Contractor

FCBC
Queensferry Crossing

DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

Project

FORTH REPLACEMENT CROSSING

Document title

AIR QUALITY MONITORING REPORT AUGUST 2016

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

Contents

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 August 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).

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 (PM_{10}) 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, 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 August
M1	Whinny Hill	Frisbee	21/03/12	• 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	• AVS rebar and concrete works on deck • Pier S1 works • Pier S2 works • Pier S3 hydro demolition • South Tower rebar, formwork, concreting works, deck segment lifts, deck table installation works
M8	Barracks West	Frisbee	31/08/11	• AVS rebar and concrete works on deck • Pier S1 works • Pier S2 works • Pier S3 hydro demolition • South Tower rebar, formwork, concreting works, deck segment lifts, deck table installation works
M10	Inchgarvie Lodge	Frisbee	22/08/11	• Main carriageway earthworks • SUDS detention basin works • AVS rebar and concrete works on deck • Pier S1 works • Pier S2 works • Pier S3 hydro demolition • 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	• Main carriageway earthworks • SUDS detention basin works • AVS rebar and concrete works on deck • Pier S1 rebar, formwork & concrete works • Pier S2 formwork and concrete works • Pier S3 hydro demolition
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	• AVS rebar and concrete works on

M13	Clufflat Brae	Frisbee	21/09/11	deck • Main carriageway works
		Automatic light scatter meter	24/10/11	
M14	Springfield	Frisbee	15/08/11	• AVS rebar and concrete works on deck • Main carriageway works
M15	Echline	Frisbee	16/08/11	• AVS rebar and concrete works on deck • Main carriageway works
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	• Utility works • Main carriageway works • North-bound bus link
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	• Utility works • Main carriageway works • North-bound bus link
		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 meter results for August 2016 have been presented in a monthly chart; this can be found in Appendix A. Results show that the PM_{10} levels were below threshold levels throughout August with the exception of Linn Mill on the 16th, 17th and 18th August and also the 30th at Inchgarvie. All monitors generally follow the same pattern throughout the month, with the exception of the exceedances noted above, in addition to Clufflat Brae on 29th and 31st August, Scotstoun on the 29th and 30th August and Linn Mill on the 27th August (although below the threshold level on these dates). With the exceedances on the 16th, 17th and 18th August at Linn Mill, the weather on these days was warm and dry. While the environmental team carried out their daily dust check,

dust was observed coming from the access track on site near the monitor. Site staff were made aware of the problem and instructed to implement appropriate mitigation. The haul road was previously re-surfaced in July to mitigate the dust problem in this area. It is apparent that mitigation, included bowser dampening, between 16th to 18th August was insufficient to deal with the increased vehicle movements that were occurring in the area for the works at the SUDS basins. With regards to the exceedance at Inchgarvie on 30th August, the light scatter meter registered 15 minute exceedances for PM_{10}. The FCBC Environmental Coordinator investigated the area and confirmed that although dry, the site conditions were not dusty at the time of the site visit and that sufficient mitigation was in place. However, it was windy that day so conditions may have been dusty if the ground dried between dampening rounds. Site staff were requested to increase mitigation measures in this area by further dampening.

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 with the exception of Clufflat, Inchgarvie and Scotstoun on the 26th August and again over the period 29th and 31st August. Although the results from Linn Mill over the period 15th to 18th August follow a similar pattern to the other monitors, the results are notably higher at this location.

3.2. Total Suspended Particles

3.2.1. The TSP results for August 2016 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during August were all within the threshold. The TSP pattern

at locations across the site was similar to that observed for PM_{10} levels. As with PM_{10} 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 3.1.3 above.

3.3. Frisbee Dust Deposition Results

3.3.1. The Frisbee dust deposition results for August 2016 have been presented in a chart and can be found in Appendix C. Three collections were made in August; these occurred on the 3rd, 17th and 31st August 2016.

