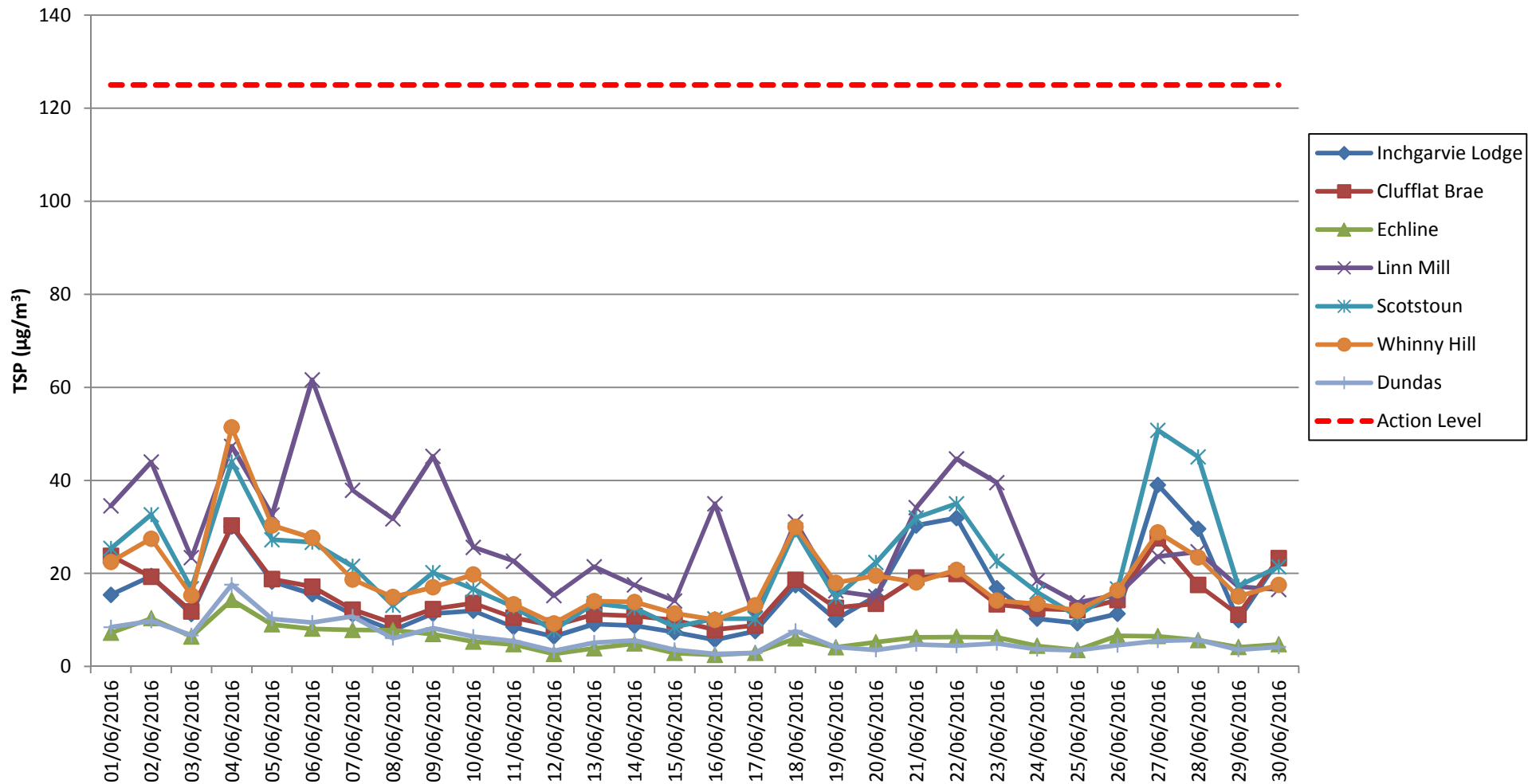


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## **APPENDIX B: TOTAL SUSPENDED PARTICLES**



