



Contractor



Forth Crossing Bridge Constructors

HOCHTIEF Solutions
 American Bridge International
 DRAGADOS
 Morrison Construction

Project

FORTH REPLACEMENT CROSSING

Document title

**AIR QUALITY MONITORING REPORT
 JULY 2014**

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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 2014.

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 Pollution Management Plan (DAPMP) 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.



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	• Earthworks
		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 S4 • Concrete pouring at Pier S4 • Repair and removal of formwork platforms • Excavation at S 2&3
M8	Barracks West	Frisbee	31/08/11	<ul style="list-style-type: none"> • Marine works • Assembling and fixing rebar and formwork works at Pier S4 • Concrete pouring at Pier S4 • Repair and removal of formwork platforms • Excavation at S2&3
M9	Barracks East	Frisbee	31/08/11	
M10	Inchgarvie Lodge	Frisbee	22/08/11	<ul style="list-style-type: none"> • Launch – Element joints and welding • Assembling and fixing rebar and formwork works at Pier S4 • Concrete pouring at Pier S4 • Repair and removal of formwork platforms • Inchgarvie Lodge wall construction • Excavation at S2&3
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	<ul style="list-style-type: none"> • Launch – Element joints and welding • Launch Operations
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	<ul style="list-style-type: none"> • Launch – Element joints and welding • Launch Operations • Inchgarvie Lodge wall construction
M13	Clufflat Brae	Automatic light scatter meter	24/10/11	
M14	Springfield	Frisbee	15/08/11	<ul style="list-style-type: none"> • Launch – Element joints and welding • Launch Operations • Excavation and haulage from mainline north of A904
M15	Echline		16/08/11	• Launch – Element joints and

		Frisbee		welding
		Automatic light scatter meter	10/11/11	<ul style="list-style-type: none"> • Launch Operations • Earth works adjacent to A904 • Kerbing at gyratory • Scottish Gas diversion work and pipe laying • Excavation and haulage from mainline north of A904
M16	Scotstoun	Frisbee	07/09/11	<ul style="list-style-type: none"> • Sheet piling • Concrete pours and rebar work • Utility works
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	<ul style="list-style-type: none"> • Haulage of excavated materials from Echline
		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 July 2014 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 six exceptions spread over 2 days, the 2nd & 3rd July. The monitors at Inchgarvie, Clufflat, Scotstoun and Whinnyhill all had either one or two exceedances of the action level during these two days. All seven monitors follow the same general pattern throughout the month of July.

3.1.2. It was noted that foggy conditions occurred on the evening of the 2nd and 3rd and morning of the 4th July. Ground conditions during the 2nd and 3rd were dry and damp respectively. Although four monitors recorded exceedances, increases in recorded values over both of these days were observed at all seven monitors across site. For the exceedances of the action level, a review of the works in each of the areas, weather conditions, and the mitigation measures in place was undertaken. No construction activities were taking place in proximity to any of the monitors and damp ground conditions would

have suppressed dust being generated via vehicle movements. The fact that all seven monitors showed the same pattern would suggest that a regional event affected the levels across the whole area rather than the increases being related to works activities in one specific area affecting only a few monitors.

- 3.1.3.** An increase at the majority of monitors was also observed during the 17th-19th and 29th-30th July. Clufflat Brae (17th & 19th) and Whinnyhill (30th) registered levels just below the action threshold. However, it should be noted that there were no exceedances at this time, and a similar increase was observed across the majority of monitors, indicating a regional event rather than being construction related.
- 3.1.4.** The Whinnyhill monitor recorded a particularly large increase on the 30th July, although the action level was not exceeded. Dust was observed being generated off-site by earthwork and demolition activities near King Malcolm Drive on this date (not FCBC activities). An inspection confirmed that no dust generating construction activities were taking place on the project site on the north side of the estuary.
- 3.1.5.** 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 stations located at Queensferry Road, Edinburgh 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 but with the light scatter results registering at higher levels at some locations. This indicates that the results are largely driven by regional changes in air quality.

3.2. Total Suspended Particles

- 3.2.1.** The TSP results for July 2014 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 low and all within the threshold level. All locations were mostly found to follow a similar pattern across the site, 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 July 2014 have been presented in a chart and can be found in Appendix C. 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 July, on the 9th and 23th. The next collection will take place on the 6th August 2014.