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

3.4. Daily Dust Log and Environmental Inspections

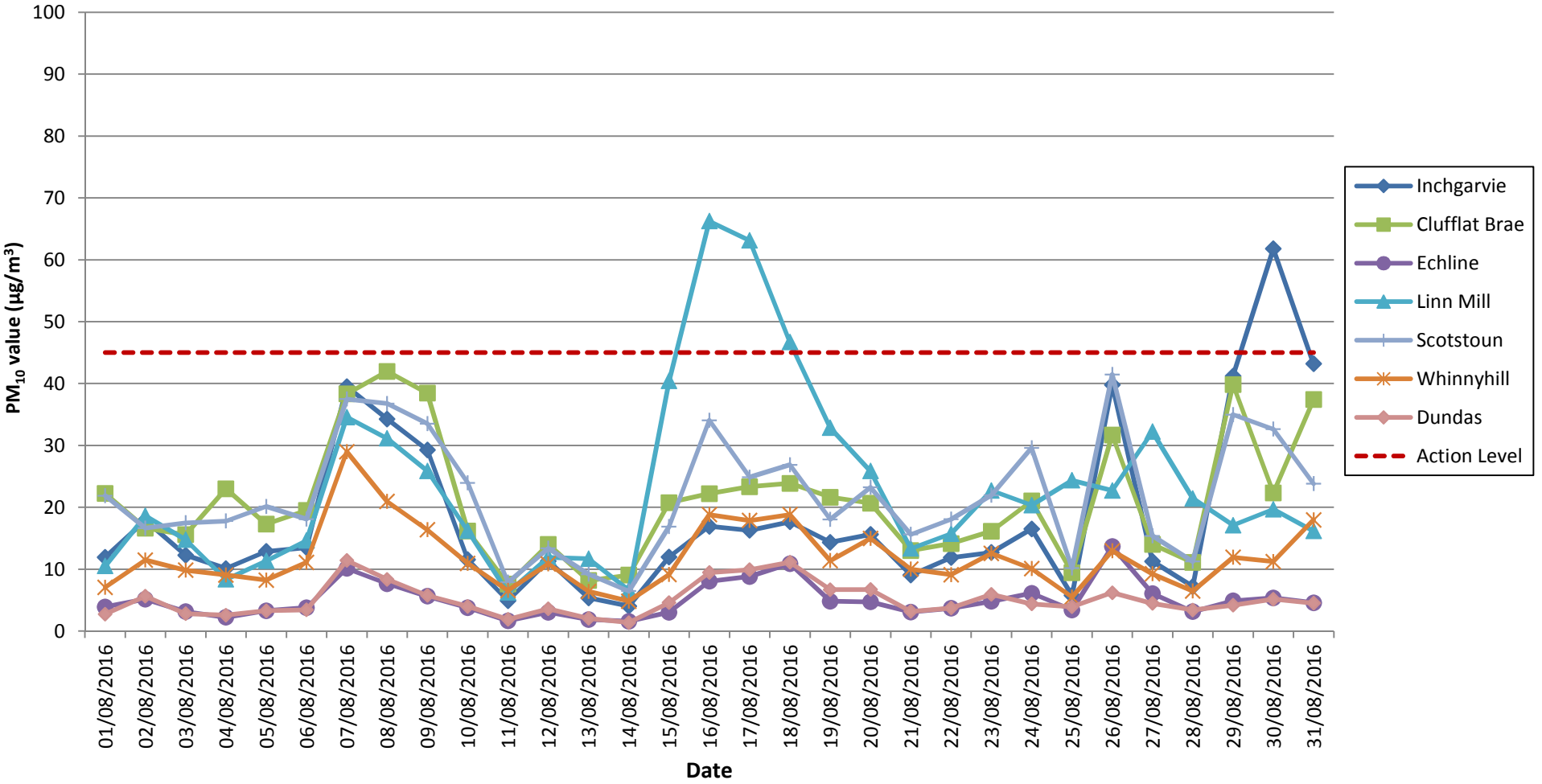
3.4.1. A summary of the daily dust log for August can be found in Appendix D.

3.4.2. During this period full environmental inspections were also undertaken across the site and covered areas where works were being carried out.

