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Project **FORTH REPLACEMENT CROSSING**

Document title

**AIR QUALITY MONITORING REPORT
AUGUST 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 August 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 (PM₁₀) 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 August
M1	Whinny Hill	Frisbee	21/03/12	<ul style="list-style-type: none"> • Earth Works/Fill Placement • New Ferrytoll Road • Works at railway bridge at Ferrytoll • Reinforced earth wall at Castlandhill Road • Roadworks
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	<ul style="list-style-type: none"> • Pier S1 rebar, formwork & concrete works • Pier S2 foundation work • Central Tower rebar, formwork, concreting works, deck table installation works • South Tower rebar, formwork, concreting works, deck table installation works
M8	Barracks West	Frisbee	31/08/11	<ul style="list-style-type: none"> • Pier S1 rebar, formwork & concrete works • Pier S2 foundation work • Central Tower rebar, formwork, concreting works, deck table installation works • South Tower rebar, formwork, concreting works, deck table installation works
M9	Barracks East	Frisbee	31/08/11	
M10	Inchgarvie Lodge	Frisbee	22/08/11	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • Pier S1 rebar, formwork & concrete works • Pier S2 foundation work • Central Tower rebar, formwork, concreting works, deck table installation works • South Tower rebar, formwork, concreting works, deck table installation works. • Main carriageway earthworks
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • Main carriageway earthworks
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	<ul style="list-style-type: none"> • Launch – snagging and bearing

M13	Clufflat Brae	Frisbee	21/09/11	<ul style="list-style-type: none"> installation Main carriageway earthworks
		Automatic light scatter meter	24/10/11	
M14	Springfield	Frisbee	15/08/11	<ul style="list-style-type: none"> Launch – snagging and bearing installation Main carriageway earthworks
M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> Launch – snagging and bearing installation Main carriageway earthworks
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	<ul style="list-style-type: none"> Arup Access works Footpath works Utility works Concrete finishing works at B800 Bridge B800 North road works including bridge works (these works are directly in the location of the meter which now sits within the construction boundary).
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	<ul style="list-style-type: none"> Utility works Concrete finishing works at B800 Bridge B800 South road works including bridge works Main carriageway works
		Automatic light scatter meter	23/02/12	
M18	Newton	Frisbee	22/08/11	<ul style="list-style-type: none"> None
		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 August 2015 have been presented in a monthly chart; this can be found in Appendix A. Results show that the PM₁₀ levels were mostly below threshold levels throughout the month with the exception of four exceedances on the 23rd August at Linn Mill, Clufflat, Whinnyhill and Scotstoun. As this was a Sunday and all monitors recorded an increase, it is concluded that the exceedances were

caused by regional changes in air quality rather than being driven by construction related activities.

3.1.2. The PM₁₀ 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 August 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 August was largely driven by regional changes in air quality, including the exceedances noted in 3.1.1 above. However, there were some increases observed for Clufflat, Linn Mill and Inchgarvie during the month which do not correspond with the TEOM results. These increased levels of PM₁₀, although below the action level, may be due partly to construction activities, particularly main carriageway earthworks. Bowser activity will be increased in the area accordingly.

3.1.3. During August, 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 PM₁₀ 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. However the Scotstoun PM₁₀ results throughout the month of August are all under the threshold with the exception of the 23rd August. 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 August 2015 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during August 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 PM₁₀ levels) but with higher levels noted at a few locations. As with PM₁₀ 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 PM₁₀ levels noted in 3.1.2.

3.3. Frisbee Dust Deposition Results

- 3.3.1.** The Frisbee dust deposition results for August 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 to cover the results for August; these occurred on the 12th and 27th August 2015.
- 3.3.2.** The site action level for the dust deposition rate has been set at 250 mg/m²/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/m²/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 August there was one exceedance of the review level at Scotstoun for the fortnight concluding 27th August. The Scotstoun light scatter meter registered levels well below the action level for both the TSP and PM₁₀ during the period with the exception of the exceedance on the 23rd August which was due to regional conditions. The dust deposition Frisbee monitor is located closer to the nearby properties



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than the light scatter meter and is not directly within the works area. It is possible that the location of the monitor, directly adjacent to a high hedge, has caused contamination of the sample. FCBC has therefore moved the monitor slightly further away from the hedge and will review the position if results continue to be high. However, it is acknowledged that site works may also be contributing to dust deposition in the area so FCBC will continue to monitor this area closely over the next few months as works progress, and provide mitigation when necessary.

