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Project **FORTH REPLACEMENT CROSSING**

Document title

**AIR QUALITY MONITORING REPORT
JULY 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 July 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 July
M1	Whinny Hill	Frisbee	21/03/12	<ul style="list-style-type: none"> • Earthworks/Fill Placement • Main carriageway roadworks
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	<ul style="list-style-type: none"> • Waterproofing on deck • Wind shield installation • Bridge deck works
M8	Barracks West	Frisbee	31/08/11	<ul style="list-style-type: none"> • Waterproofing on deck • Wind shield installation • Bridge deck works
M10	Inchgarvie Lodge	Frisbee	22/08/11	<ul style="list-style-type: none"> • Minor main carriageway works • Waterproofing on deck • Wind shield installation • Bridge deck works • South abutment works • Cycle Track
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	<ul style="list-style-type: none"> • Minor main carriageway works • Waterproofing on deck • Wind shield installation • Surfacing access track at Linn Mill • 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 • Waterproofing on deck • Wind shield installation • Bridge deck works • South abutment works • Cycle Track
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"> • Cycle Track
M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> • Cycle Track



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		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	• Tidying / reinstatement works
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	• Tidying / reinstatement works
		Automatic light scatter meter	23/02/12	
M18	Newton	Frisbee	22/08/11	• 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 July 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 throughout the month with the exception of an exceedance that is recorded at Scotstoun on the 17th July. At the time of this exceedance there were no project related activities being undertaken in this area which would give rise to dust, FRC construction works now being complete in this area.

3.1.2. There were also higher results recorded at Scotstoun on the 3rd, 12th and 14th July, although none of these resulted in an exceedance of the action level.

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 January 2012. The comparison between the light scatter and TEOM results demonstrates that both sets



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of results generally follow the same pattern throughout the month, with the exception of the results recorded at Scotstoun noted in 3.1.1 and 3.1.2 where PM_{10} levels were higher than the TEOM levels.

3.2. Total Suspended Particles

3.2.1. The TSP results for July 2017 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during July were found to be generally low and all within the threshold level. All locations across the site were found to follow a similar pattern to that observed for PM_{10} levels, as described in 3.1.1 and 3.1.2.

3.3. Frisbee Dust Deposition Results

3.3.1. The Frisbee dust deposition results for July 2017 have been presented in a chart and can be found in Appendix C. Two collections were made in July; these occurred on the 5th and 26th July 2017. Please note that due to an error with the courier collecting the samples there was a three week period between collections rather than a two week period.

3.3.2. The site action level for the dust deposition rate has been set at 250 $mg/m^2/day$. 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 $mg/m^2/day$. 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 July there were exceedances of the site review level at Scotstoun Park for both monitoring periods. With regards to these exceedances, the temporary Frisbee at Scotstoun Arups, which is located closer to the FCBC works area, indicates a significantly lower result than for the permanent Frisbee during this period. In addition, there were no project related activities being undertaken in this area during July which would give rise to dust. This suggests that the higher



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results obtained at the permanent monitoring location are not due to FCBC activities.