# Total Suspended Particles (TSP) Results June 2016

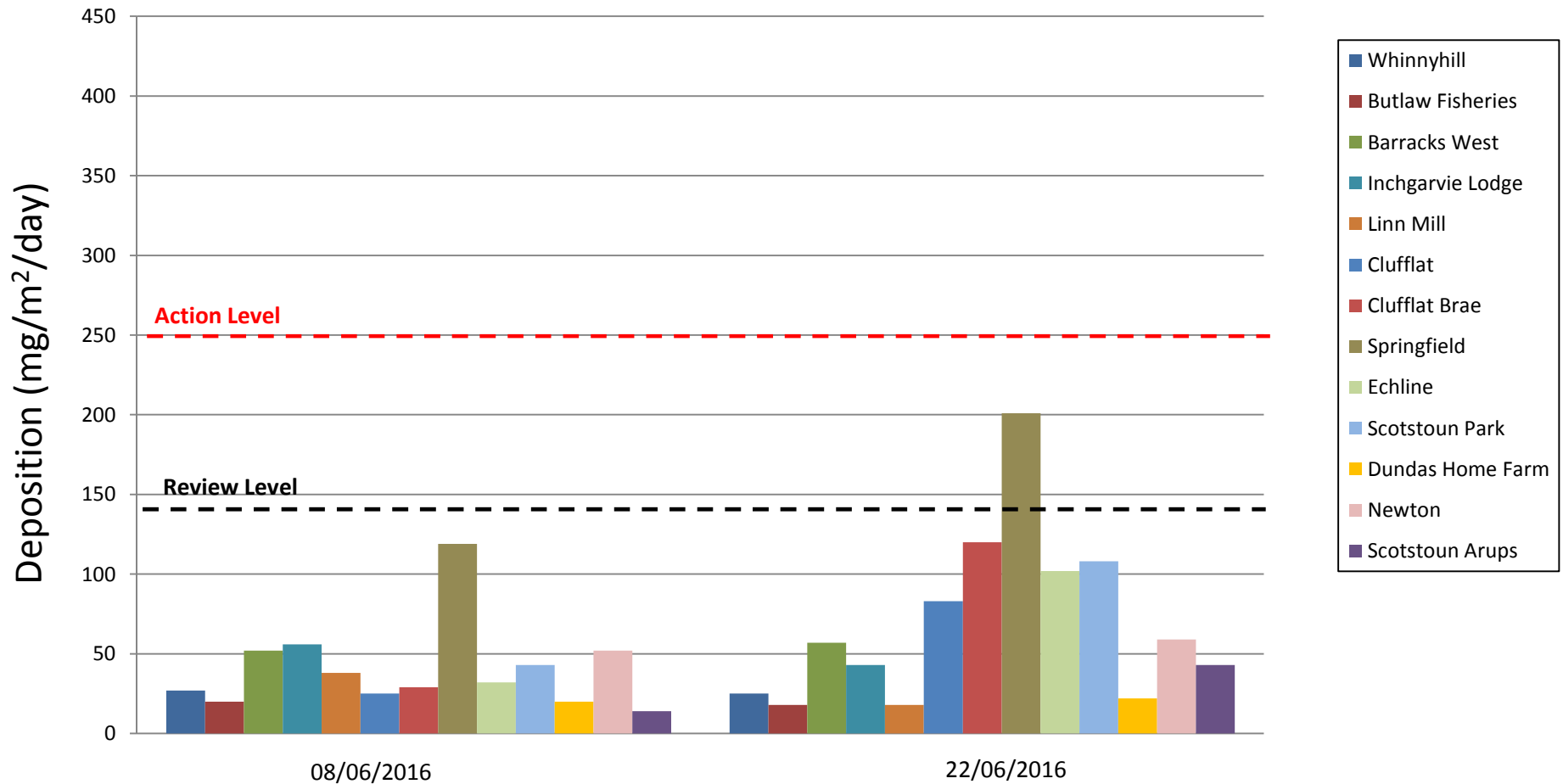




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## **APPENDIX C: FRISBEE GAUGE RESULTS**