3.4. Daily Dust Log and Environmental Inspections

- 3.4.1.** A summary of the daily dust log for August 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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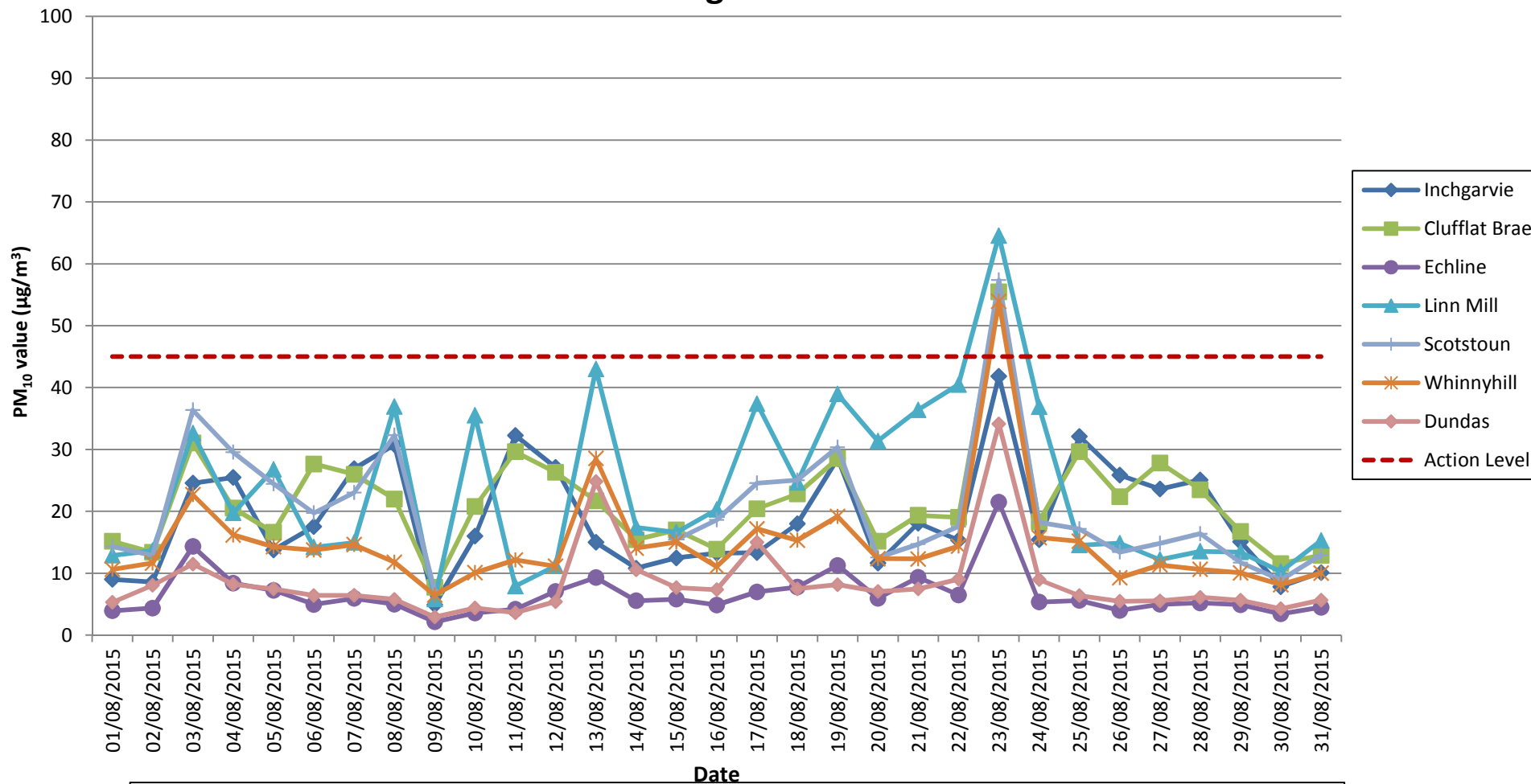
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APPENDIX A: LIGHT SCATTER METER RESULTS

