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Forth Crossing Bridge Constructors

HOCHTIEF Solutions
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Project **FORTH REPLACEMENT CROSSING**

Document title

**AIR QUALITY MONITORING REPORT
MARCH 2015**

00	05/03/2015	First revision	SSN	KHN	SSN
Rev	Rev. Date	Purpose of revision	Made	Checked	Reviewed

Document status

FOR REVIEW

Made by Stuart Swainson	Checked By: Kathryn Hamilton
Initials: SSN	Initials: LSN

Document number	Rev
REP -00226	00

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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 March 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 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 March
M1	Whinny Hill	Frisbee	21/03/12	<ul style="list-style-type: none"> • Rock Trimming/Breaking/Crushing • Earth Works
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	<ul style="list-style-type: none"> • Marine works • Assembling and fixing rebar and formwork works at Pier S3 • Concrete pouring at Pier S3 • Excavation/Cleaning at Pier S2
M8	Barracks West	Frisbee	31/08/11	<ul style="list-style-type: none"> • Marine works • Assembling and fixing rebar and formwork works at Pier S3 • Concrete pouring at Pier S3 • Excavation/Cleaning at Pier S2
M9	Barracks East	Frisbee	31/08/11	
M10	Inchgarvie Lodge	Frisbee	22/08/11	<ul style="list-style-type: none"> • Launch – Painting works, snagging and bearing installation • Assembling and fixing rebar and formwork works at Pier S3 • Concrete pouring at Pier S3 • Excavation/Cleaning at Pier S2
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	<ul style="list-style-type: none"> • Launch – Painting works, snagging and bearing installation
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	<ul style="list-style-type: none"> • Launch – Painting works, snagging and bearing installation
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"> • Launch – Painting works, snagging and bearing installation
M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> • Launch – Painting works, snagging and bearing installation • Earth bund landscaping and Fencing • Planting
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	<ul style="list-style-type: none"> • Earthworks at B800

		Automatic light scatter meter	14/02/12	<ul style="list-style-type: none"> • Utility works • Drainage works
M17	Dundas Home Farm	Frisbee	29/08/11	<ul style="list-style-type: none"> • Construction of road formation and drainage from Dundas to Queensferry gyratory • Gantry foundations
		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 March 2015 have been presented in a monthly chart; this can be found in Appendix A. Results show that the PM₁₀ levels were below threshold levels throughout the month with the exception of the 16th- 19th March. During this period all monitors registered levels above the action level on at least 2 days.
- 3.1.2.** During the period of high readings the Department of the Environment, Food and Rural Affairs issued an alert regarding an area of increased levels of air pollution passing over the UK. This combined with the fact all monitors registered high levels suggests that the results were driven by regional/national changes in air quality rather than being driven by construction related activities.
- 3.1.3.** 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 May 2012. The comparison between the light scatter and TEOM results demonstrates that both sets of results generally follow the same pattern, including an increase in

levels over the period 16th – 19th March, indicating that the pattern observed throughout March was largely driven by regional changes in air quality rather than by construction related activities.

- 3.1.4.** During March, rock breaking and trimming activities have been on-going between Castlandhill Road and the A90. These works will continue to progress north towards Whinny Hill over the coming few months. Localised dust creation is associated with these activities. Though this has not caused an issue so far and has required no additional mitigation, FCBC are monitoring the situation closely to ensure that as the works get close to Whinny Hill, and as the weather improves, these activities continue to have no measurable impacts on the local air quality and are mitigated appropriately where necessary.

3.2. Total Suspended Particles

- 3.2.1.** The TSP results for March 2015 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during March were found to be low and all within the threshold level. All locations across the site were mostly found to follow a similar pattern, including an increase during the 16th-19th March, similar to that observed for PM₁₀ levels. This demonstrates that, in general, the levels 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 March 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

March, on the 11th and 25th. The next collection will take place on the 8th April 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 March there was one exceedance of the site review level and no exceedances of the action level (see Table 2).

Table 2: Exceedances of the dust deposition thresholds

Fortnight ending	Threshold Exceeded	Monitoring Location	Considerations	Weather conditions during period
11/03/2015	Review	Scotstoun	Some dust generating construction activities in the area	Generally windy and wet

- 3.3.4.** For the exceedance of the review level a review of the works in the area, weather conditions, and the mitigation measures in place was undertaken. Other considerations were also made, such as where the gauge is located. Where available, the Frisbee gauge results were also considered alongside the particulate matter data for the same period.
- 3.3.5.** During the period ending the 11th March the Scotstoun gauge registered dust deposition results above the review level. A further review into works undertaken in the vicinity took place. Although a small amount of earthworks were undertaken in the area during the period no dust creation was noted and mitigation methods were employed throughout.