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 July there were no exceedances of the site review level. Frisbee results from monitoring locations across site were generally low.

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. During this period no instances of dust relating to FCBC works were noted on site.

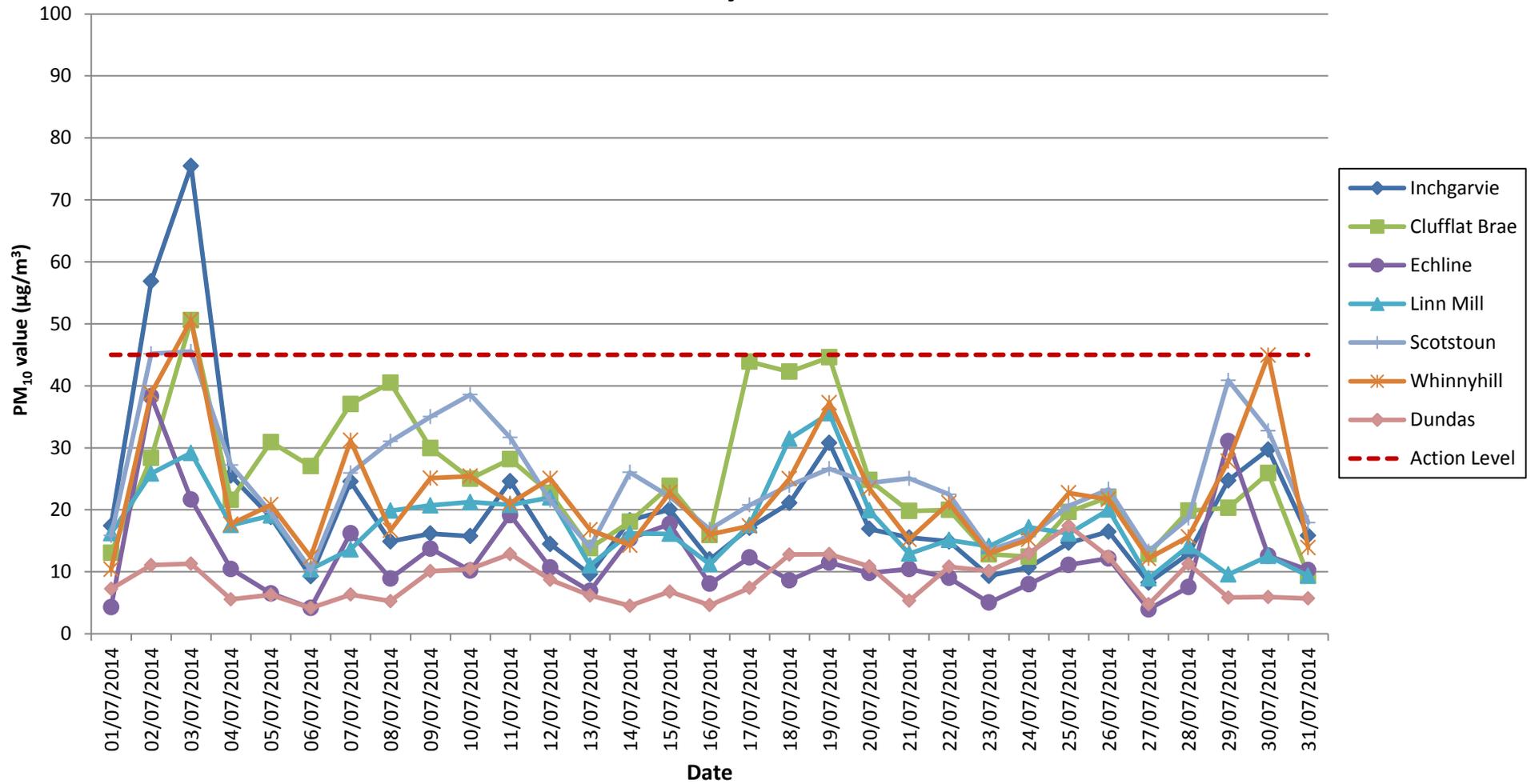
3.4.2. During this period full environmental inspections were also undertaken across the site and covered areas where works were being undertaken. In July, no instances of dust were noted during inspections.

