




Contractor



Forth Crossing Bridge Constructors

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Project **FORTH REPLACEMENT CROSSING**

Document title

**AIR QUALITY MONITORING REPORT
JUNE 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 June 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. Fourteen 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. The installation of the air quality monitoring equipment was not simultaneous across the site, installation dates are also given in Table 1.

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 June
M1	Whinny Hill	Frisbee	21/03/12	<ul style="list-style-type: none"> Excavation for working platform 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 S5 Concrete pouring at Pier S5 Repair and removal of formwork platforms
M8	Barracks West	Frisbee	31/08/11	<ul style="list-style-type: none"> Marine works Assembling and fixing rebar and formwork works at Pier S5 Concrete pouring at Pier S5 Repair and removal of formwork platforms
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 S5 Concrete pouring at Pier S5 Repair and removal of formwork platforms Inchgarvie Lodge wall construction
		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	Frisbee	21/09/11	
		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	Frisbee	16/08/11	<ul style="list-style-type: none"> Launch – Element joints and welding

		Automatic light scatter meter	10/11/11	<ul style="list-style-type: none"> • Launch Operations • Install lighting columns and duct crossings • Gyrotory: Concrete finishing & waterproofing • 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 at south pier and abutment • Utility works
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	<ul style="list-style-type: none"> • Noise barrier construction • 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 June 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 June and generally followed the same pattern across the site.

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 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 at similar levels, indicating that the pattern observed throughout June was largely driven by regional changes in air quality.

3.2. Total Suspended Particles

3.2.1. The TSP results for June 2014 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during June 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 June 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 June, on the 11th and 25th. The next collection will take place on the 9th July 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 June there were two exceedances of the site review level (see Table 2) and one exceedance of the action level. With the exception of the locations where exceedances occurred, Frisbee results from monitoring locations across site were generally low.

Table 2: Exceedances of the dust deposition thresholds

Fortnight ending	Threshold Exceeded	Monitoring Location	Considerations	Weather conditions during period
11/06/2014	Action	Echline Corner	Dust generating activities in area being mitigated. Monitor located within construction site adjacent to activities and A904.	Low winds/ Generally dry
25/06/2014	Review	Echline Corner	Dust generating activities in area being mitigated. Monitor located within construction site adjacent to activities and A904.	Low winds/ Generally dry
		Springfield	No dust generating construction activities in close proximity. Dust generating activities near A904 being mitigated.	

3.3.4. For each of the exceedances of the review or action 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 results were also considered alongside the particulate matter data for the same period.

3.3.5. With regard to the exceedance of the review level at Springfield for the fortnight concluding 25th June, a further review into works undertaken in the vicinity took place. However, during the period in question no construction activities that would be likely to give rise to dust took place in close proximity to

the area. The excavations being undertaken to the north of the A904 are located 500 m to the south-west. Three other monitoring locations are situated within 250m of the Springfield Frisbee (Clufflat, Clufflat Brae and Inchgarvie Lodge), all of which showed low levels for all indicators (TSP, PM₁₀ and dust deposition) during this period. These factors would indicate that the exceedance at this location was not related to FCBC works.

- 3.3.6.** During the periods ending 11th and 25th June the Echline Corner Frisbee registered levels above the action and review levels respectively. This is an additional temporary Frisbee that was put in place after the dust incident during April. It has been positioned within the construction site and provides information regarding dust levels generated on-site. After being cleaned during the collection on the 11th June, this Frisbee became covered in a fine oily deposition which was noted at the next collection on the 25th June. This deposition did not appear related to construction activity in the vicinity. It was considered more likely that this deposition was due to the close proximity to the A904. It should be noted that the Frisbee at Echline (located 80m to the north), see (figure 3) registered low levels throughout June. Due to these findings and a change in road layout for the A904 at the start of July, the Echline Corner Frisbee was relocated to the other side of the works in that area on 25th June. Although the monitor remains in close proximity to the works it is no longer directly adjacent to the A904. FCBC will continue to conduct increased inspections in the vicinity to ensure any dust generating construction activities are adequately mitigated.