Air Quality Monitoring

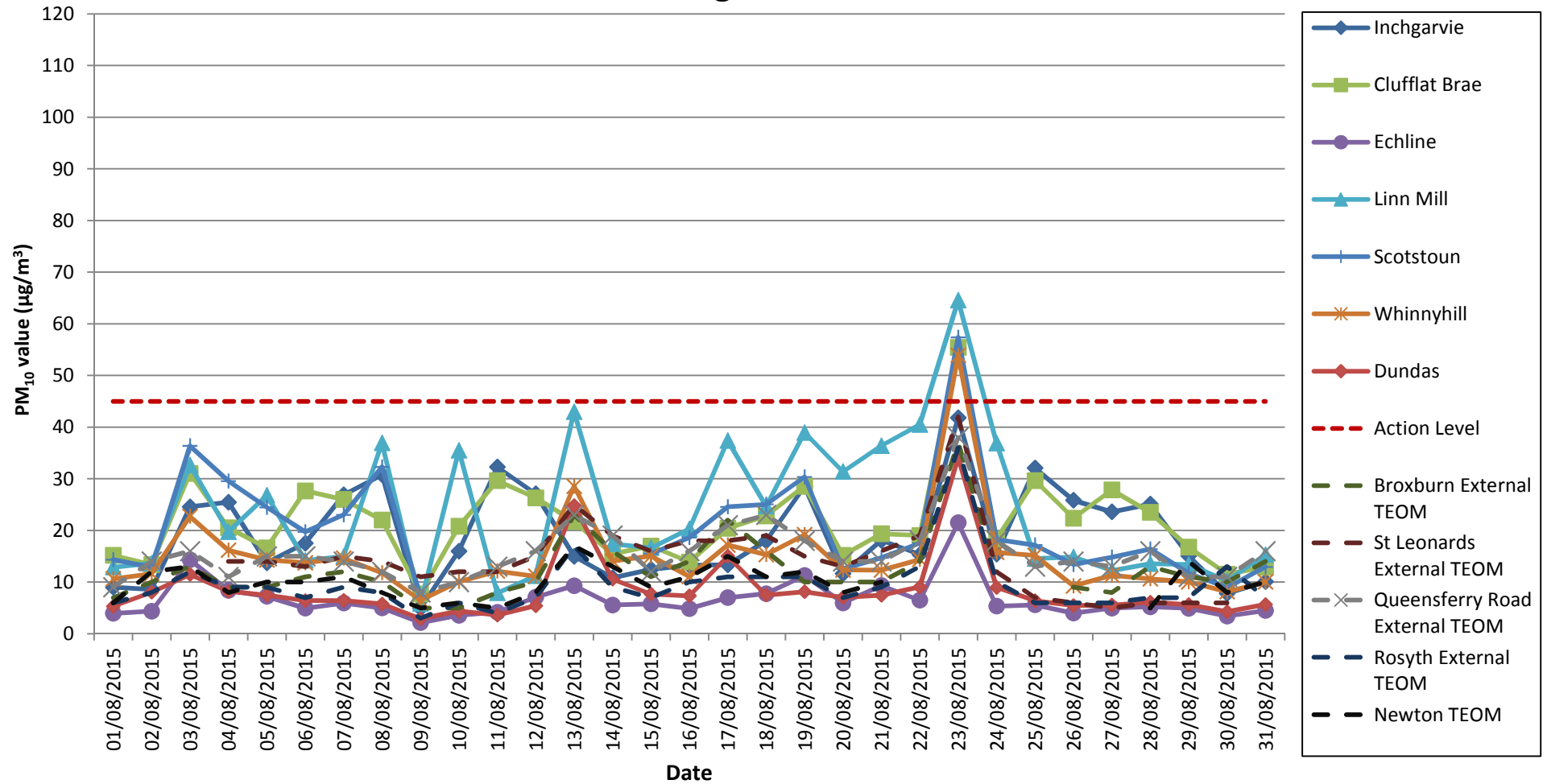
Particulate Matter (PM10) Results for all Monitoring Locations

August 2015



Note: Please note there is no data for Scotstoun from 10th-14th due to power cut at the scotstoun monitor.