APPENDIX A: LIGHT SCATTER METER RESULTS

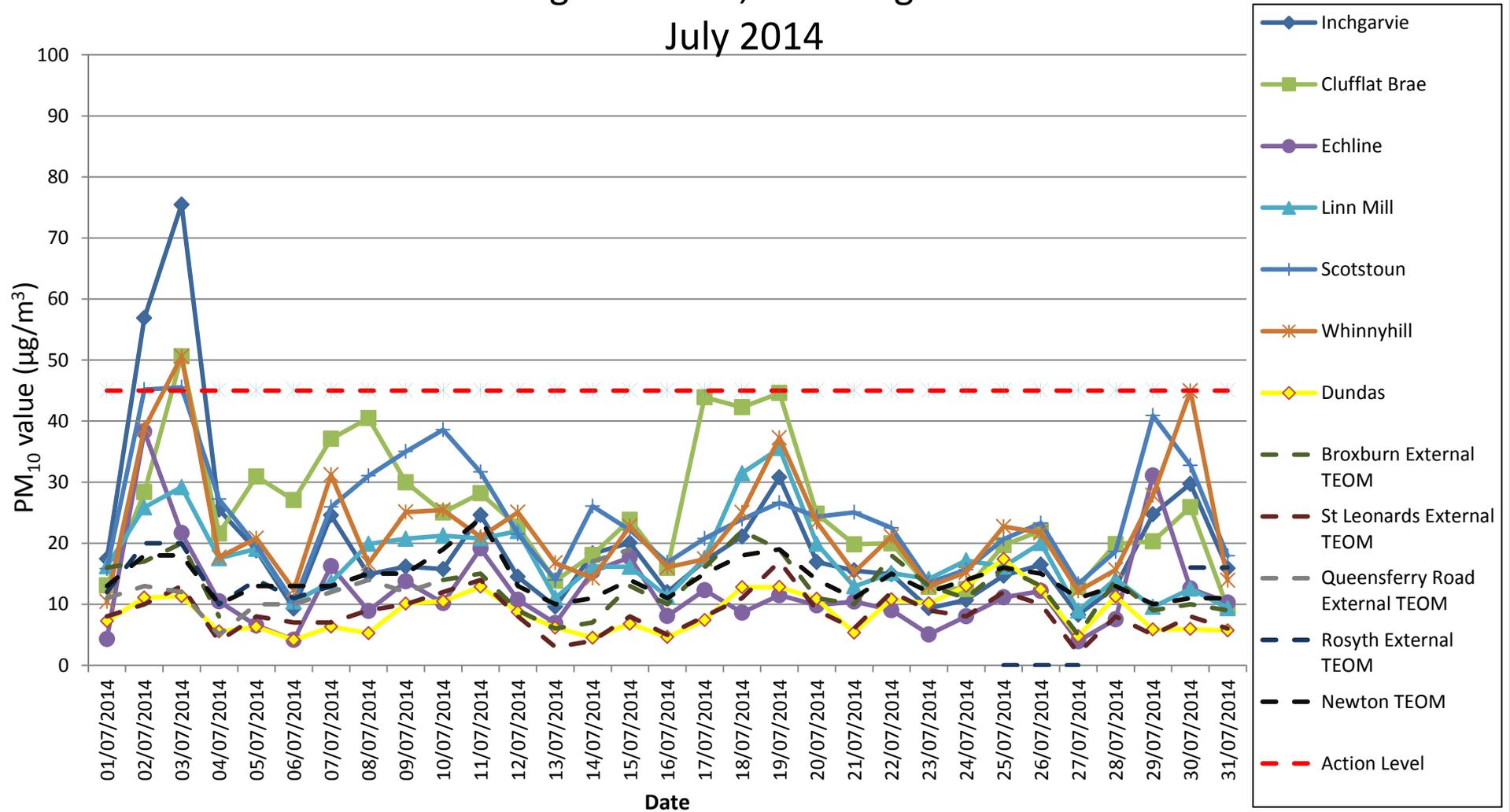
Air Quality Monitoring

Particulate Matter (PM10) Results for all Monitoring Locations