PM₁₀ and TSP levels remained low throughout the period. It is also noted that similar activities have been ongoing throughout the periods before and after, with low levels of dust deposition being registered. After thorough review it is concluded that FCBC construction activities may have contributed to the exceedance. Due to the amount of works that are taking place in the area FCBC's environmental department will increase inspections at this location during April to ensure that works are not allowing any dust created to migrate off-site.

- 3.3.6.** For the collection on the 11th March the sample bottle for the Echline Corner Frisbee gauge was found away from the gauge, upturned and empty. The gauge was also found on the ground, presumably blown over.

3.4. Daily Dust Log and Environmental Inspections

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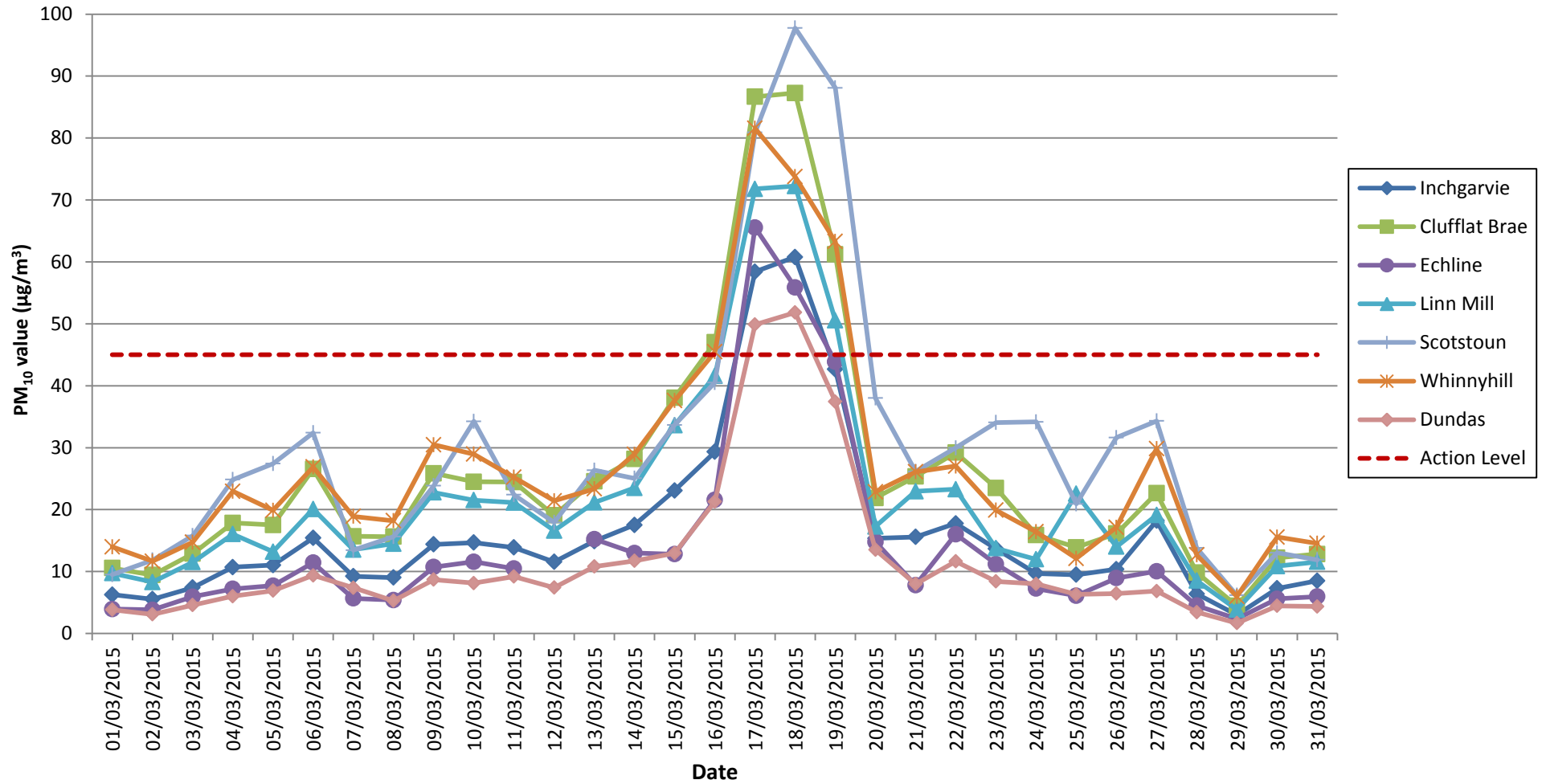
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APPENDIX A: LIGHT SCATTER METER RESULTS

