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Project **FORTH REPLACEMENT CROSSING**

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**AIR QUALITY MONITORING REPORT
SEPTEMBER 2016**

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Distribution

Name	Email Address	Copy Sent (Y/N)
Michael Martin	Michael.martin@fbcjv.co.uk	



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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 September 2016.

- 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 September
M1	Whinny Hill	Frisbee	21/03/12	<ul style="list-style-type: none"> • Earthworks/Fill Placement • Hope Street roadworks • Bridge works at Ferrytoll • Main carriageway roadworks • Rock crushing
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	<ul style="list-style-type: none"> • AVS rebar and concrete works on deck • Pier S2 works • South Tower rebar, formwork, concreting works, deck segment lifts, deck table installation works
M8	Barracks West	Frisbee	31/08/11	<ul style="list-style-type: none"> • AVS rebar and concrete works on deck • Pier S2 works • South Tower rebar, formwork, concreting works, deck segment lifts, deck table installation works
M10	Inchgarvie Lodge	Frisbee	22/08/11	<ul style="list-style-type: none"> • Main carriageway earthworks • SUDS detention basin works • AVS rebar and concrete works on deck • Pier S2 works • South Tower rebar, formwork, concreting works, deck segment lifts, deck table installation works
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	<ul style="list-style-type: none"> • Main carriageway earthworks • SUDS detention basin works • AVS rebar and concrete works on deck • Pier S2 works
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	<ul style="list-style-type: none"> • AVS rebar and concrete works on deck • SUDS detention basin works • Main carriageway works
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"> • AVS rebar and concrete works on deck • Main carriageway works



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M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> AVS rebar and concrete works on deck Main carriageway works
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	<ul style="list-style-type: none"> Main carriageway works North-bound bus link B800 road works
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	<ul style="list-style-type: none"> Main carriageway works North-bound bus link B800 road 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 meter results for September 2016 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 September with the exception of Linn Mill on the 20th September. All monitors generally follow the same pattern throughout the month, with the exception of the exceedance noted above, in addition to Inchgarvie on 5th and 12th September, Scotstoun on the 6th and 16th September and Linn Mill on the 12th and 21st September (although below the threshold level on these dates). With the exceedance on the 20th September at Linn Mill, the light scatter meter registered 15 minute exceedances for PM₁₀. The FCBC Environmental Coordinator investigated the area and confirmed that conditions were not dusty and that sufficient mitigation was in place. There were no works being undertaken at the SUDS pond adjacent to the monitor on this day. The highest PM₁₀ levels occurred during the day and may have been caused by traffic on the access road. However, the results also indicate high levels of PM₁₀ during the



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evening, including between 10pm and 11pm, which would suggest elevated levels which are not due to any construction activities. FCBC will continue to regularly dampen the access road during dry conditions to minimise dust generation.

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 January 2012. The comparison between the light scatter and TEOM results demonstrates that both sets of results generally follow the same pattern with the exception of Inchgarvie on 12th September, Scotstoun on the 6th and 16th September and Linn Mill on the 12th and 20th September.

3.2. Total Suspended Particles

3.2.1. The TSP results for September 2016 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during September were all within the threshold. The TSP pattern at locations across the site was similar to that observed for PM₁₀ levels. As with PM₁₀ it is considered that the TSP levels across site were generally influenced by regional changes in TSP levels, with the exception of results corresponding with the higher peaks noted in 3.1.1 and 3.1.2 above.

3.3. Frisbee Dust Deposition Results

3.3.1. The Frisbee dust deposition results for September 2016 have been presented in a chart and can be found in Appendix C. Two collections were made in September; these occurred on the 14th and 28th September 2016.



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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 September there were no exceedances of either the site review or action levels.

3.4. Daily Dust Log and Environmental Inspections

3.4.1. A summary of the daily dust log for September 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 was an exceedance registered on the 20th September at Linn Mill. This was investigated by the environmental team.