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



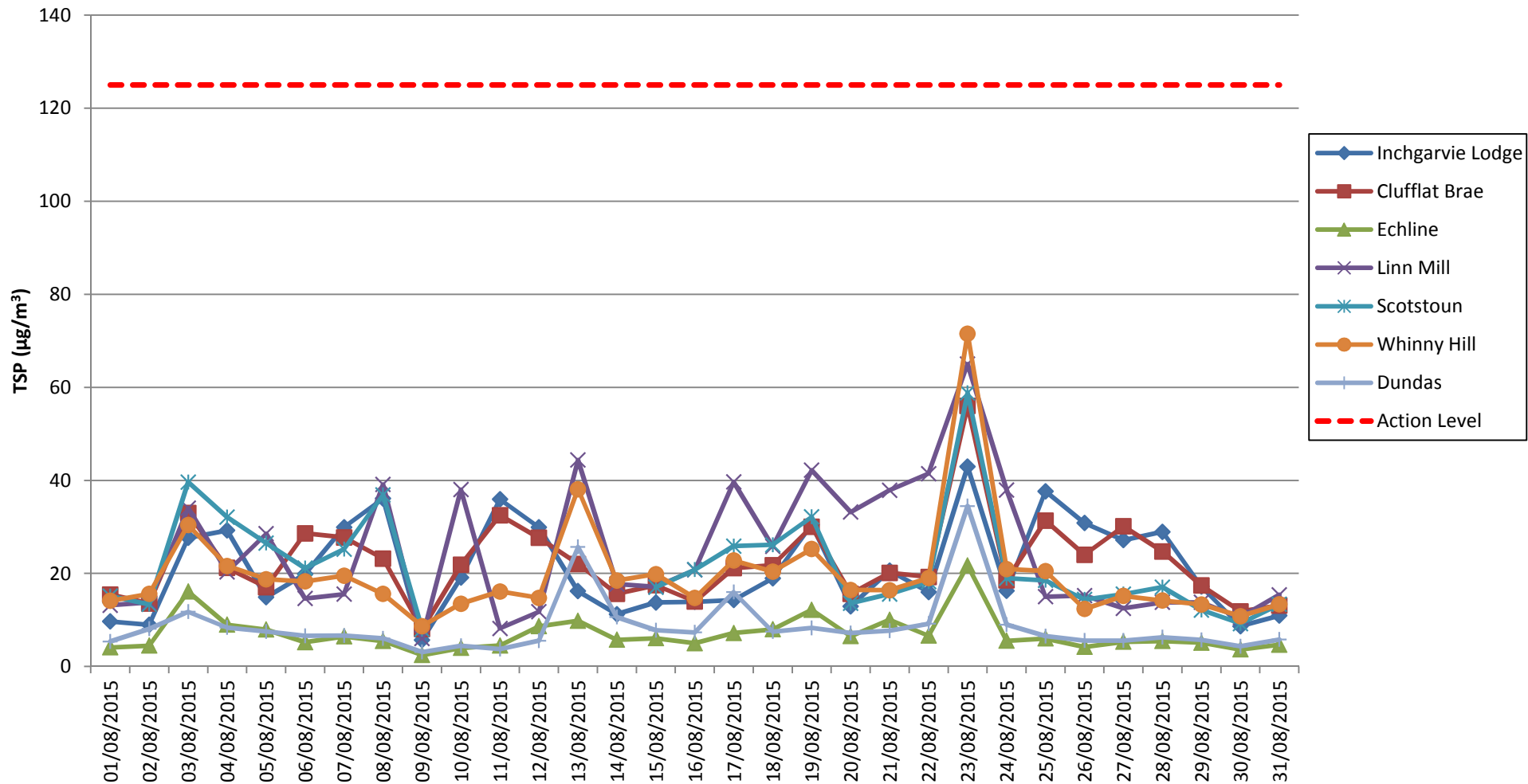


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APPENDIX B: TOTAL SUSPENDED PARTICLES

