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Project **FORTH REPLACEMENT CROSSING**

Document title

**AIR QUALITY MONITORING REPORT
APRIL 2017**

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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 April 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 (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.



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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 April
M1	Whinny Hill	Frisbee	21/03/12	<ul style="list-style-type: none"> • Earthworks/Fill Placement • Bridge works at Ferrytoll • Main carriageway roadworks
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	<ul style="list-style-type: none"> • AVS concrete works • Waterproofing on deck • Wind shield installation • Scour protection • Stay cable installation works • Bridge deck works
M8	Barracks West	Frisbee	31/08/11	<ul style="list-style-type: none"> • AVS concrete works • Waterproofing on deck • Wind shield installation • Scour protection • Stay cable installation works • Bridge deck works
M10	Inchgarvie Lodge	Frisbee	22/08/11	<ul style="list-style-type: none"> • Minor main carriageway works • SUDS detention basin works • AVS concrete works on deck • Waterproofing on deck • Wind shield installation • Scour protection • Stay cable installation works • Bridge deck works • South abutment works • Cycle Track • Reinstatement work at Echline Field
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	<ul style="list-style-type: none"> • Minor main carriageway works • SUDS detention basin works • AVS concrete works on deck • Waterproofing on deck • Wind shield installation • Scour protection • Stay cable installation works • Bridge deck works • South abutment works
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	<ul style="list-style-type: none"> • Minor main carriageway works • SUDS detention basin works • AVS concrete works on deck • Waterproofing on deck • Wind shield installation • Scour protection
M13	Clufflat Brae	Frisbee	21/09/11	
		Automatic light scatter meter	24/10/11	

				<ul style="list-style-type: none"> Stay cable installation works Bridge deck works South abutment works Cycle Track Reinstatement work at Echline Field
M14	Springfield	Frisbee	15/08/11	<ul style="list-style-type: none"> Cycle Track Reinstatement work at Echline Field
M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> Cycle Track Reinstatement work at Echline Field
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	<ul style="list-style-type: none"> Tidying / reinstatement works Minor access road improvements.
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	<ul style="list-style-type: none"> Tidying / reinstatement works Minor access road improvements.
		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 April 2017 have been presented in a monthly chart; this can be found in Appendix A. Results show that the PM₁₀ levels generally follow a similar pattern with a few notable exceptions. Inchgarvie and Clufflat Brae show two periods of higher results in the first two weeks of April with exceedances for Inchgarvie on 4 – 6 April and again on 11 -13 April. Clufflat Brae had exceedances on 5 April and 11 – 12 April. Higher levels of PM₁₀ were also obtained at Clufflat Brae and Scotstoun on 20 and 24 April although below the threshold levels on these dates. It is considered likely that the exceedances at



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Inchgarvie and Clufflat were due to site activities and very dry conditions. Action was taken to manage the situation and the site team increased bowser movement and decreased site traffic in the area. The lower PM_{10} results in the second half of the month indicate some success with these mitigation measures. The environmental team continue to monitor the area.

- 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 throughout the month, with the exception of the elevated results noted in 3.1.1 where these locations showed significantly higher results than the TEOM levels.

3.2. Total Suspended Particles

- 3.2.1.** The TSP results for April 2017 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during April were found to be generally low and all within the threshold. All locations across the site were found to follow a similar pattern to that observed for PM_{10} levels, with the most notable increase occurring at Inchgarvie and Clufflat Brae in the first half of the month, corresponding to the high PM_{10} levels noted in 3.1.1.

3.3. Frisbee Dust Deposition Results

- 3.3.1.** The Frisbee dust deposition results for April 2017 have been presented in a chart and can be found in Appendix C. Two collections were made in April; these occurred on the 5th and 19th April 2017.



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- 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 April there were exceedances of the site review level at Scotstoun Park for both monitoring periods. With regards to the exceedances at Scotstoun Park, the temporary Frisbee at Scotstoun Arups, which is located closer to the FCBC works, indicates a significantly lower result than for the permanent Frisbee during this period. This suggests that the higher results obtained at the permanent monitoring location are not entirely due to FCBC activities. In addition, there were limited project related activities being undertaken in this area during April which would give rise to dust. The roads in this area are substantially complete with only tidying / reinstatement works and minor access road improvements occurring. As noted in previous reports, other construction work (not project related) is ongoing in the Scotstoun area. However, FCBC will continue to monitor Forth Replacement Crossing construction closely as works progress and provide mitigation as necessary.