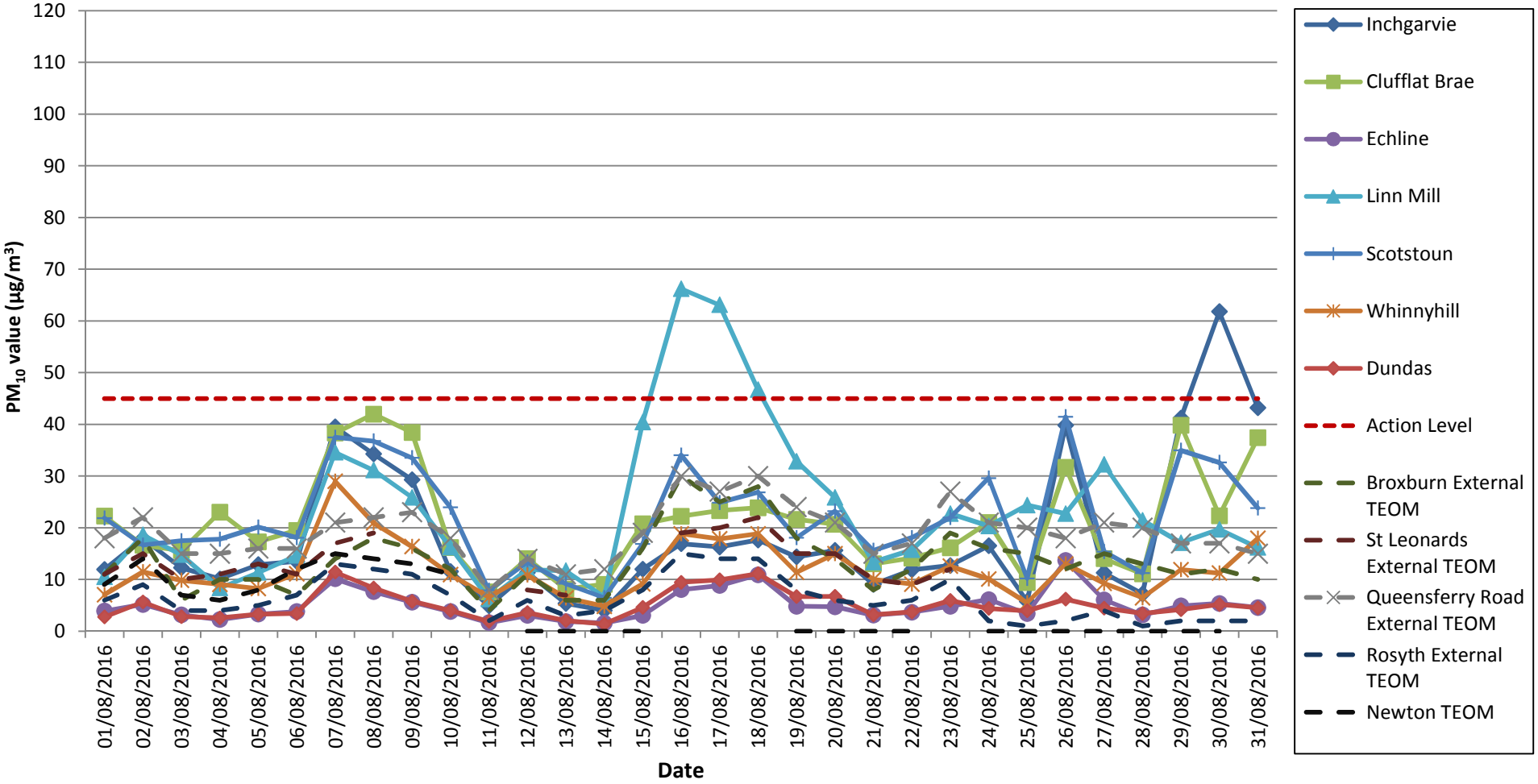
3.4.3. As noted in 3.1.1 there were exceedances registered on the 16th to 18th August at Linn Mill and on the 30th August at Inchgarvie. These incidents were investigated by the environmental team. Site teams were requested to increase dust suppression.