## Frisbee Dust Deposition Results: June 2016



Note: The exceedance at Springfield was likely caused by organic material from a nearby tree that was found on the filter during collection



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

### Daily Dust Log - North - June 2016

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/06/2016	N	LIGHT	E	DRY	N			
02/06/2016	N	LIGHT	SE	DRY	N			
03/06/2016	N	LIGHT	E	DRY	N			
04/06/2016	N	LIGHT						
05/06/2016	N	LIGHT						
06/06/2016	N	LIGHT	E	DRY	N			
07/06/2016	N	LIGHT	E	DRY	N			
08/06/2016	N	LIGHT	E	DRY	N			
09/06/2016	N	LIGHT	E	WET	N			
10/06/2016	N	LIGHT	E	WET	N			
11/06/2016	N	LIGHT						
12/06/2016	N	LIGHT						
13/06/2016	N	LIGHT	E	WET	N			
14/06/2016	N	LIGHT	SE	WET	N			
15/06/2016	N	LIGHT	SE	WET	N			
16/06/2016	N	LIGHT	S	DAMP	N			
17/06/2016	N	LIGHT	W	DAMP	N			
18/06/2016	N	LIGHT						
19/06/2016	N	LIGHT						
20/06/2016	N	LIGHT	SW	DAMP	N			
21/06/2016	N	LIGHT	SE	DAMP	N			
22/06/2016	N	LIGHT	E	DAMP	N			
23/06/2016	N	LIGHT	S	WET	N			
24/06/2016	N	LIGHT	S	WET	N			
25/06/2016	N	LIGHT						
26/06/2016	N	LIGHT						
27/06/2016	N	LIGHT	SE	DRY	N			
28/06/2016	N	LIGHT	E	DRY	N			
29/06/2016	N	LIGHT	E	DAMP	N			
30/06/2016	N	LIGHT	E	DAMP	N			

### Daily Dust Log -South - June 2016

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/06/2016	S	LIGHT	SW	DRY	N			
02/06/2016	S	LIGHT	SW	DRY	N			
03/06/2016	S	LIGHT	SW	DRY	N			
04/06/2016	S	LIGHT						
05/06/2016	S	LIGHT						
06/06/2016	S	LIGHT	SE	DRY	N			15 Minute exceedances at Linn Mill, no dust visible on site inspections. appropriate mitigation in place
07/06/2016	S	LIGHT	S	DRY	N			
08/06/2016	S	LIGHT	W	DRY	N			
09/06/2016	S	LIGHT	W	WET	N			
10/06/2016	S	LIGHT	SW	WET	N			
11/06/2016	S	LIGHT						
12/06/2016	S	LIGHT						
13/06/2016	S	LIGHT	SW	WET	N			
14/06/2016	S	LIGHT	SW	WET	N			
15/06/2016	S	LIGHT	SW	WET	N			
16/06/2016	S	LIGHT	SE	DAMP	N			
17/06/2016	S	LIGHT	S	DAMP	N			
18/06/2016	S	LIGHT						
19/06/2016	S	LIGHT						
20/06/2016	S	LIGHT	SE	DAMP	N			
21/06/2016	S	LIGHT	E	DAMP	N			
22/06/2016	S	LIGHT	E	DAMP	N			
23/06/2016	S	LIGHT	S	WET	N			
24/06/2016	S	LIGHT	S	WET	N			
25/06/2016	S	LIGHT						
26/06/2016	S	LIGHT						
27/06/2016	S	LIGHT	SE	DRY	N			15 Minute exceedances at Scotstoun, no dust visible on site inspections.
28/06/2016	S	LIGHT	E	DRY	N			15 Minute exceedances at Scotstoun, no dust visible on site inspections.
29/06/2016	S	LIGHT	E	DAMP	N			
30/06/2016	S	LIGHT	E	DAMP	N			