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3.4. Daily Dust Log and Environmental Inspections

- 3.4.1.** A summary of the daily dust log for April 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.

- 3.4.3.** As noted in 3.1.1 there were exceedances registered during the month at Inchgarvie and Clufflat. These incidents were investigated by the environmental team. Site teams were instructed to increase dust suppression and reduce vehicle movement.



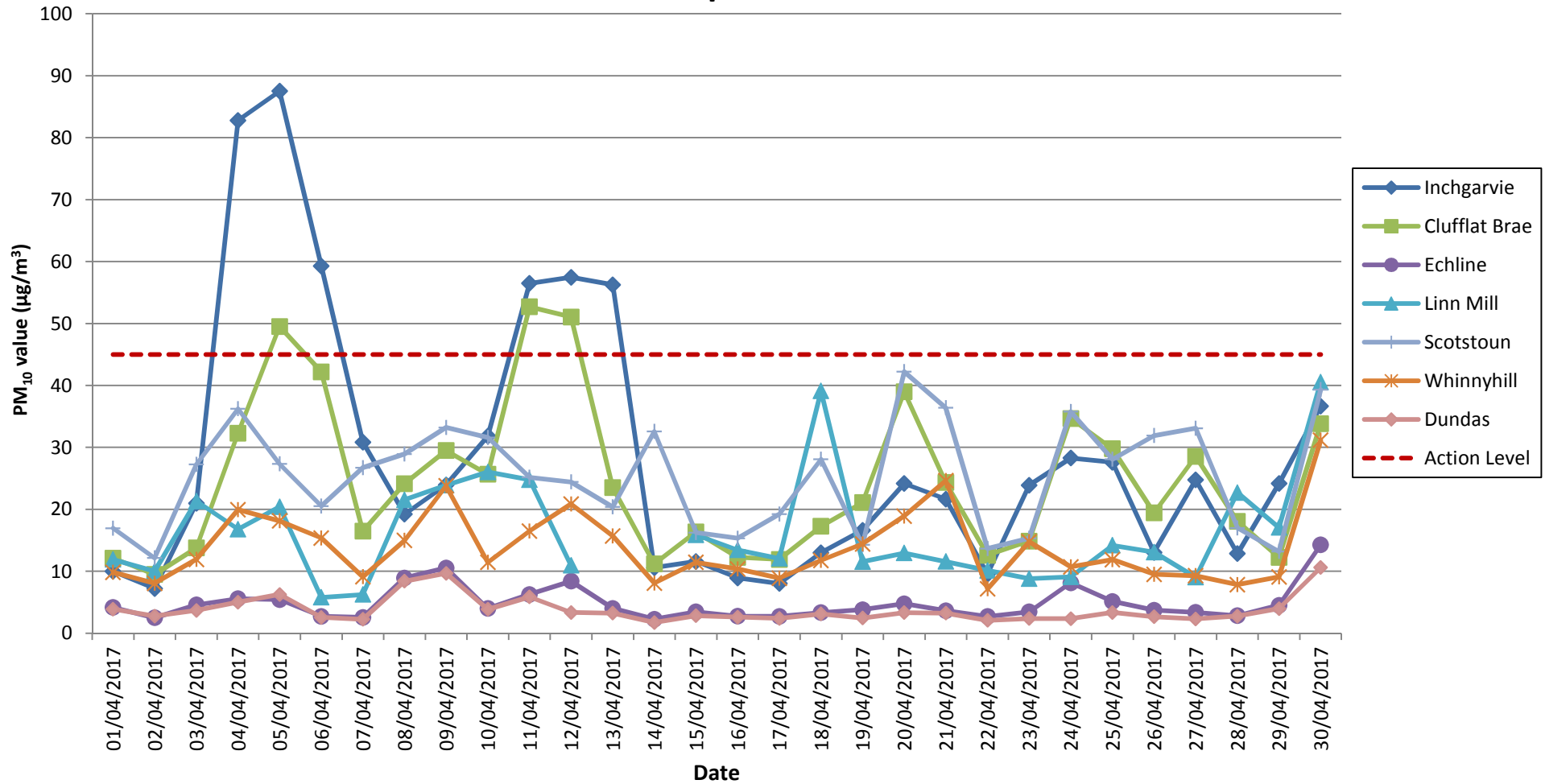
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APPENDIX A: LIGHT SCATTER METER RESULTS