APPENDIX A: LIGHT SCATTER METER RESULTS

Air Quality Monitoring
Particulate Matter (PM10) Results for all Monitoring Locations
August 2016

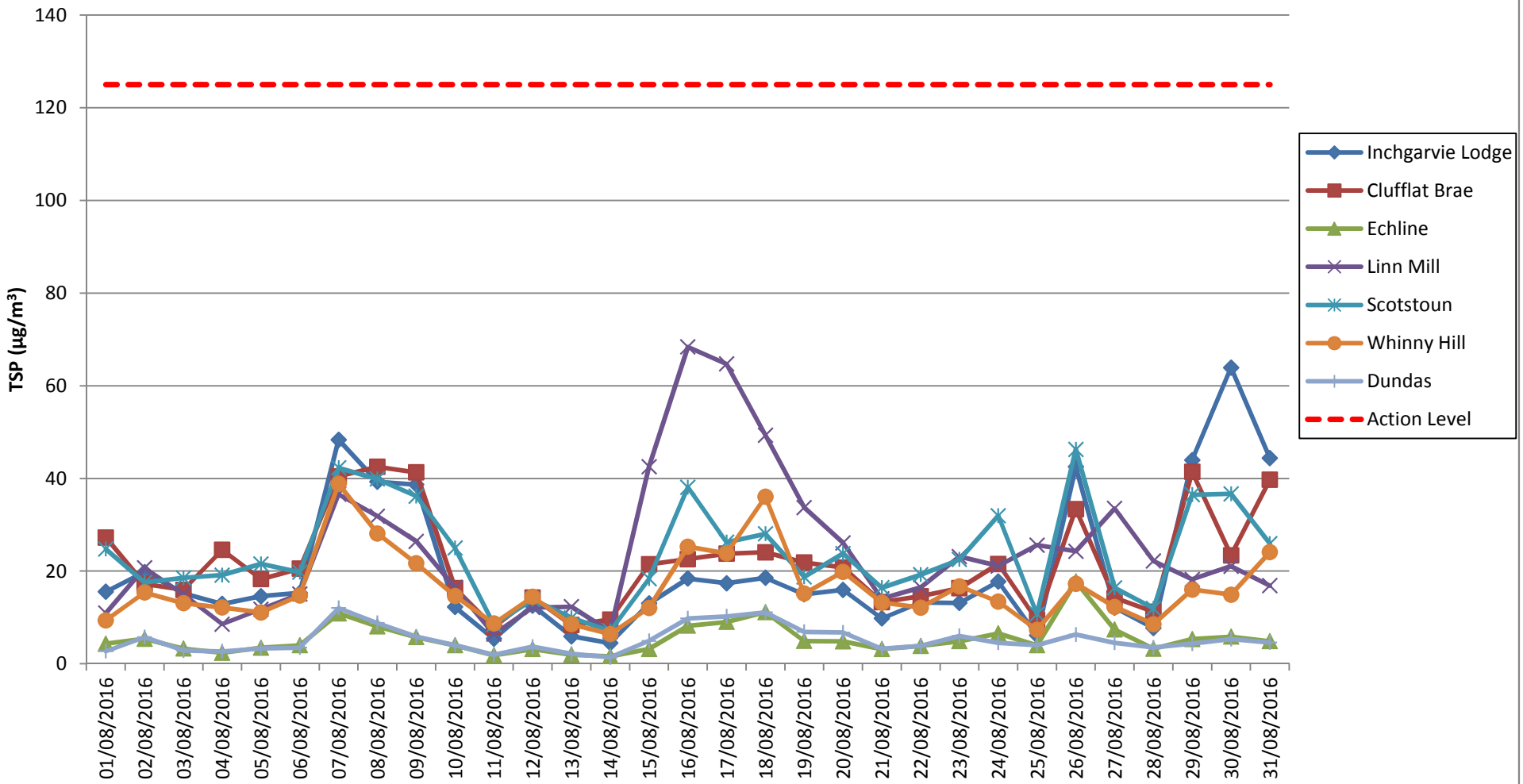


Air Quality Monitoring: Particulate Matter (PM10) Results for all Monitoring Locations, inlcuding TEOM data
August 2016



