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Forth Crossing Bridge Constructors

HOCHTIEF Solutions
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Project **FORTH REPLACEMENT CROSSING**

Document title

**AIR QUALITY MONITORING REPORT
JANUARY 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 January 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 January
M1	Whinny Hill	Frisbee	21/03/12	<ul style="list-style-type: none"> • Rock Trimming • CMC Piles
		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 Piers S1 • Concrete pouring at Piers S1 • Excavation 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 S1 • Concrete pouring at Pier S1 • Excavation 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 and snagging • Assembling and fixing rebar and formwork works at Pier S1 • Concrete pouring at Pier S1 • Excavation 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 and snagging
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	<ul style="list-style-type: none"> • Launch – Painting works and snagging
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 and snagging
M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> • Launch – Painting works and snagging • Paving, cabling and kerbing at A904
		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 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 January 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. All the monitors follow the same general pattern throughout the month. All monitors registered increased levels on the 9th, 12th, 15th and 21st-22nd although the action level was not reached. The fact that all seven monitors showed the same pattern throughout this period suggests that the increases are being caused by regional events rather than being caused 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, Edinburgh. 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 at similar levels, indicating that the pattern observed throughout January was largely driven by regional changes in air quality.

3.2. Total Suspended Particles

3.2.1. The TSP results for January 2015 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during January were found to be low and all within the threshold level. All locations across the site were mostly found to follow a similar pattern, demonstrating 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 January 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 January, on the 7th and 21st. The collection on the 7th January represents the period covering the previous 28 days as no collection took place over the Christmas break. The next collection will take place on the 5th February 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 January 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
07/01/2015	Review	Linn Mill	No dust generating construction activities in the area	Generally windy and wet

3.3.4. For the exceedances of the review level a review of the works in each of the areas, 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 7th January the Linn Mill gauge registered above the Review Level. However, a review of works was undertaken and it was found that no construction activities that would be likely to give rise to dust took place in the area during this period, which included the Christmas site closure (19th Dec -5th Jan). Although, elevated levels were also observed at the Linn Mill gauge for the previous collection in December, levels had decreased again by the second collection in January (covering the period from 7th – 21st). PM₁₀ and TSP data were low for the period at the same location. After a thorough review it was concluded that the results cannot be explained by FCBC construction activities undertaken during this period.

3.3.6. During January a number of collection bottles were found away from the gauges (Barracks West, Springfield and Echline Corner), upturned and empty of water. In some cases gauges were also found on the ground,

presumably blown over (Barracks West and Echline Corner). During January the site experienced sustained periods of strong wind (Appendix D). The collection bottles found away from the gauges were situated in locations that are more exposed than the other monitoring locations.

3.4. Daily Dust Log and Environmental Inspections

- 3.4.1.** A summary of the daily dust log for January 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 undertaken. In January, no instances of dust were noted during inspections.