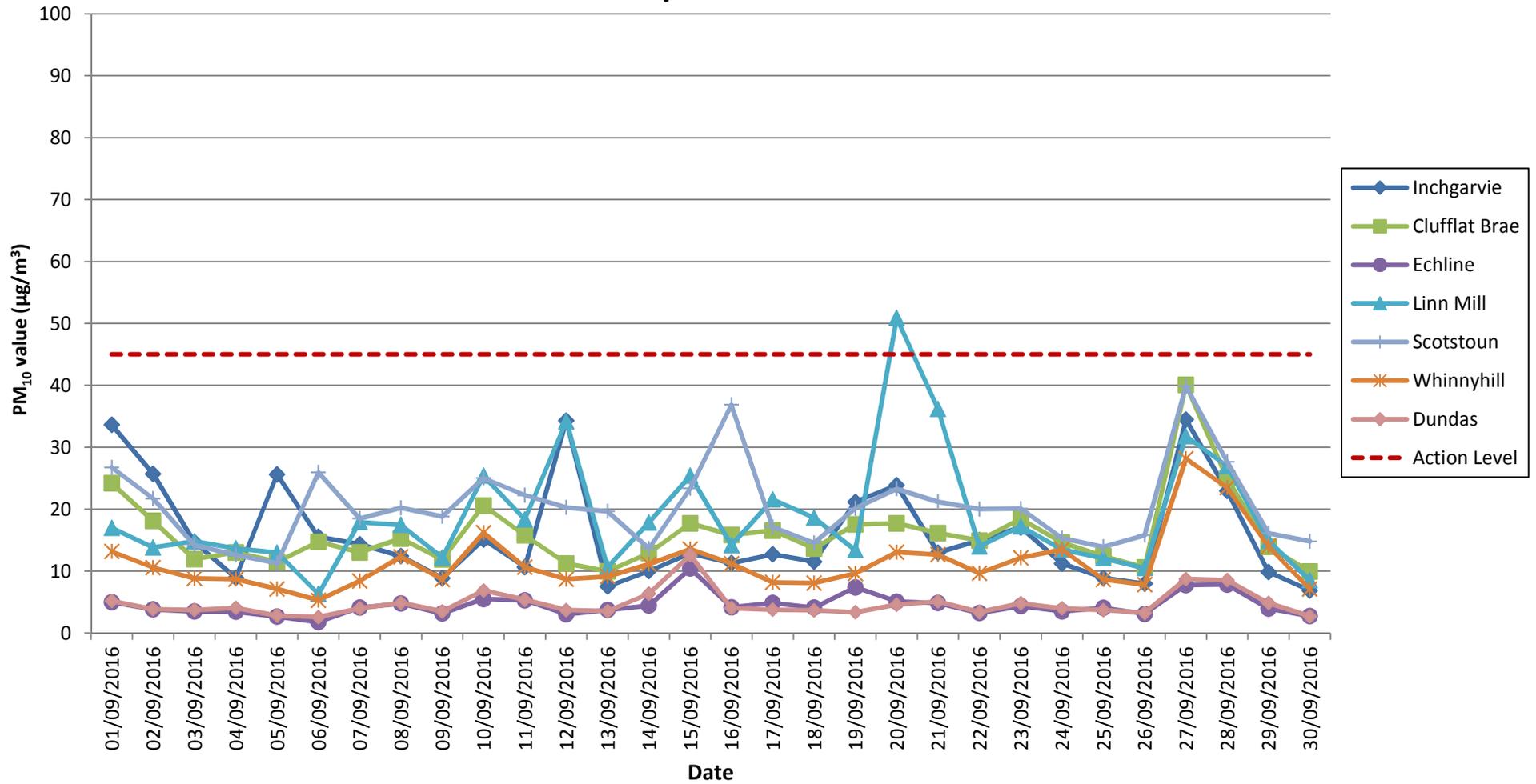
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APPENDIX A: LIGHT SCATTER METER RESULTS