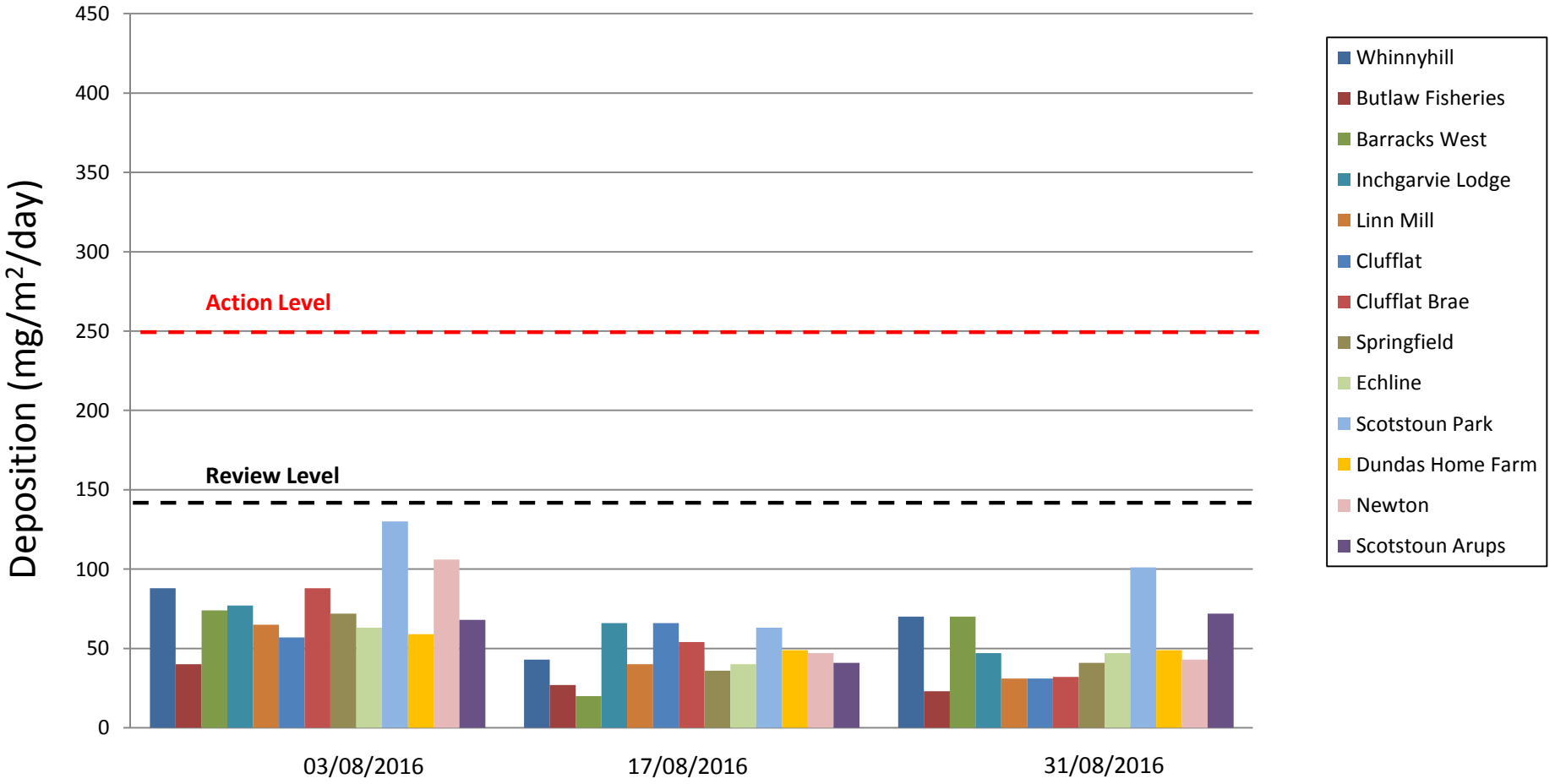
APPENDIX B: TOTAL SUSPENDED PARTICLES

Total Suspended Particles (TSP) Results
August 2016



APPENDIX C: FRISBEE GAUGE RESULTS

Frisbee Dust Deposition Results: August 2016



APPENDIX D: DAILY DUST LOG

Daily Dust Log - North - August 2016

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/08/2016	N	LIGHT	S	DRY	N			
02/08/2016	N	LIGHT	E	DRY	N			
03/08/2016	N	LIGHT	S	DRY	N			
04/08/2016	N	LIGHT	SW	DRY	N			
05/08/2016	N	LIGHT	S	DRY	N			
06/08/2016	N							
07/08/2016	N							
08/08/2016	N	LIGHT	S	DRY	N			
09/08/2016	N	LIGHT	S	DAMP	N			
10/08/2016	N	LIGHT	SW	DAMP	N			
11/08/2016	N	LIGHT	SW	DRY	N			
12/08/2016	N	LIGHT	SW	DRY	N			
13/08/2016	N							
14/08/2016	N							
15/08/2016	N	LIGHT	SE	DRY	N			
16/08/2016	N	LIGHT	E	DRY	N			
17/08/2016	N	LIGHT	SE	DRY	N			
18/08/2016	N	LIGHT	SE	DRY	N			
19/08/2016	N	LIGHT	E	DRY	N			
20/08/2016	N							
21/08/2016	N							
22/08/2016	N	LIGHT	S	DAMP	N			
23/08/2016	N	LIGHT	SE	DAMP	N			
24/08/2016	N	LIGHT	S	DRY	N			
25/08/2016	N	LIGHT	E	DRY	N			
26/08/2016	N	LIGHT	S	DRY	N			
27/08/2016	N							
28/08/2016	N							
29/08/2016	N	LIGHT	SW	DRY	N			
30/08/2016	N	LIGHT	S	DRY	N			