3.4. Daily Dust Log and Environmental Inspections

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



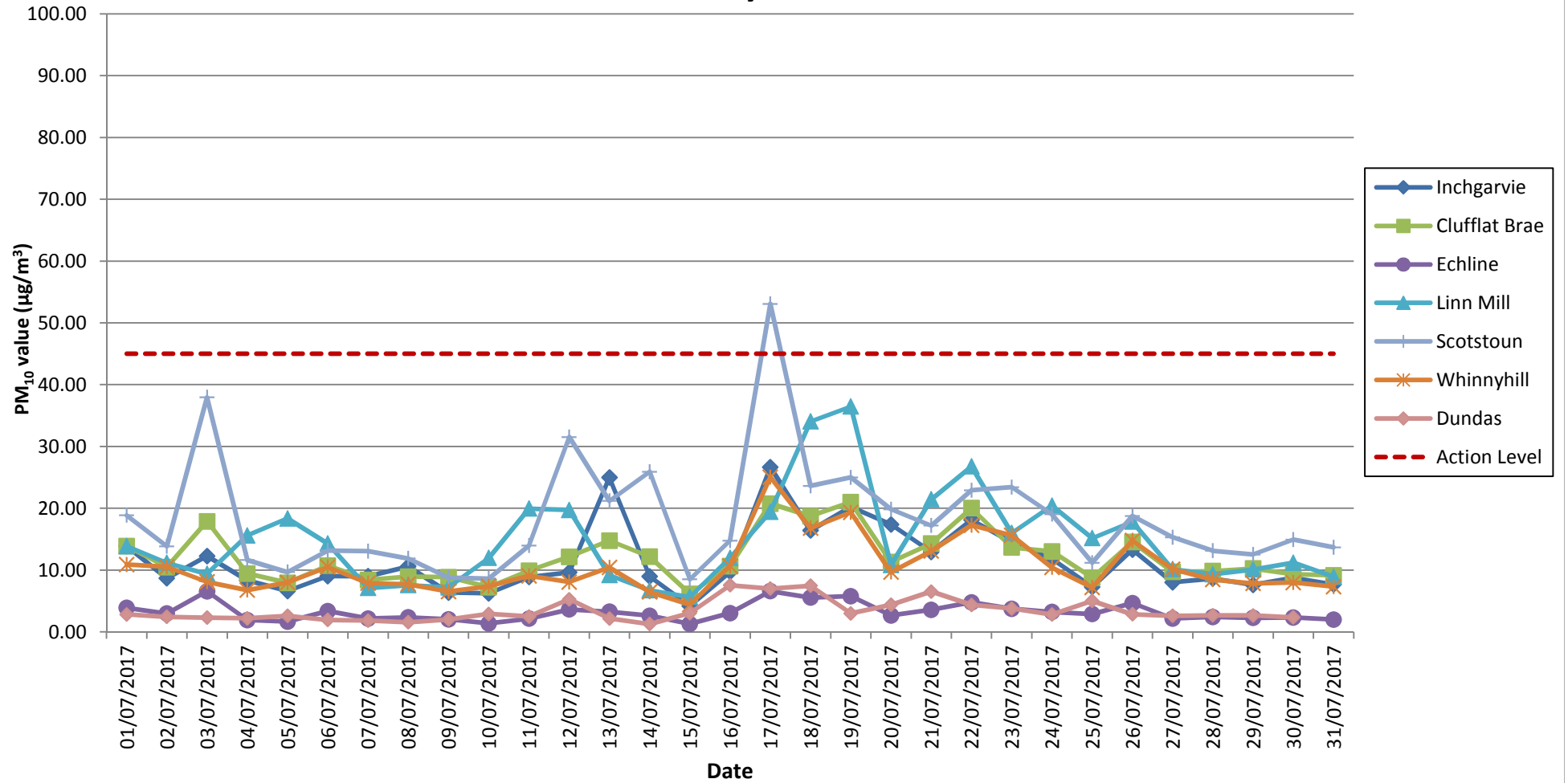
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APPENDIX A: LIGHT SCATTER METER RESULTS