Air Quality Monitoring

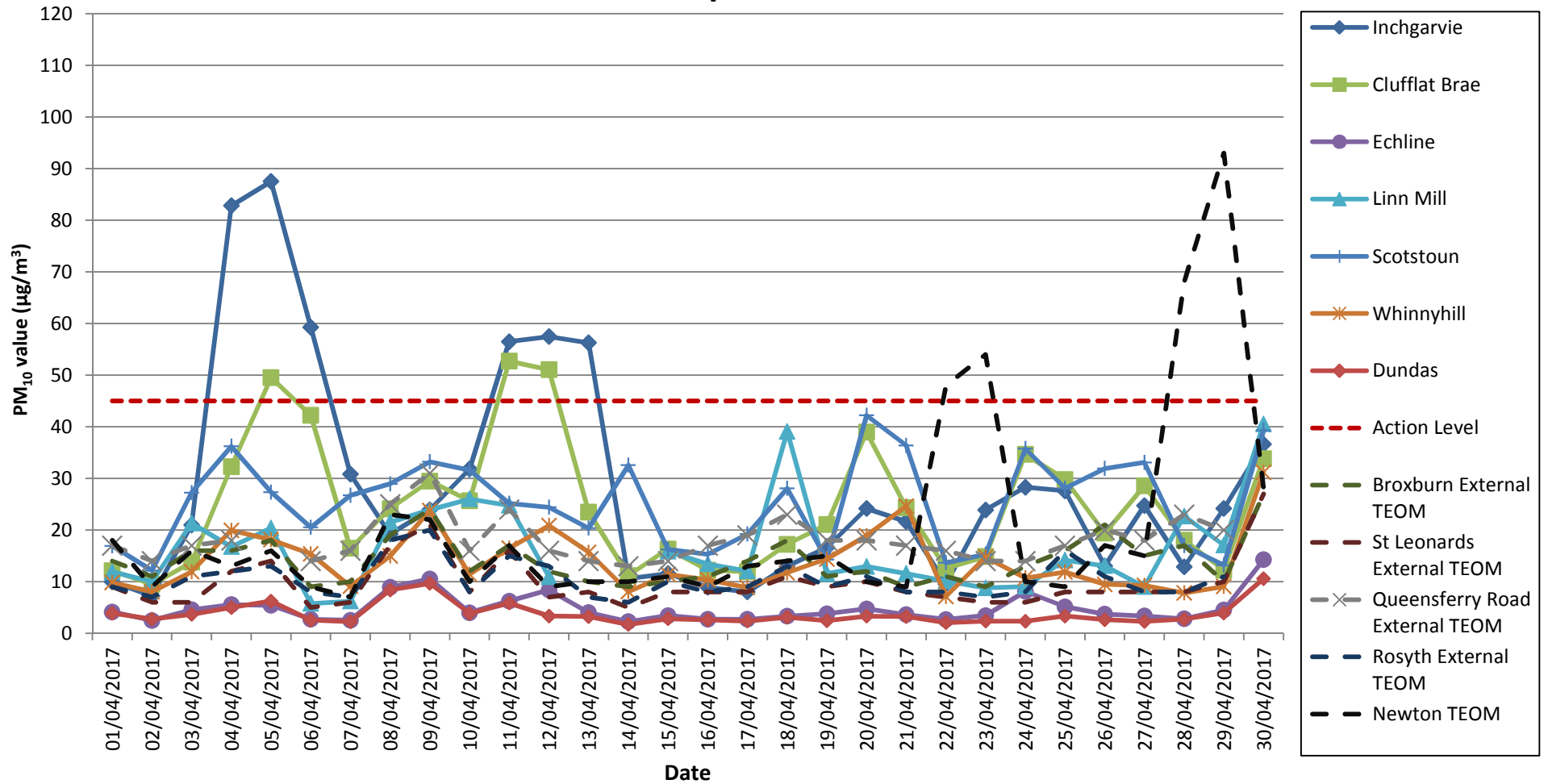
Particulate Matter (PM10) Results for all Monitoring Locations

April 2017



Note: There is no data at the the Linn Mill monitor between 13/04/2017 and 14/04/2017 due to a electrical problem at the monitor.