July 2014

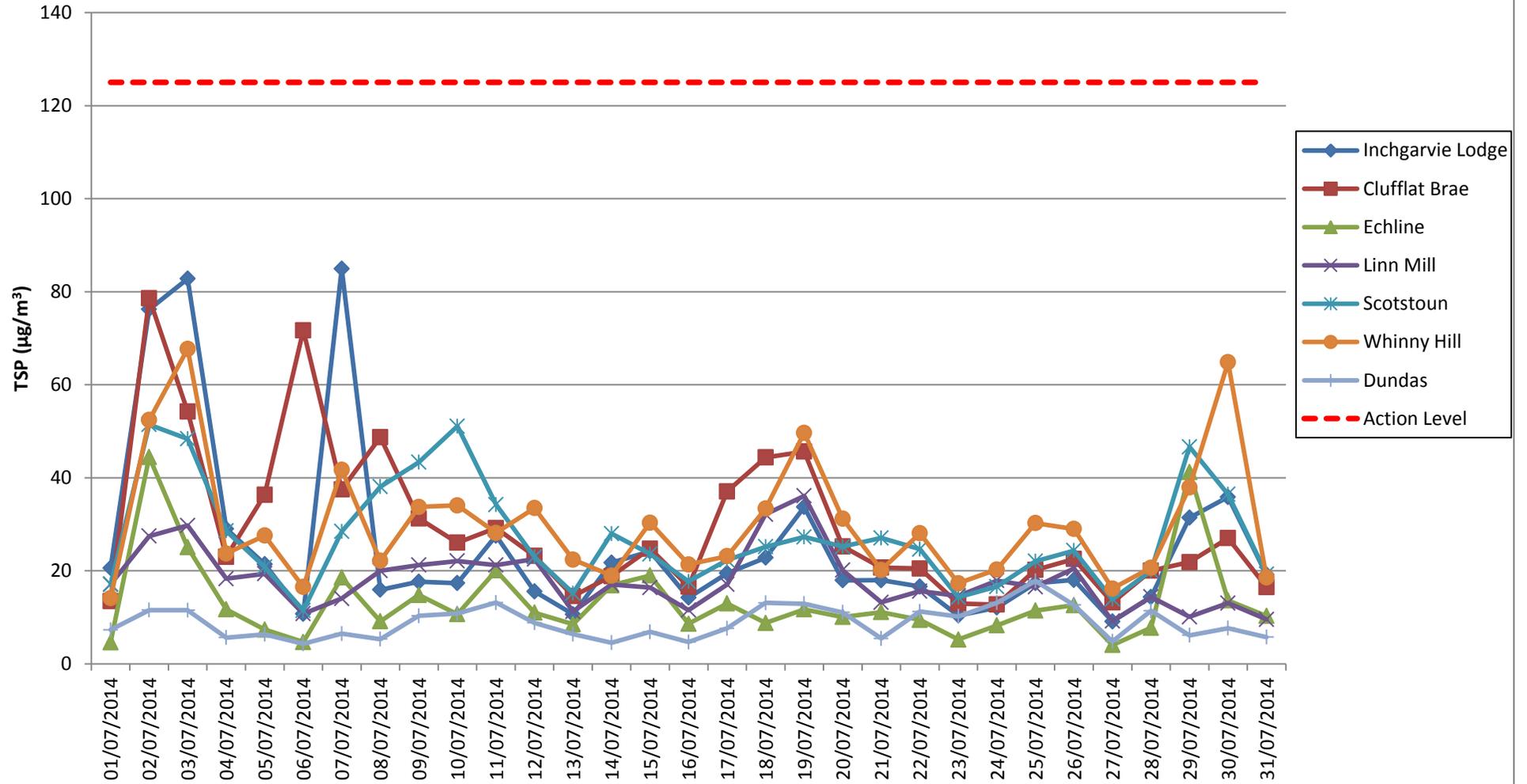


Air Quality Monitoring: Particulate Matter (PM10) Results for all Monitoring Locations, including TEOM data July 2014