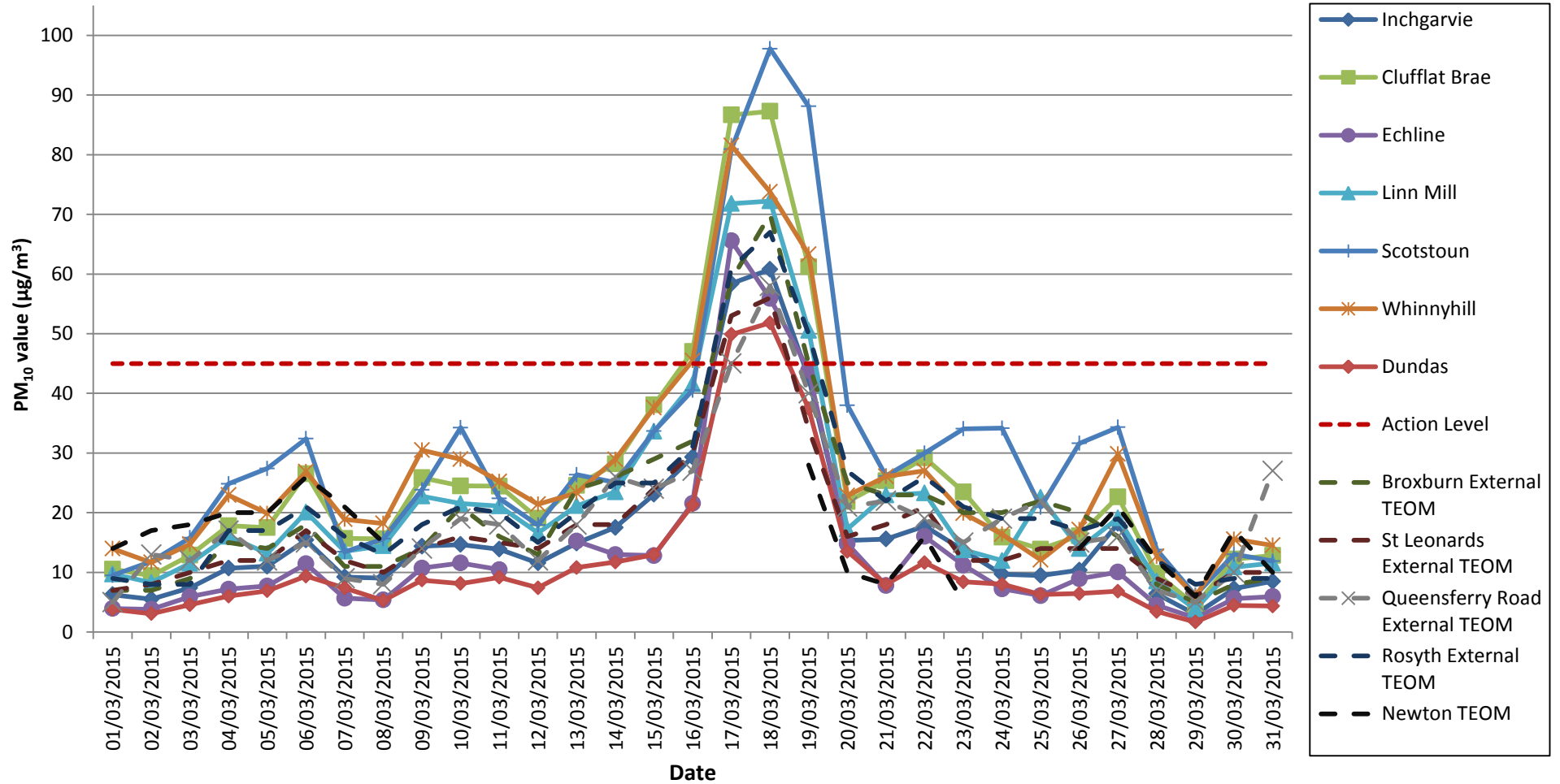
Air Quality Monitoring

Particulate Matter (PM10) Results for all Monitoring Locations

March 2015