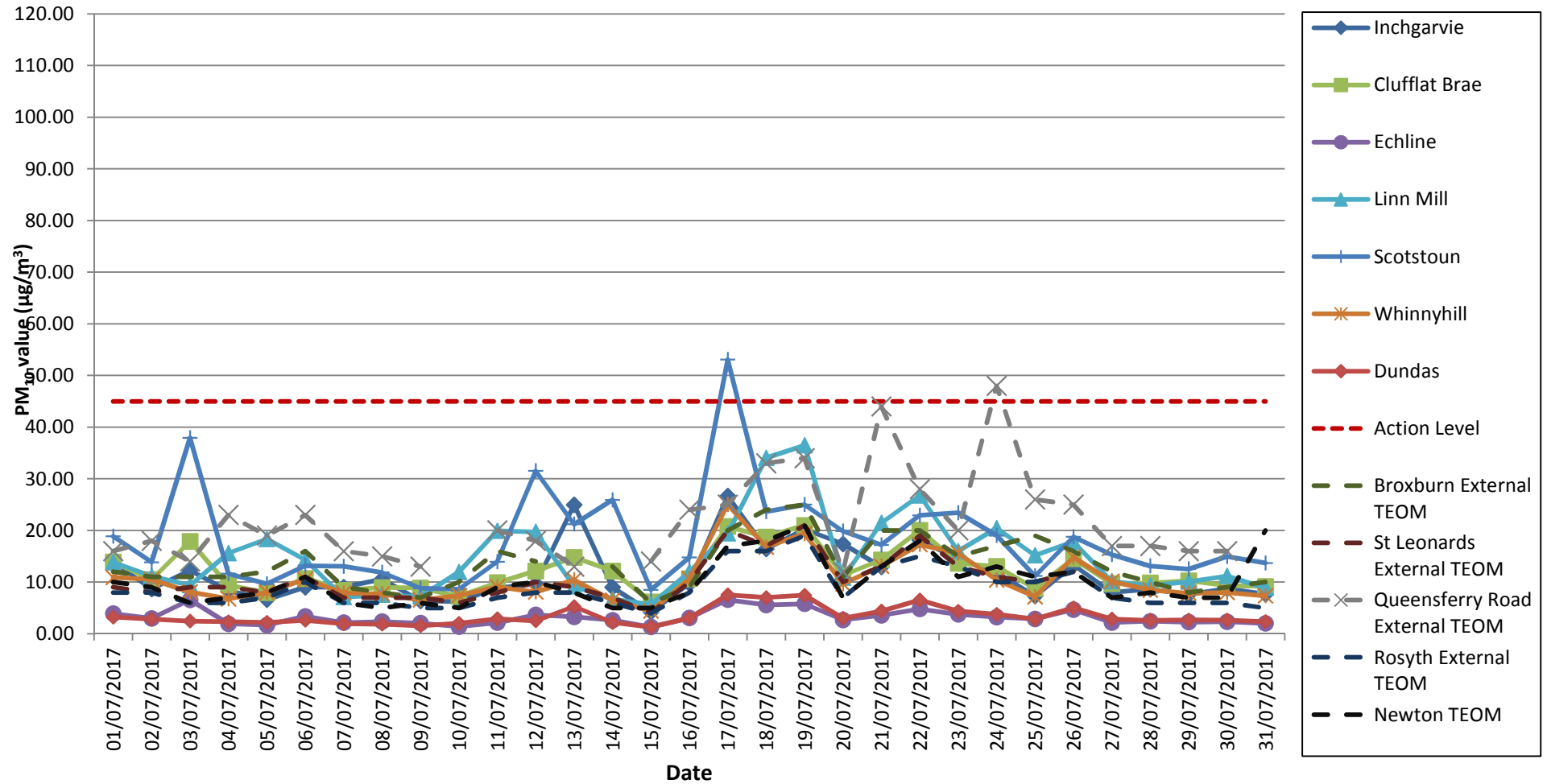
Air Quality Monitoring

Particulate Matter (PM10) Results for all Monitoring Locations

July 2017