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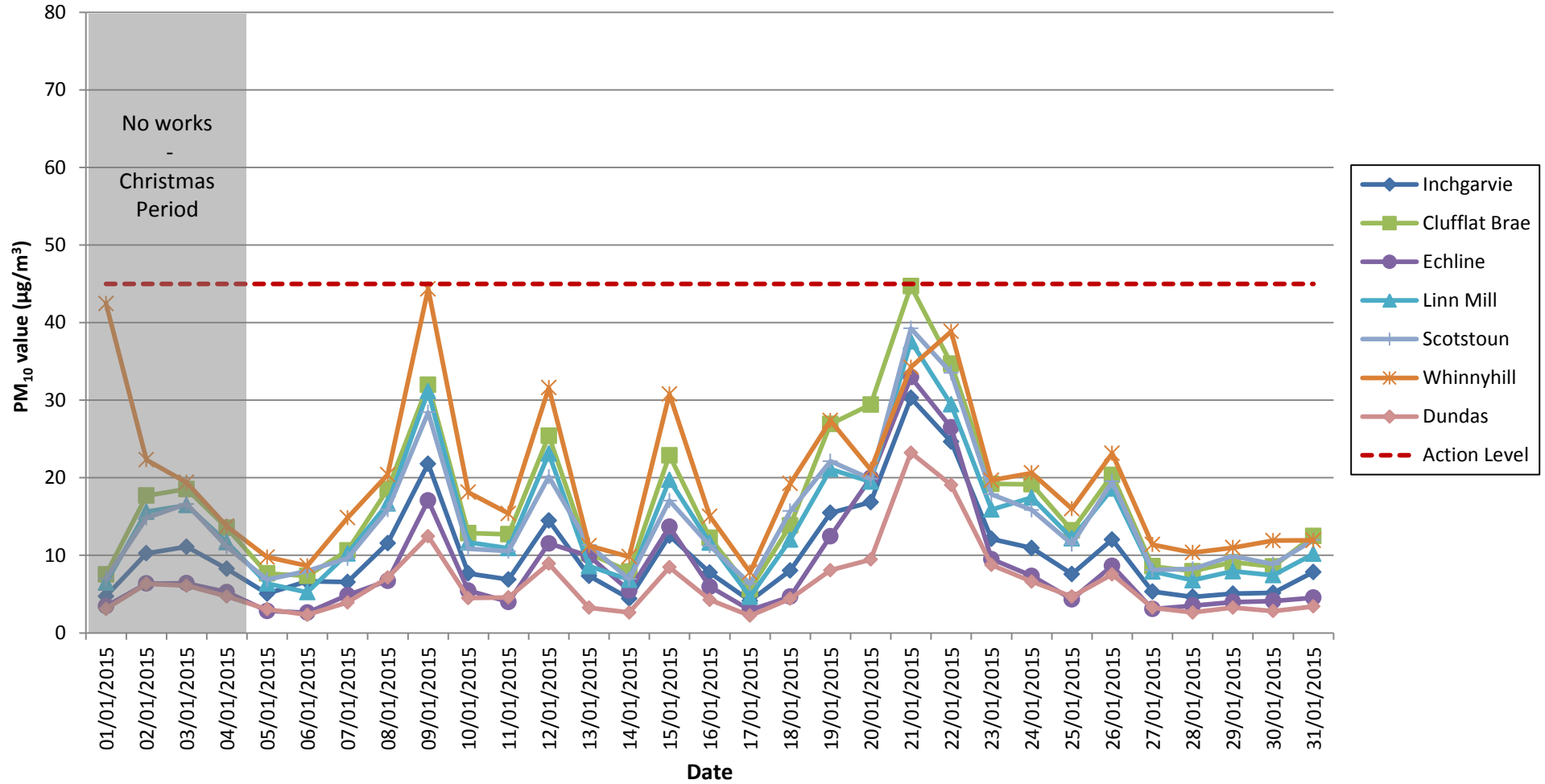
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APPENDIX A: LIGHT SCATTER METER RESULTS