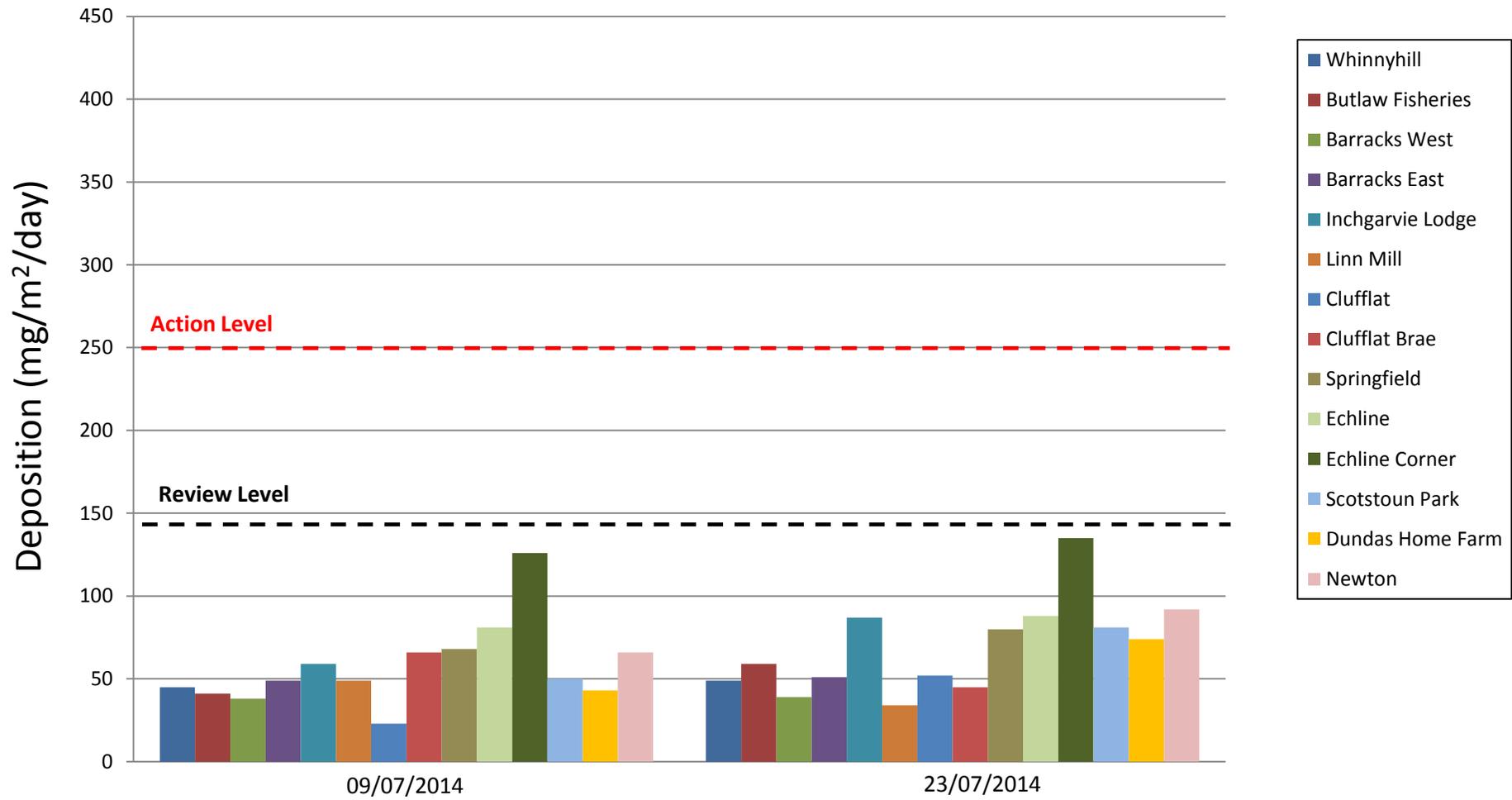
APPENDIX B: TOTAL SUSPENDED PARTICLES

Total Suspended Particles (TSP) Results July 2014



APPENDIX C: FRISBEE GAUGE RESULTS

Frisbee Dust Deposition Results: July 2014



APPENDIX D: DAILY DUST LOG

Daily Dust Log - North - July 2014

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	DUST DUE TO WORKS	DUST DUE TO WORKS	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/07/2014	N	LIGHT	N	Dry	N			
02/07/2014	N	LIGHT	SW	Dry	N			Fog (PM)
03/07/2014	N	LIGHT	S	Damp	N			Fog
04/07/2014	N	LIGHT	S	Damp	N			Fog (AM)
05/07/2014	N	LIGHT	S		N			
06/07/2014	N	LIGHT	ENE		N			
07/07/2014	N	LIGHT	SSW	Dry	N			
08/07/2014	N	LIGHT	ENE	Damp	N			
09/07/2014	N	LIGHT	WSW	Dry	N			
10/07/2014	N	LIGHT	NE	Dry	N			
11/07/2014	N	LIGHT	WSW	Dry	N			
12/07/2014	N	LIGHT	NE		N			
13/07/2014	N	MEDIUM	WSW		N			
14/07/2014	N	LIGHT	SW	Wet	N			
15/07/2014	N	MEDIUM	SW	Damp	N			
16/07/2014	N	LIGHT	SW	Wet	N			
17/07/2014	N	LIGHT	WSW	Damp	N			
18/07/2014	N	MEDIUM	NE	Dry	N			
19/07/2014	N	LIGHT	NNE		N			
20/07/2014	N	LIGHT	WSW		N			
21/07/2014	N	LIGHT	WSW	Dry	N			
22/07/2014	N	LIGHT	NNE	Dry	N			
23/07/2014	N	LIGHT	NE	Dry	N			
24/07/2014	N	LIGHT	NE	Dry	N			
25/07/2014	N	LIGHT	NNE	Dry	N			
26/07/2014	N	LIGHT	ENE		N			
27/07/2014	N	LIGHT	WSW		N			
28/07/2014	N	LIGHT	SW	Dry	N			
29/07/2014	N	LIGHT	WSW	Dry	N			