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

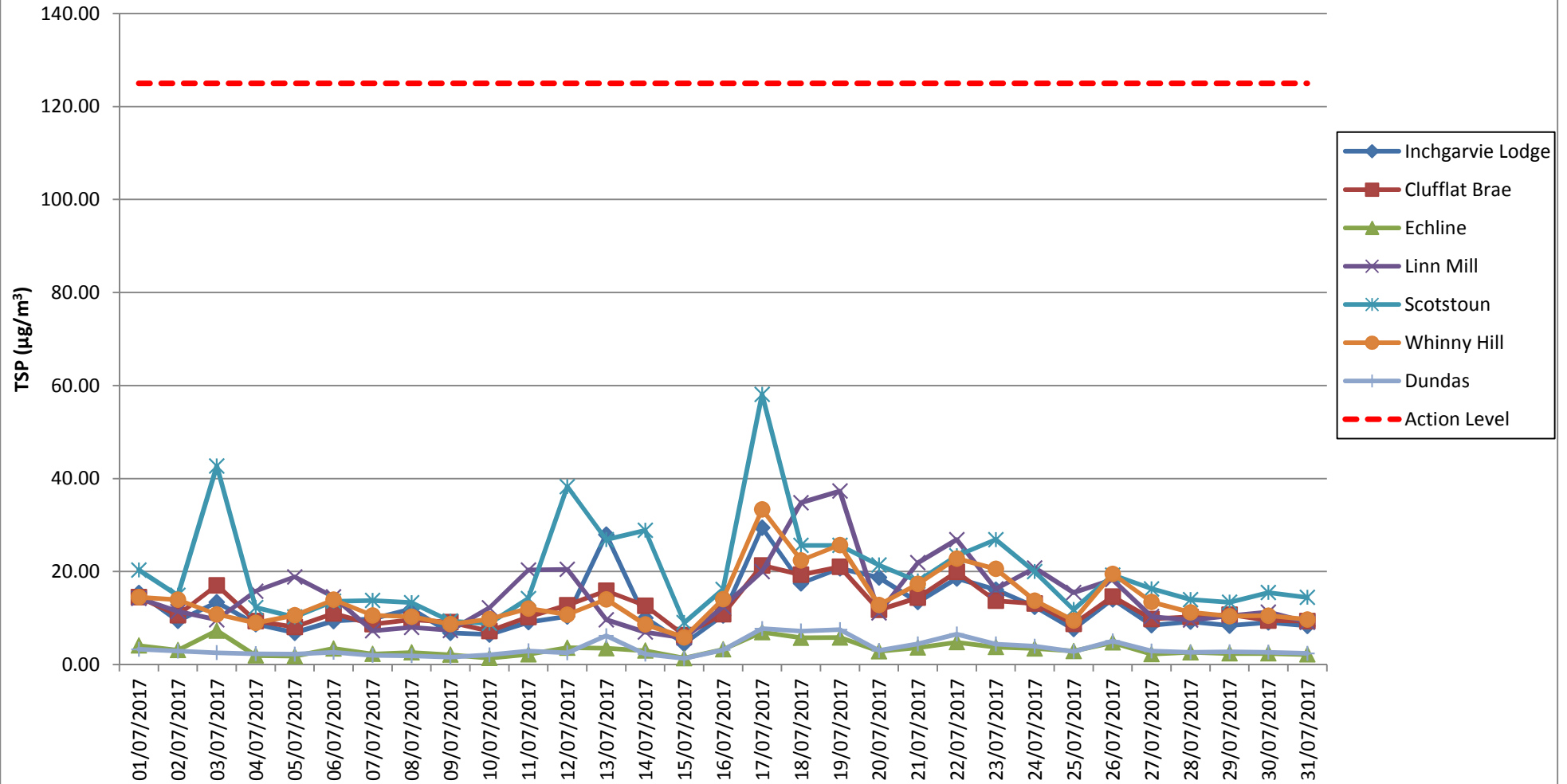




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APPENDIX B: TOTAL SUSPENDED PARTICLES