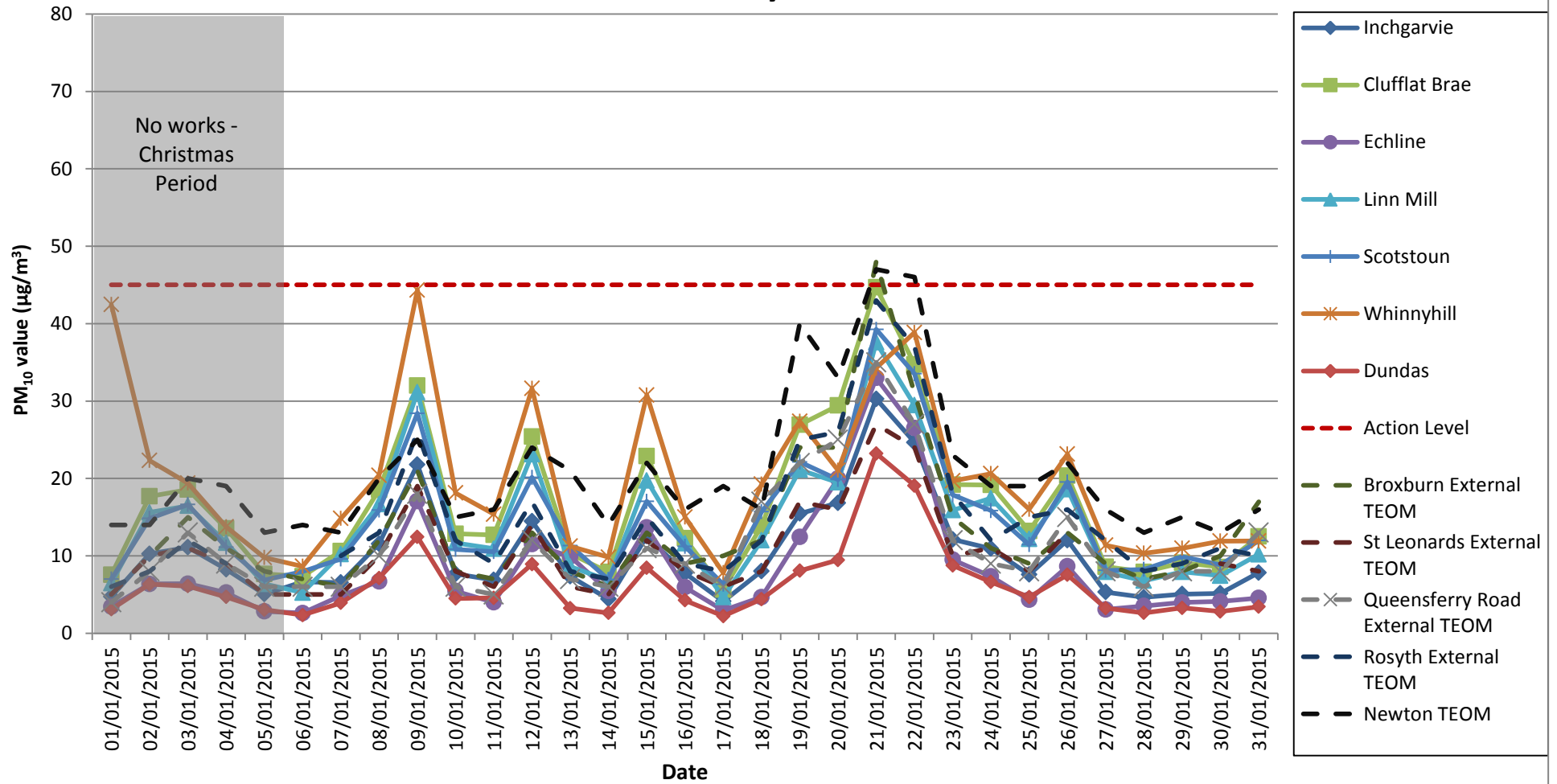
Air Quality Monitoring

Particulate Matter (PM10) Results for all Monitoring Locations

January 2015