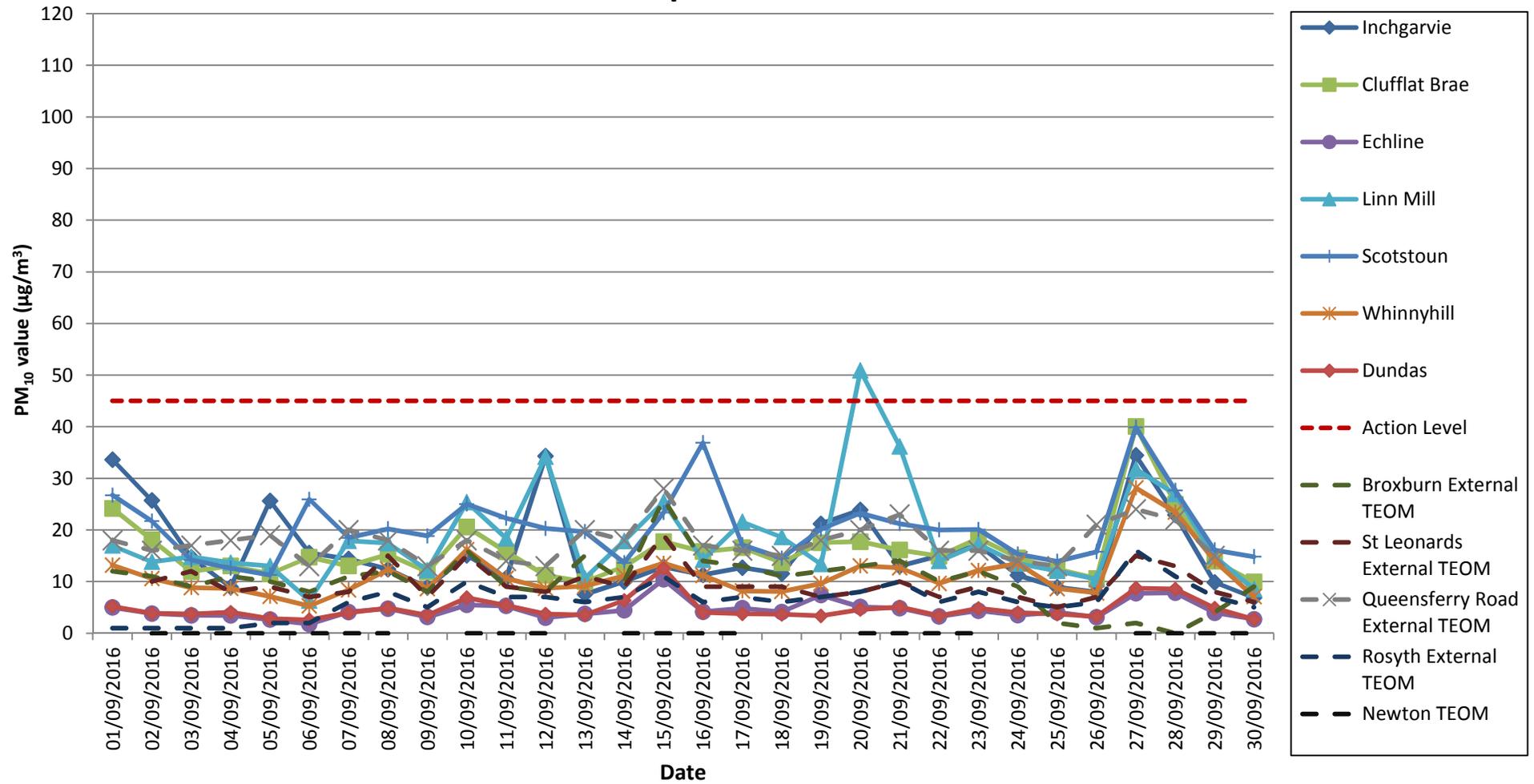
Air Quality Monitoring

Particulate Matter (PM10) Results for all Monitoring Locations

September 2016



Air Quality Monitoring: Particulate Matter (PM10) Results for all Monitoring Locations, including TEOM data September 2016