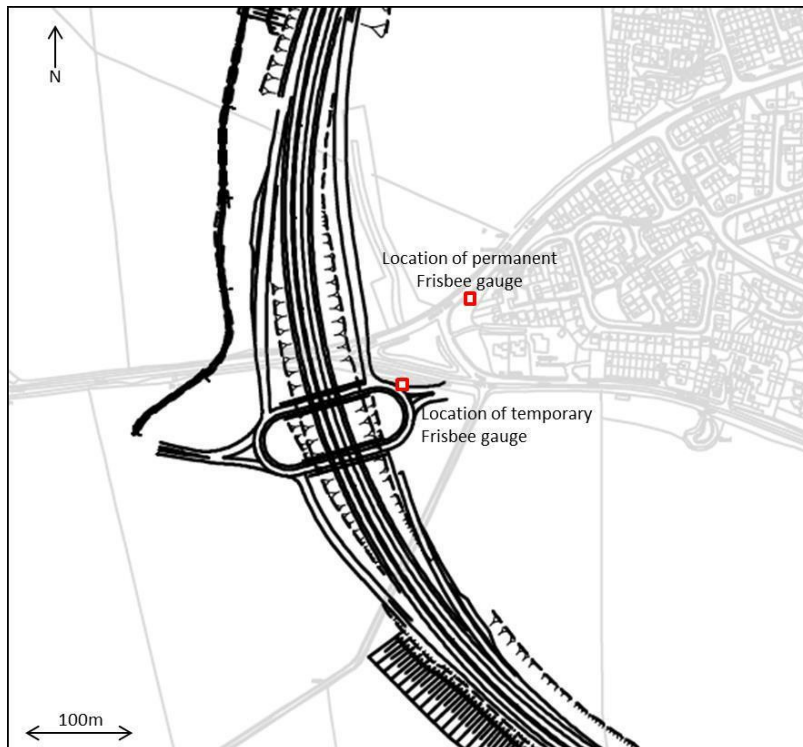


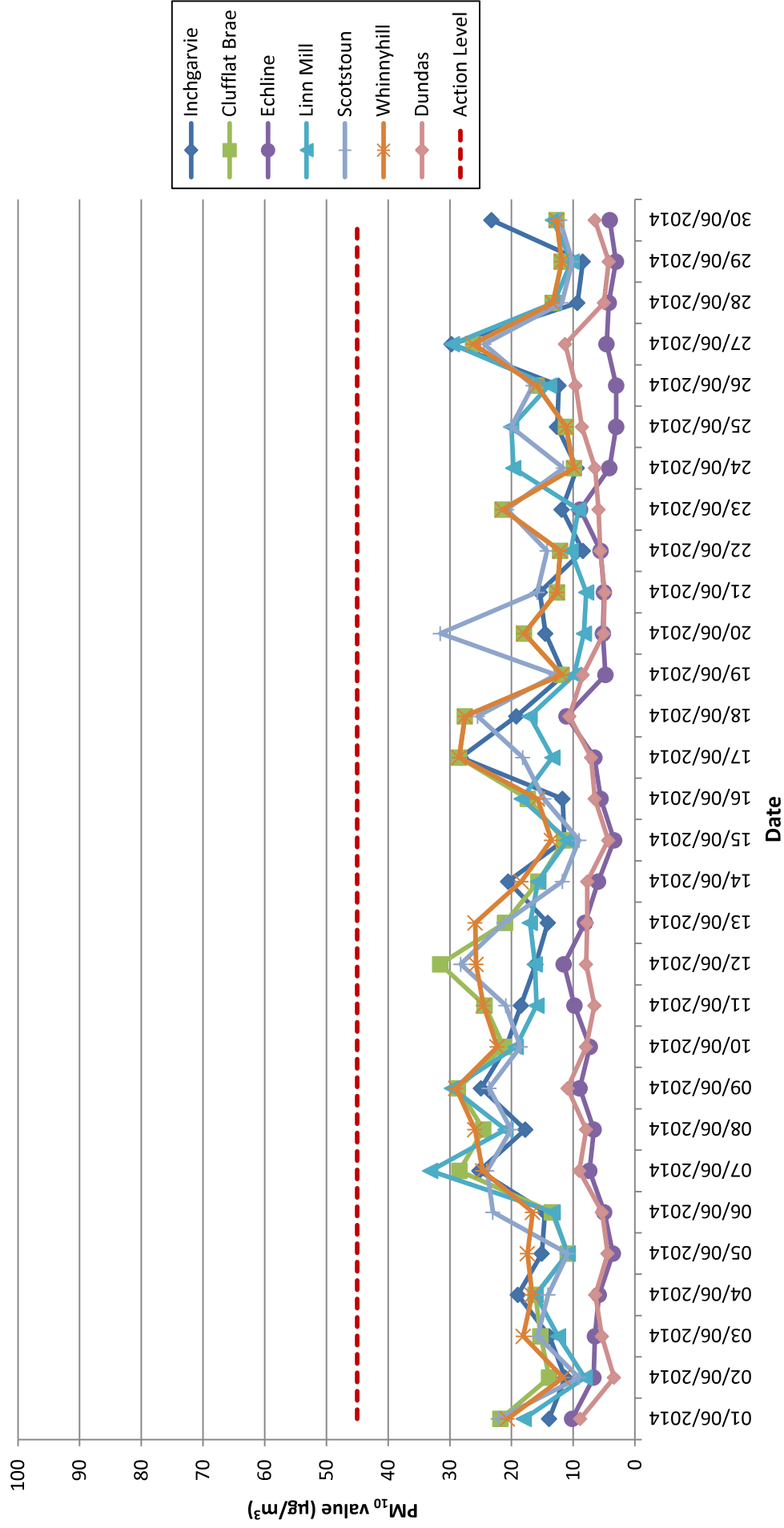
Figure 3: Location of additional temporary Frisbee gauge (Echline Corner)