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



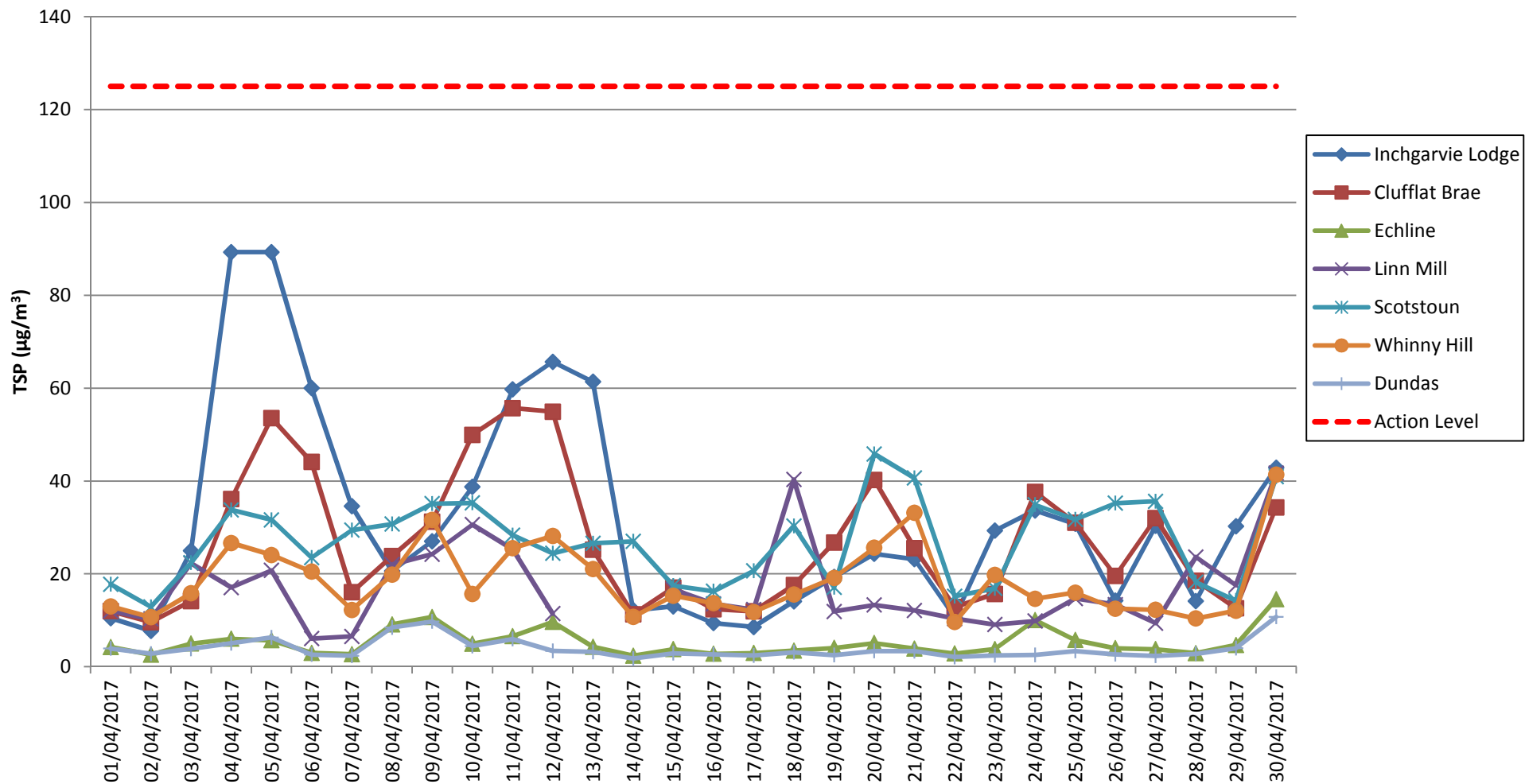
Note: There is no data at the the Linn Mill monitor between 13/04/2017 and 14/04/2017 due to a electrical problem at the monitor.