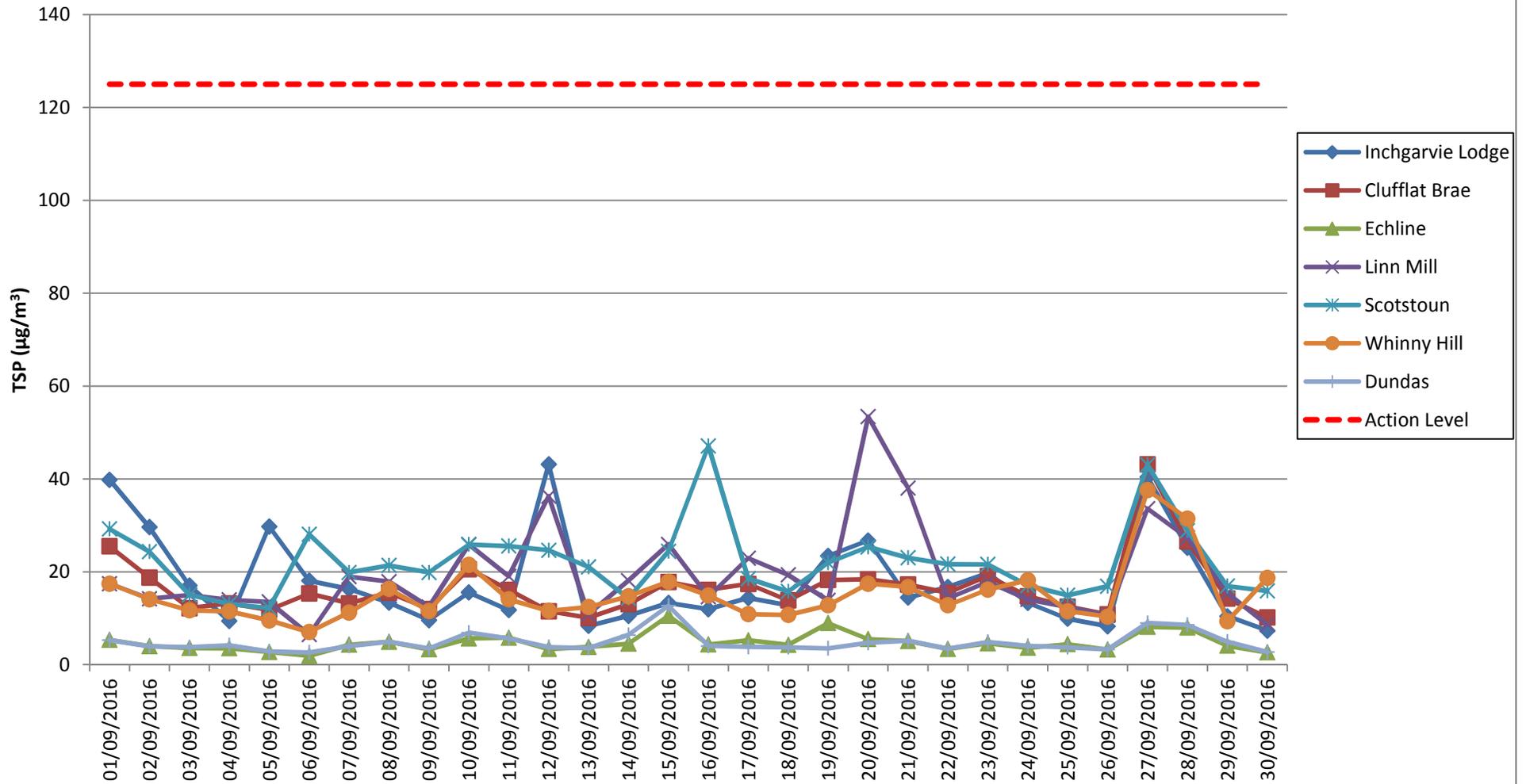




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APPENDIX B: TOTAL SUSPENDED PARTICLES