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



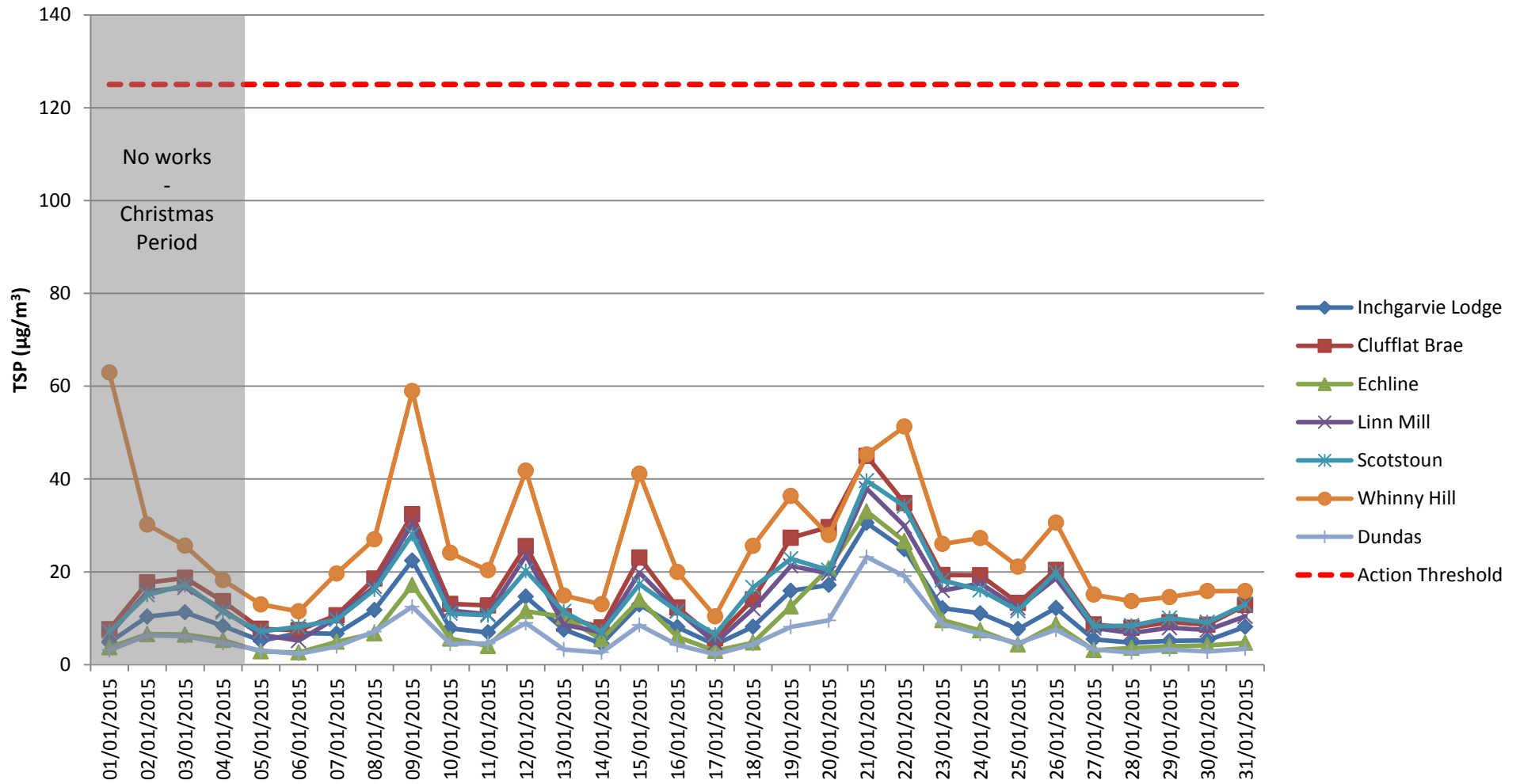


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APPENDIX B: TOTAL SUSPENDED PARTICLES