Total Suspended Particles (TSP) Results August 2015



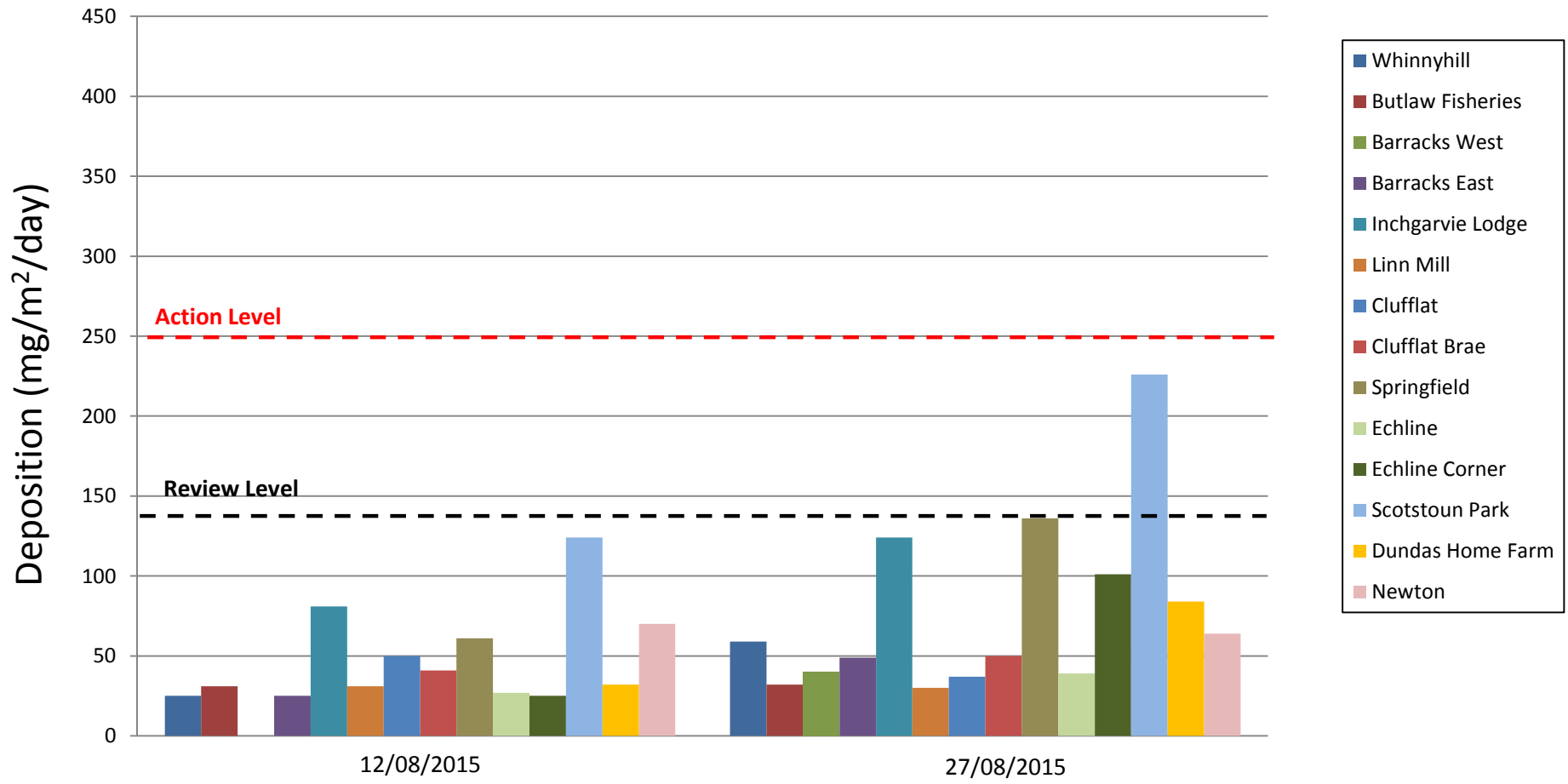


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APPENDIX C: FRISBEE GAUGE RESULTS

Frisbee Dust Deposition Results: August 2015





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APPENDIX D: DAILY DUST LOG

Daily Dust Log - North - August 2015

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

Daily Dust Log - South - August 2015

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