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APPENDIX B: TOTAL SUSPENDED PARTICLES

Total Suspended Particles (TSP) Results April 2017



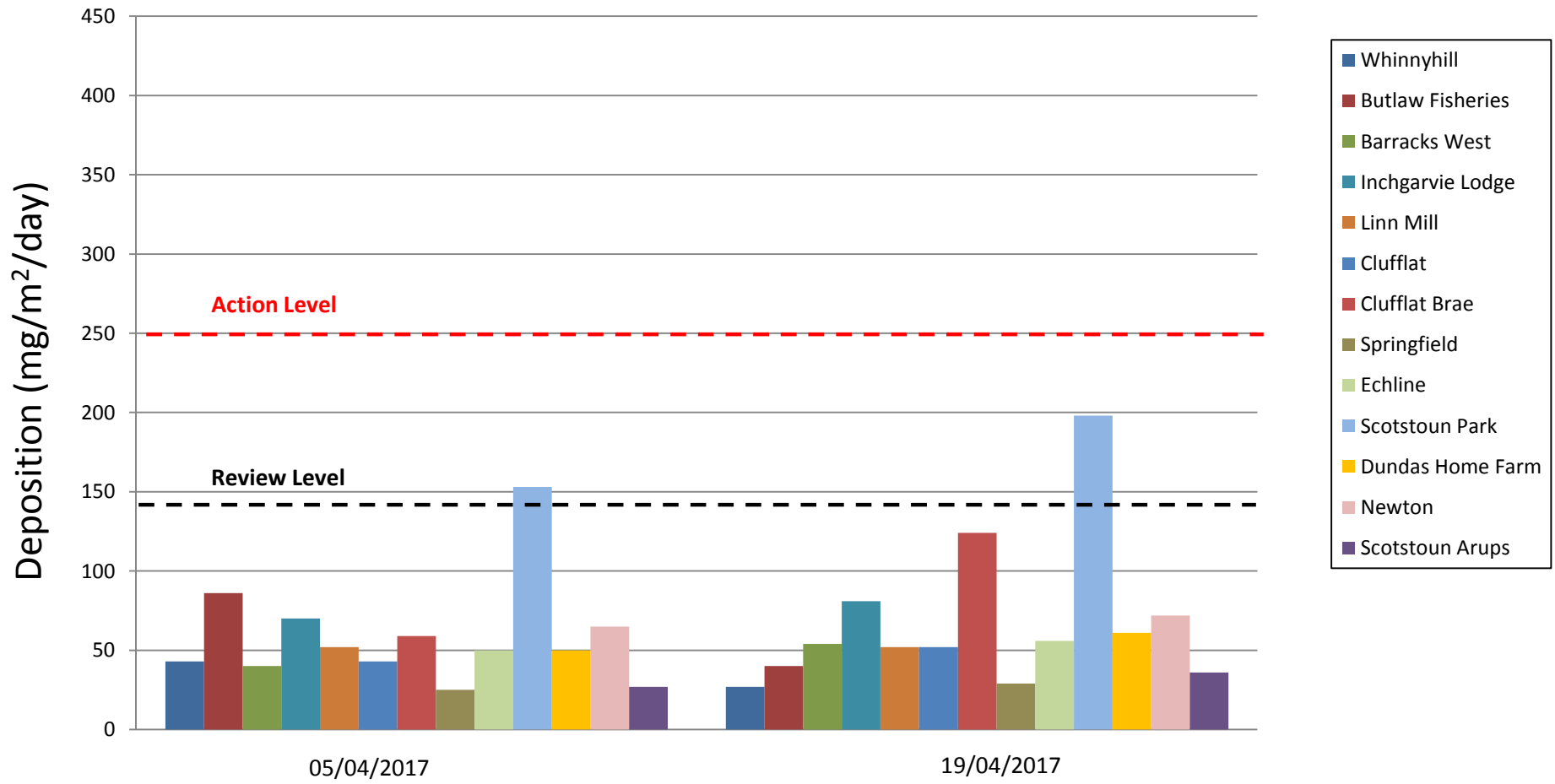
Note: There is no data at the the Linn Mill monitor between 13/04/2017 and 14/04/2017 due to a electrical problem at the monitor.



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APPENDIX C: FRISBEE GAUGE RESULTS

Frisbee Dust Deposition Results: April 2017





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APPENDIX D: DAILY DUST LOG