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





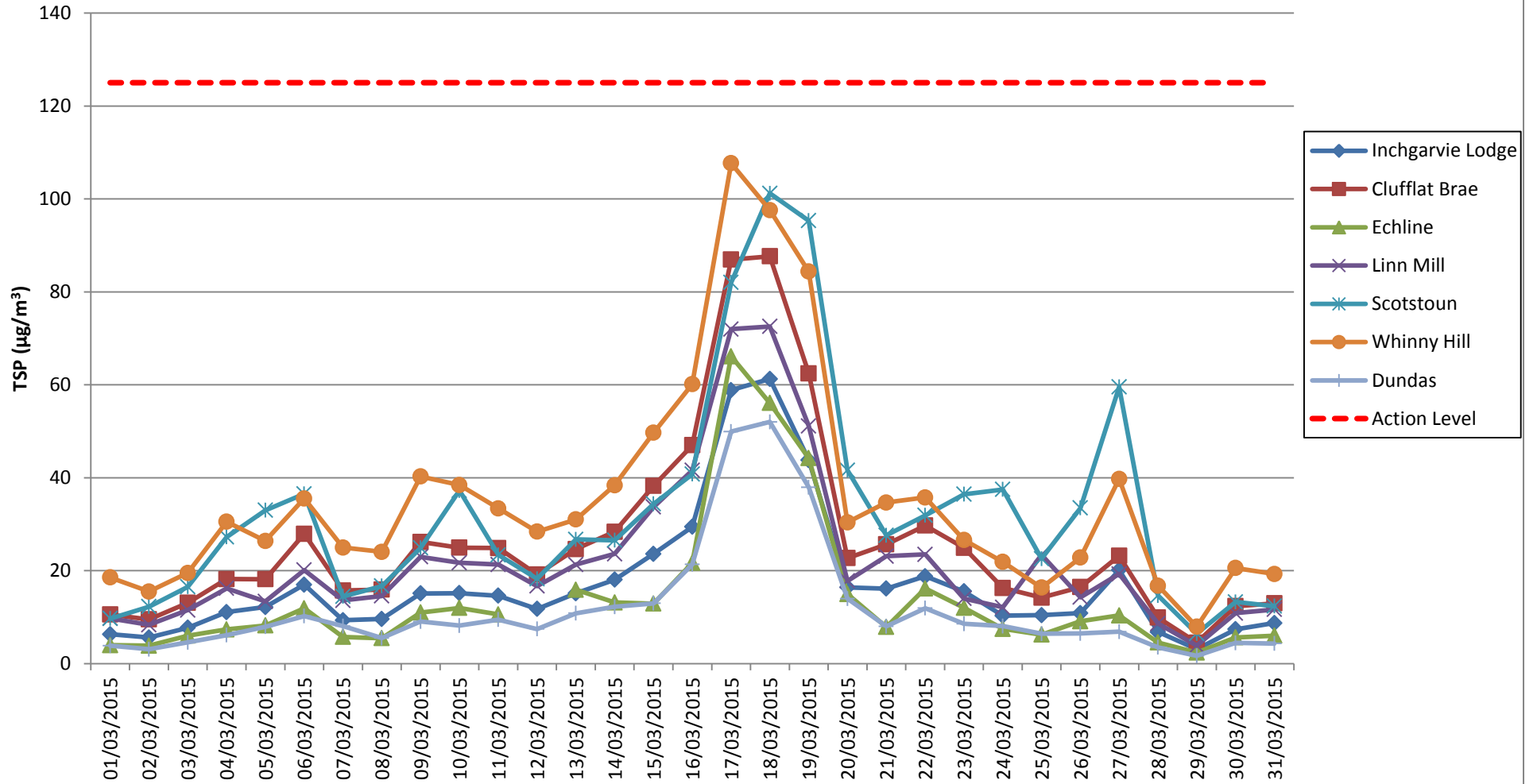
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APPENDIX B: TOTAL SUSPENDED PARTICLES