Total Suspended Particles (TSP) Results September 2016

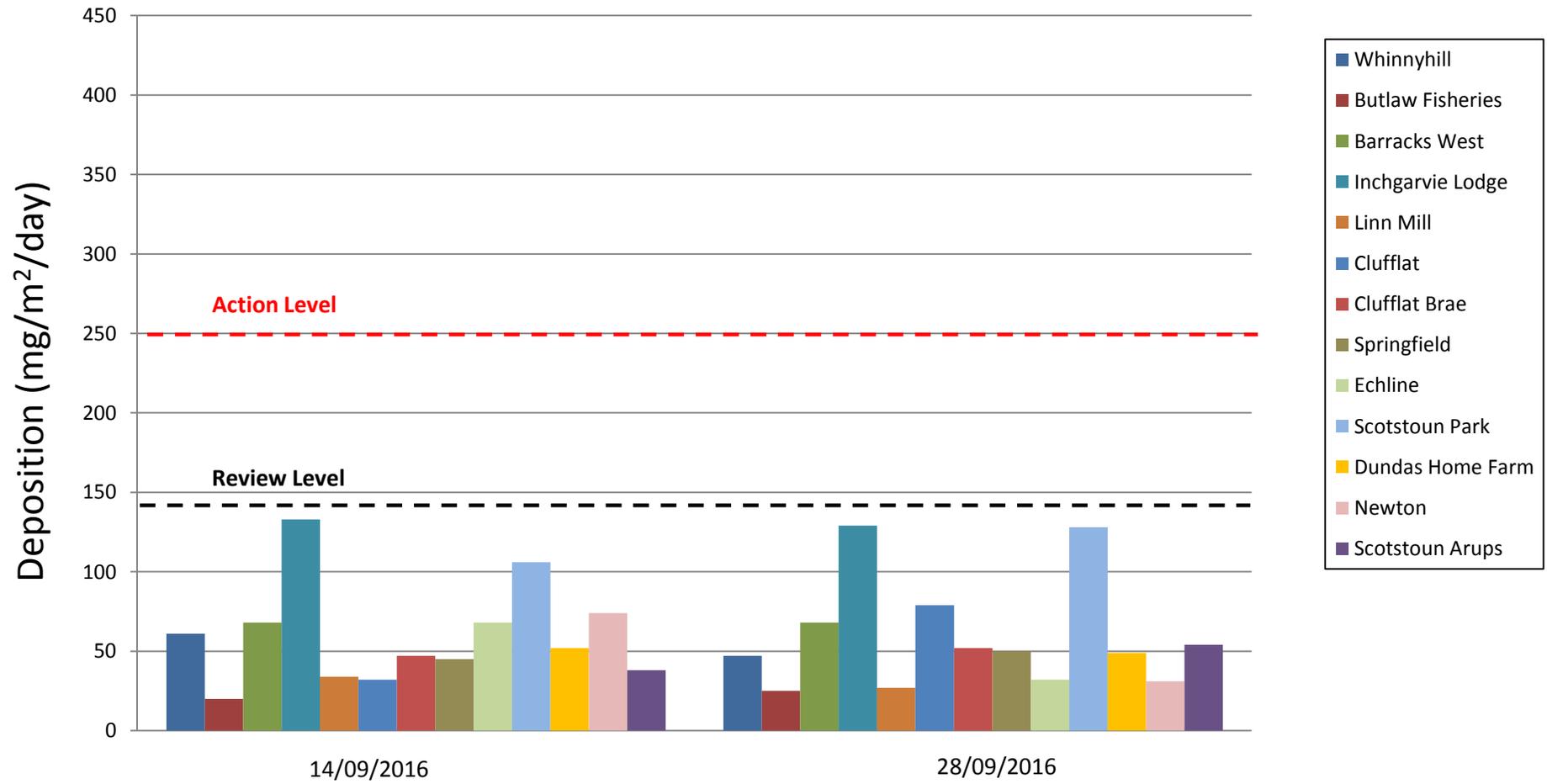




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APPENDIX C: FRISBEE GAUGE RESULTS