Total Suspended Particles (TSP) Results January 2015



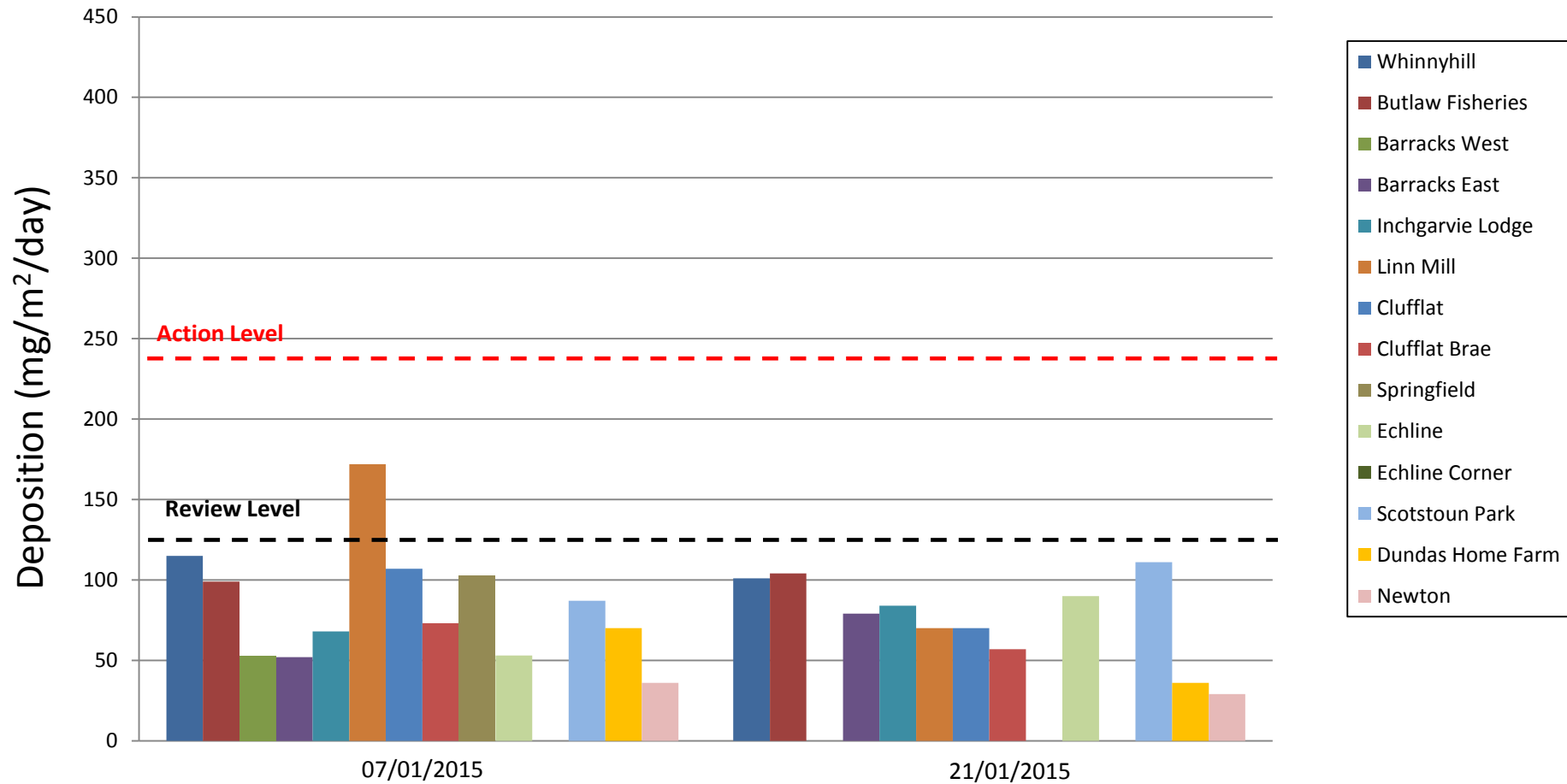


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APPENDIX C: FRISBEE GAUGE RESULTS

Frisbee Dust Deposition Results: January 2015



Note: High winds during January 2015 caused the Barracks West and Springfield gauge's collection bottle to be found empty and away from the gauge for the fortnight ending 21/01/2015. Echline Corner's bottle was found away from the frisbee for both periods. The collection on the 7th represents the period of 28 days previous as no collection took place over the Christmas break.



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APPENDIX D: DAILY DUST LOG

Daily Dust Log - North - January 2015

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

Daily Dust Log - South - January 2015

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