3.4. Daily Dust Log and Environmental Inspections

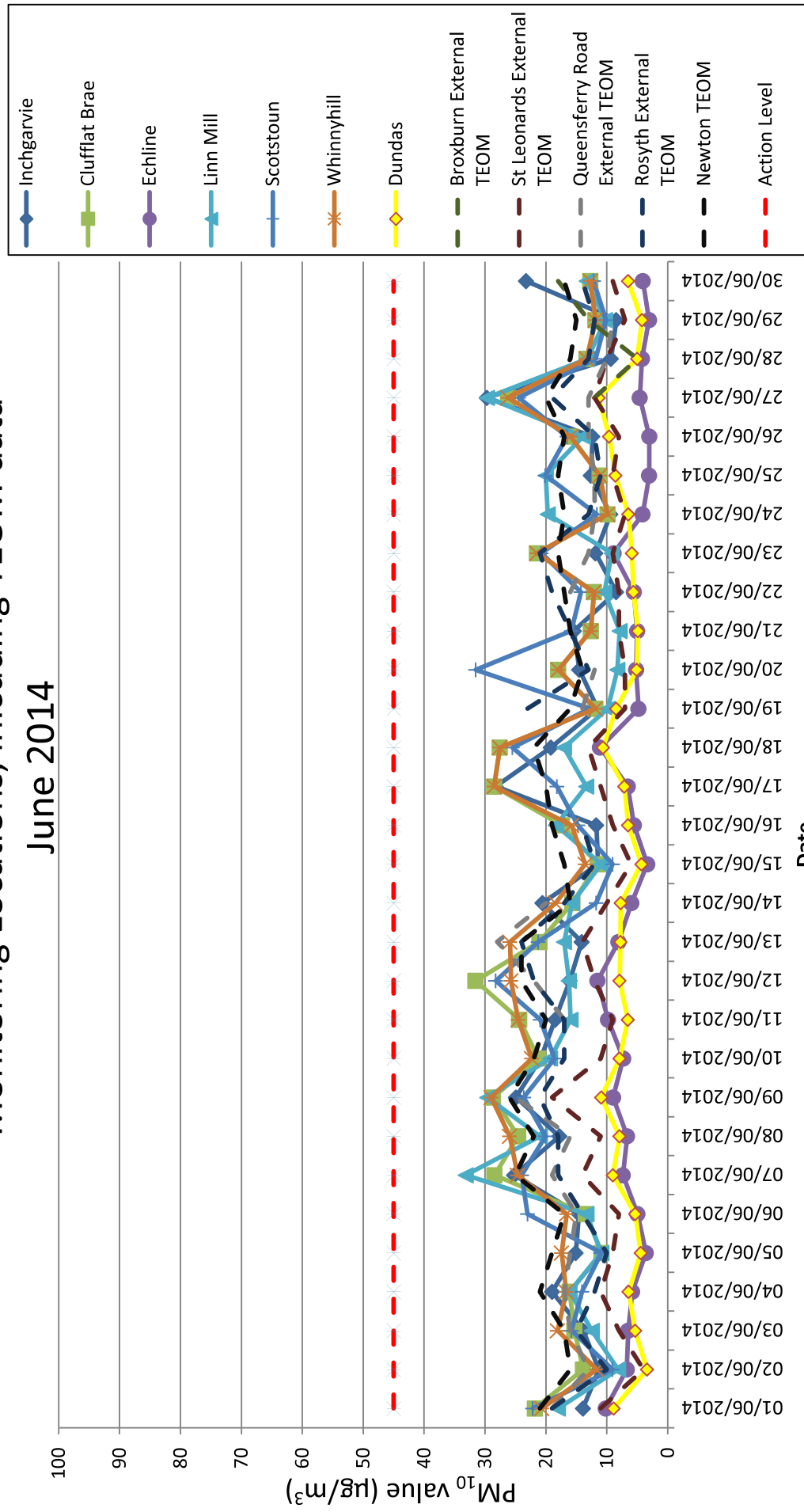
- 3.4.1. A summary of the daily dust log for June can be found in Appendix D. During this period no instances of dust were noted on site
- 3.4.2. During this period full environmental inspections were also undertaken across the site and covered areas where works were being undertaken. In June, no instances of dust were noted during inspections.