Frisbee Dust Deposition Results: September 2016





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APPENDIX D: DAILY DUST LOG

Daily Dust Log - North - September 2016

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/09/2016	N	LIGHT	SW	DRY	N			
02/09/2016	N	LIGHT	SW	DAMP	N			
03/09/2016	N							
04/09/2016	N							
05/09/2016	N	LIGHT	S	DAMP	N			
06/09/2016	N	LIGHT	SE	DRY	N			
07/09/2016	N	LIGHT	S	DAMP	N			
08/09/2016	N	LIGHT	SE	WET	N			
09/09/2016	N	LIGHT	E	DAMP	N			
10/09/2016	N							
11/09/2016	N							
12/09/2016	N	LIGHT	E	DRY	N			
13/09/2016	N	LIGHT	SW	DAMP	N			
14/09/2016	N	LIGHT	NW	DAMP	N			Foggy
15/09/2016	N	LIGHT	SW	DRY	N			Foggy
16/09/2016	N	LIGHT	S	DAMP	N			
17/09/2016	N							
18/09/2016	N							
19/09/2016	N	LIGHT	SE	DRY	N			
20/09/2016	N	LIGHT	E	DRY	N			
21/09/2016	N	LIGHT	E	DRY	N			
22/09/2016	N	LIGHT	SE	DRY	N			
23/09/2016	N	LIGHT	E	DAMP	N			
24/09/2016	N							
25/09/2016	N							
26/09/2016	N	LIGHT	E	WET	N			
27/09/2016	N	LIGHT	S	DAMP	N			
28/09/2016	N	LIGHT	SE	WET	N			
29/09/2016	N	LIGHT	SW	DAMP	N			
30/09/2016	N	LIGHT	S	DRY	N			

Daily Dust Log - South - September 2016

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/09/2016	S	LIGHT	E	DRY	N			
02/09/2016	S	LIGHT	SE	DAMP	N			
03/09/2016	S							
04/09/2016	S							
05/09/2016	S	LIGHT	S	DAMP	N			
06/09/2016	S	LIGHT	SE	DRY	N			
07/09/2016	S	LIGHT	S	DAMP	N			
08/09/2016	S	LIGHT	SE	WET	N			
09/09/2016	S	LIGHT	E	DAMP	N			
10/09/2016	S							
11/09/2016	S							
12/09/2016	S	LIGHT	E	DRY	N			
13/09/2016	S	LIGHT	SW	DAMP	N			
14/09/2016	S	LIGHT	NW	DAMP	N			Foggy
15/09/2016	S	LIGHT	SW	DRY	N			Foggy
16/09/2016	S	LIGHT	S	DAMP	N			
17/09/2016	S							
18/09/2016	S							
19/09/2016	S	LIGHT	SE	DRY	N			
20/09/2016	S	LIGHT	E	DRY	N			15 Minute exceedances at Linn Mill , no dust visible on site inspections.
21/09/2016	S	LIGHT	E	DRY	N			
22/09/2016	S	LIGHT	SE	DRY	N			
23/09/2016	S	LIGHT	E	DAMP	N			
24/09/2016	S							
25/09/2016	S							
26/09/2016	S	LIGHT	E	WET	N			
27/09/2016	S	LIGHT	SE	DAMP	N			
28/09/2016	S	LIGHT	SE	WET	N			
29/09/2016	S	LIGHT	SE	DAMP	N			
30/09/2016	S	LIGHT	E	DRY	N			