Total Suspended Particles (TSP) Results

March 2015



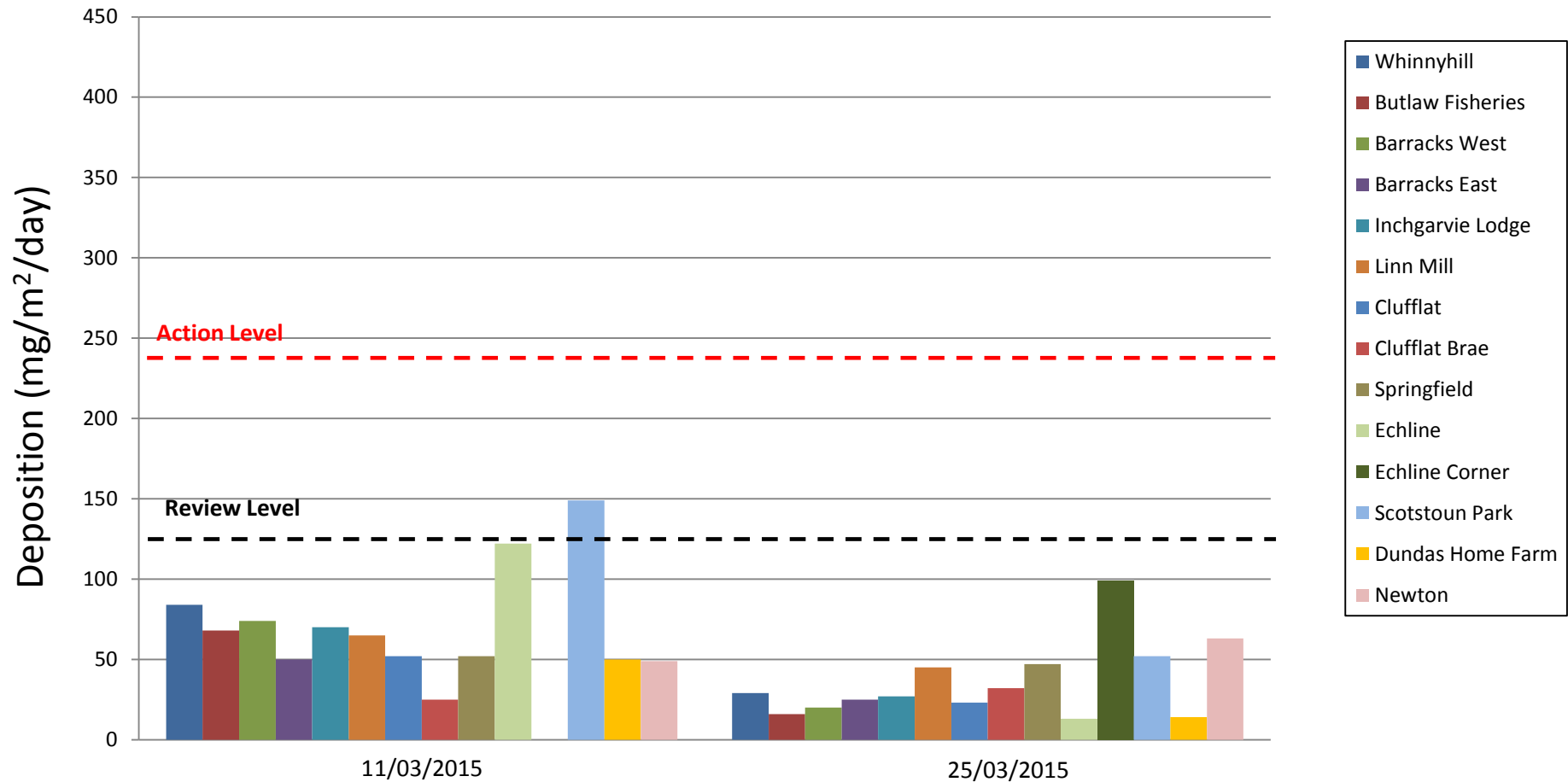


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APPENDIX C: FRISBEE GAUGE RESULTS

Frisbee Dust Deposition Results: March 2015



Note: Echline Corner (11/03/2015) has been omitted due to the sample bottle being found away from the gauge, upturned and empty (see Section 3.3.6).



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APPENDIX D: DAILY DUST LOG

Daily Dust Log - North - March 2015

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

Daily Dust Log - South - March 2015

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