APPENDIX A: LIGHT SCATTER METER RESULTS

Air Quality Monitoring Particulate Matter (PM10) Results for all Monitoring Locations June 2014



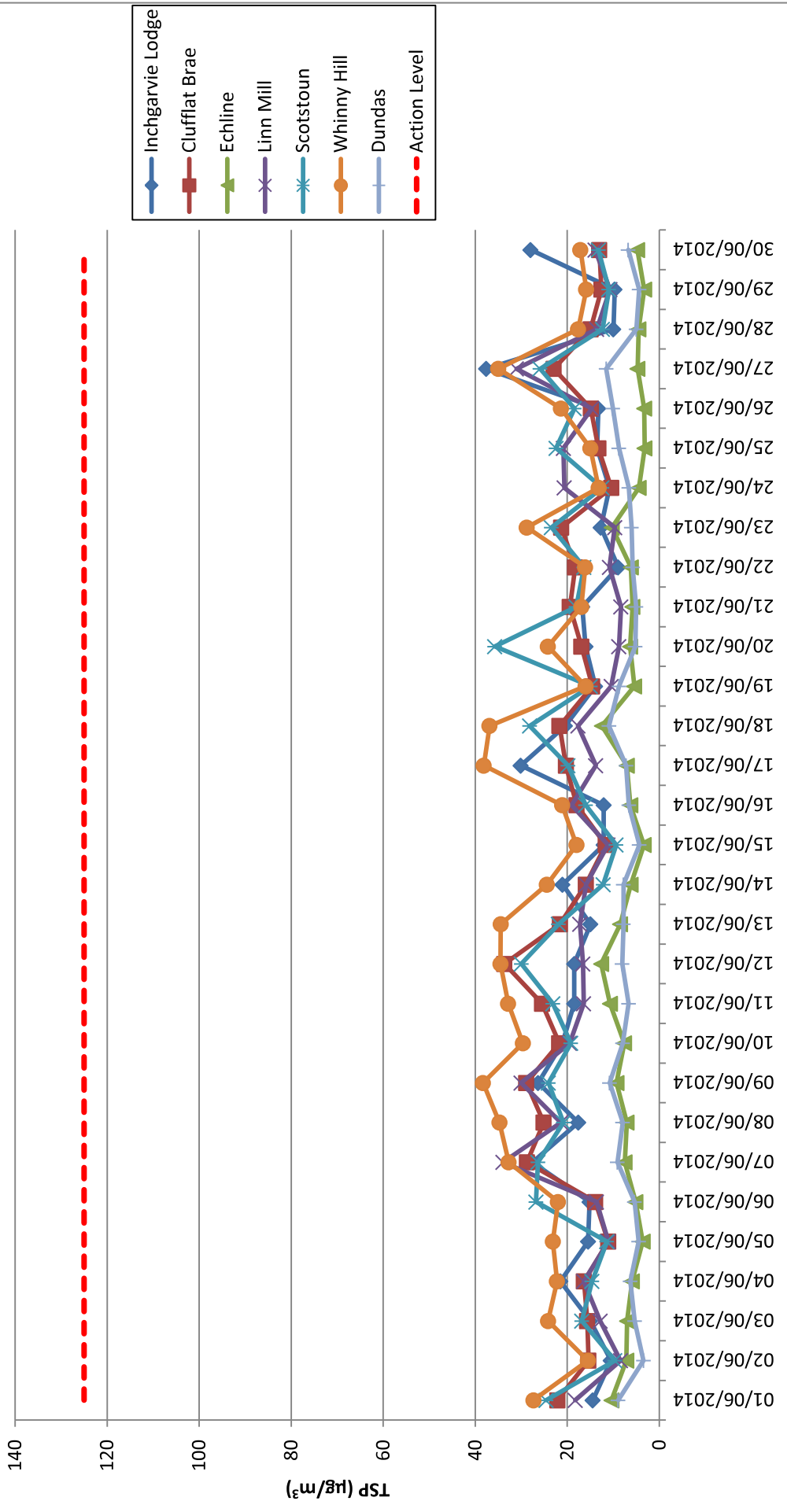
Air Quality Monitoring: Particulate Matter (PM10) Results for all Monitoring Locations, including TEOM data June 2014



Note: TEOM data missing from scottish air quality data for 01-26 June 2014 for Broxburn, 17-18 June 2014 for Rosyth and the 10, 15-18, 21 & 30 June 2014 for Queensferry Road.