Total Suspended Particles (TSP) Results July 2017

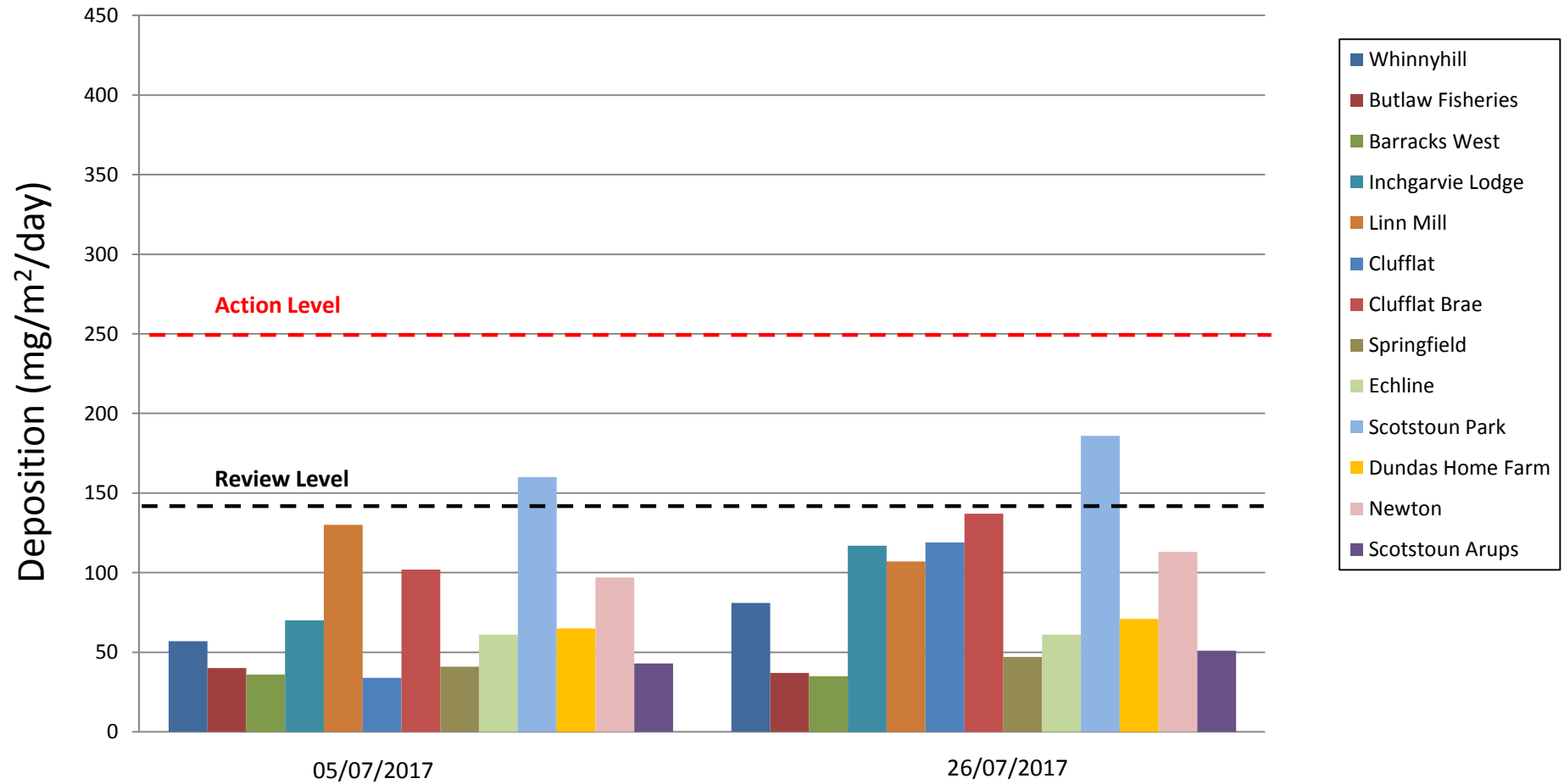




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APPENDIX C: FRISBEE GAUGE RESULTS

Frisbee Dust Deposition Results: July 2017





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APPENDIX D: DAILY DUST LOG

Daily Dust Log - North - June 2017

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/07/2017								
02/07/2017								
03/07/2017	N	LIGHT	SE	DAMP	N			
04/07/2017	N	LIGHT	S	DRY	N			
05/07/2017	N	LIGHT	SW	DRY	N			
06/07/2017	N	LIGHT	S	DRY	N			
07/07/2017	N	LIGHT	SE	DRY	N			
08/07/2017								
09/07/2017								
10/07/2017	N	LIGHT	SW	WET	N			
11/07/2017	N	LIGHT	SW	DAMP	N			
12/07/2017	N	LIGHT	S	DRY	N			
13/07/2017	N	LIGHT	W	DRY	N			
14/07/2017	N	LIGHT	S	DRY	N			
15/07/2017								
16/07/2017								
17/07/2017	N	LIGHT	S	DRY	N			
18/07/2017	N	LIGHT	S	DAMP	N			
19/07/2017	N	LIGHT	SW	DRY	N			
20/07/2017	N	LIGHT	SE	DAMP	N			
21/07/2017	N	LIGHT	W	DAMP	N			
22/07/2017								
23/07/2017								
24/07/2017	N	LIGHT	W	DRY	N			
25/07/2017	N	LIGHT	SW	DAMP	N			
26/07/2017	N	LIGHT	S	WET	N			
27/07/2017	N	LIGHT	SE	DAMP	N			
28/07/2017	N	LIGHT	E	DRY	N			
29/07/2017								
30/07/2017								
31/07/2017	N	LIGHT	SE	DRY	N			

Daily Dust Log - South - June 2017

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/07/2017								
02/07/2017								
03/07/2017	S	LIGHT	SE	DAMP	N			
04/07/2017	S	LIGHT	S	DRY	N			
05/07/2017	S	LIGHT	SW	DRY	N			
06/07/2017	S	LIGHT	S	DRY	N			
07/07/2017	S	LIGHT	SE	DRY	N			
08/07/2017								
09/07/2017								
10/07/2017	S	LIGHT	SW	WET	N			
11/07/2017	S	LIGHT	SW	DAMP	N			
12/07/2017	S	LIGHT	S	DRY	N			
13/07/2017	S	LIGHT	SE	DRY	N			
14/07/2017	S	LIGHT	S	DRY	N			
15/07/2017								
16/07/2017								
17/07/2017	S	LIGHT	SE	DRY	N			
18/07/2017	S	LIGHT	SW	DAMP	N			
19/07/2017	S	LIGHT	W	DRY	N			
20/07/2017	S	LIGHT	SE	DAMP	N			
21/07/2017	S	LIGHT	W	DAMP	N			
22/07/2017								
23/07/2017								
24/07/2017	S	LIGHT	SW	DRY	N			
25/07/2017	S	LIGHT	SW	DAMP	N			
26/07/2017	S	LIGHT	S	WET	N			
27/07/2017	S	LIGHT	E	DAMP	N			
28/07/2017	S	LIGHT	E	DRY	N			
29/07/2017								
30/07/2017								
31/07/2017	S	LIGHT	E	DRY	N			