31/07/2016	N	LIGHT	SW	DRY	N			

Daily Dust Log - South - August 2016

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/08/2016	S	LIGHT	SE	DRY	N			
02/08/2016	S	LIGHT	SW	DRY	N			
03/08/2016	S	LIGHT	E	DRY	N			
04/08/2016	S	LIGHT	S	DRY	N			
05/08/2016	S	LIGHT	S	DRY	N			
06/08/2016	S							
07/08/2016	S							
08/08/2016	S	LIGHT	S	DRY	N			
09/08/2016	S	LIGHT	S	DAMP	N			
10/08/2016	S	LIGHT	SE	DAMP	N			
11/08/2016	S	LIGHT	SE	DRY	N			
12/08/2016	S	LIGHT	E	DRY	N			
13/08/2016	S							
14/08/2016	S							
15/08/2016	S	LIGHT	S	DRY	N			
16/08/2016	S	LIGHT	SW	DRY	Y	Y	ACCESS TRACK NEAR LINN MILL	Site teams instructued to increase mitigation using bowser to keep access track damp
17/08/2016	S	LIGHT	SW	DRY	Y	Y		
18/08/2016	S	LIGHT	W	DRY	N			
19/08/2016	S	LIGHT	W	DRY	N			
20/08/2016	S							
21/08/2016	S							
22/08/2016	S	LIGHT	S	DAMP	N			
23/08/2016	S	LIGHT	S	DAMP	N			
24/08/2016	S	LIGHT	SE	DRY	N			
25/08/2016	S	LIGHT	SW	DRY	N			
26/08/2016	S	LIGHT	SE	DRY	Y	y		Dust visible near inchgarvie however bowser arrived and area was dampened down.
27/08/2016	S							
28/08/2016	S							
29/08/2016	S	LIGHT	SE	DRY	N			
30/08/2016	S	LIGHT	SE	DRY	N			
31/07/2016	S	LIGHT	E	DRY	N			