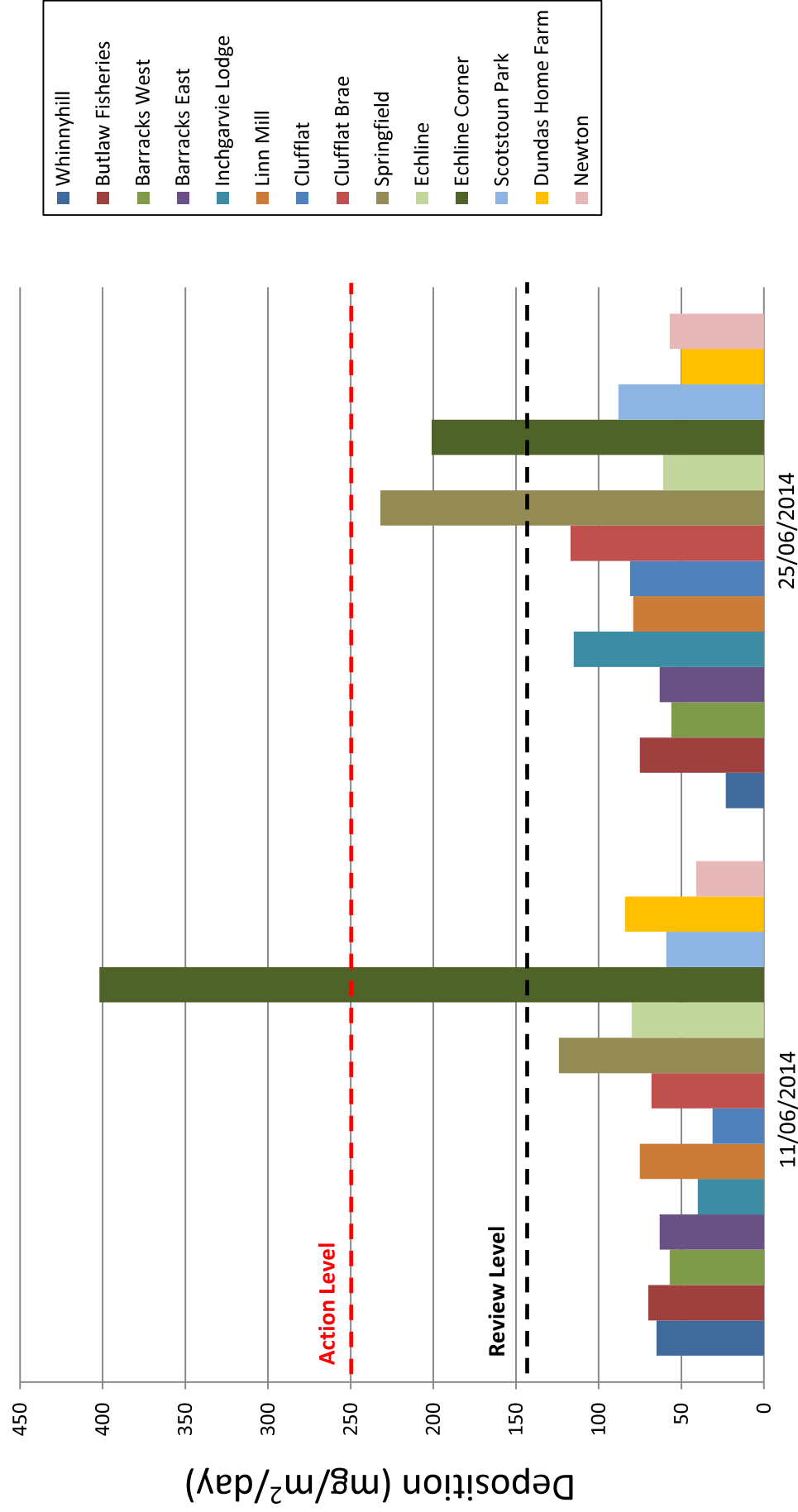
APPENDIX B: TOTAL SUSPENDED PARTICLES

Total Suspended Particles (TSP) Results June 2014



APPENDIX C: FRISBEE GAUGE RESULTS

Frisbee Dust Deposition Results: June 2014



APPENDIX D: DAILY DUST LOG

Daily Dust Log - North - June 2014

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

Daily Dust Log - South - June 2014

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