30/07/2014	N	LIGHT	WSW	Dry	Y	N		Dust being generated off-site by earthwork and demolition activities on King Malcolm Drive (not FCBC works).
31/07/2014	N	LIGHT	WSW	Dry	Y	N		Dust being generated off-site by earthwork and demolition activities on King Malcolm Drive (not FCBC works).

Daily Dust Log - South - July 2014

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/07/2014	N	LIGHT	N	Dry	N			
02/07/2014	N	LIGHT	SW	Dry	N			Fog (PM)
03/07/2014	N	LIGHT	S	Damp	N			Fog
04/07/2014	N	LIGHT	S	Damp	N			Fog (AM)
05/07/2014	N	LIGHT	S		N			
06/07/2014	N	LIGHT	ENE		N			
07/07/2014	N	LIGHT	SSW	Dry	N			
08/07/2014	N	LIGHT	ENE	Damp	N			
09/07/2014	N	LIGHT	WSW	Dry	N			
10/07/2014	N	LIGHT	NE	Dry	N			
11/07/2014	N	LIGHT	WSW	Dry	N			
12/07/2014	N	LIGHT	NE		N			
13/07/2014	N	MEDIUM	WSW		N			
14/07/2014	N	LIGHT	SW	Wet	N			
15/07/2014	N	MEDIUM	SW	Damp	N			
16/07/2014	N	LIGHT	SW	Wet	N			
17/07/2014	N	LIGHT	WSW	Damp	N			
18/07/2014	N	MEDIUM	NE	Dry	N			
19/07/2014	N	LIGHT	NNE		N			
20/07/2014	N	LIGHT	WSW		N			
21/07/2014	N	LIGHT	WSW	Dry	N			
22/07/2014	N	LIGHT	NNE	Dry	N			
23/07/2014	N	LIGHT	NE	Dry	N			
24/07/2014	N	LIGHT	NE	Dry	N			
25/07/2014	N	LIGHT	NNE	Dry	N			
26/07/2014	N	LIGHT	ENE		N			
27/07/2014	N	LIGHT	WSW		N			
28/07/2014	N	LIGHT	SW	Dry	N			
29/07/2014	N	LIGHT	WSW	Dry	N			
30/07/2014	N	LIGHT	WSW	Dry	N			
31/07/2014	N	LIGHT	WSW	Dry	N			