Contractor

FCBC Queensferry Crossing

DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

Project

FORTH REPLACEMENT CROSSING

Document title

AIR QUALITY MONITORING REPORT NOVEMBER 2016

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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 November 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 November
M1	Whinny Hill	Frisbee	21/03/12	• Earthworks/Fill Placement • 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 • 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 • South Tower rebar, formwork, concreting works, deck segment lifts, deck table installation works
M10	Inchgarvie Lodge	Frisbee	22/08/11	• Main carriageway works • SUDS detention basin works • AVS rebar and concrete works on deck • 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 works • SUDS detention basin works • AVS rebar and concrete works on deck
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	• AVS rebar and concrete works on deck • SUDS detention basin works • Main carriageway works • South abutment works
M13	Clufflat Brae	Frisbee	21/09/11	
		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	• Main carriageway works
		Automatic light scatter meter	10/11/11	

M16	Scotstoun	Frisbee	07/09/11	• Main carriageway works • North-bound bus link • South-bound bus link • Gantry Erection
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	• 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 results for November 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 November. All monitors generally follow the same pattern throughout the month. However, the PM_{10} results for Scotstoun show larger increases on the 1st, 2nd and10th November.

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 throughout the month.

3.2. Total Suspended Particles

3.2.1. The TSP results for November 2016 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during November 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.

3.3. Frisbee Dust Deposition Results

3.3.1. The Frisbee dust deposition results for November 2016 have been presented in a chart and can be found in Appendix C. Two collections were made in November; these occurred on the 9th and 23rd November 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 November there were exceedances of the site review level at Scotstoun Park for both monitoring periods. There was also an exceedance of the review level at Clufflat Brae for the fortnight concluding 23rd November. With regards to the exceedances at Scotstoun Park, the temporary Frisbee at Scotstoun Arups, which is located closer to the FCBC works, indicates a significantly lower result than for the permanent Frisbee during this period. This suggests that the higher results obtained at the permanent monitoring location are not entirely due to FCBC activities. As noted in previous reports, other

construction work (not project related) is ongoing in the Scotstoun area. However, FCBC will continue to monitor Forth Replacement Crossing construction closely as works progress and provide mitigation as necessary. With regards to the exceedance at Clufflat Brae, the light scatter meter at this location indicated mostly low levels of PM_{10} and TSP during this fortnight. In addition, the other Frisbees in closest proximity to Clufflat Brae (Clufflat and Springfield) showed significantly lower results during this period. The Clufflat Frisbee is located only 40m away and both are located behind the timber screen fence. The nearest site access track is located approximately 160m from the monitor. The ground conditions for the fortnight were mostly wet and damp so it is considered unlikely that the exceedance was caused by FCBC construction activities.

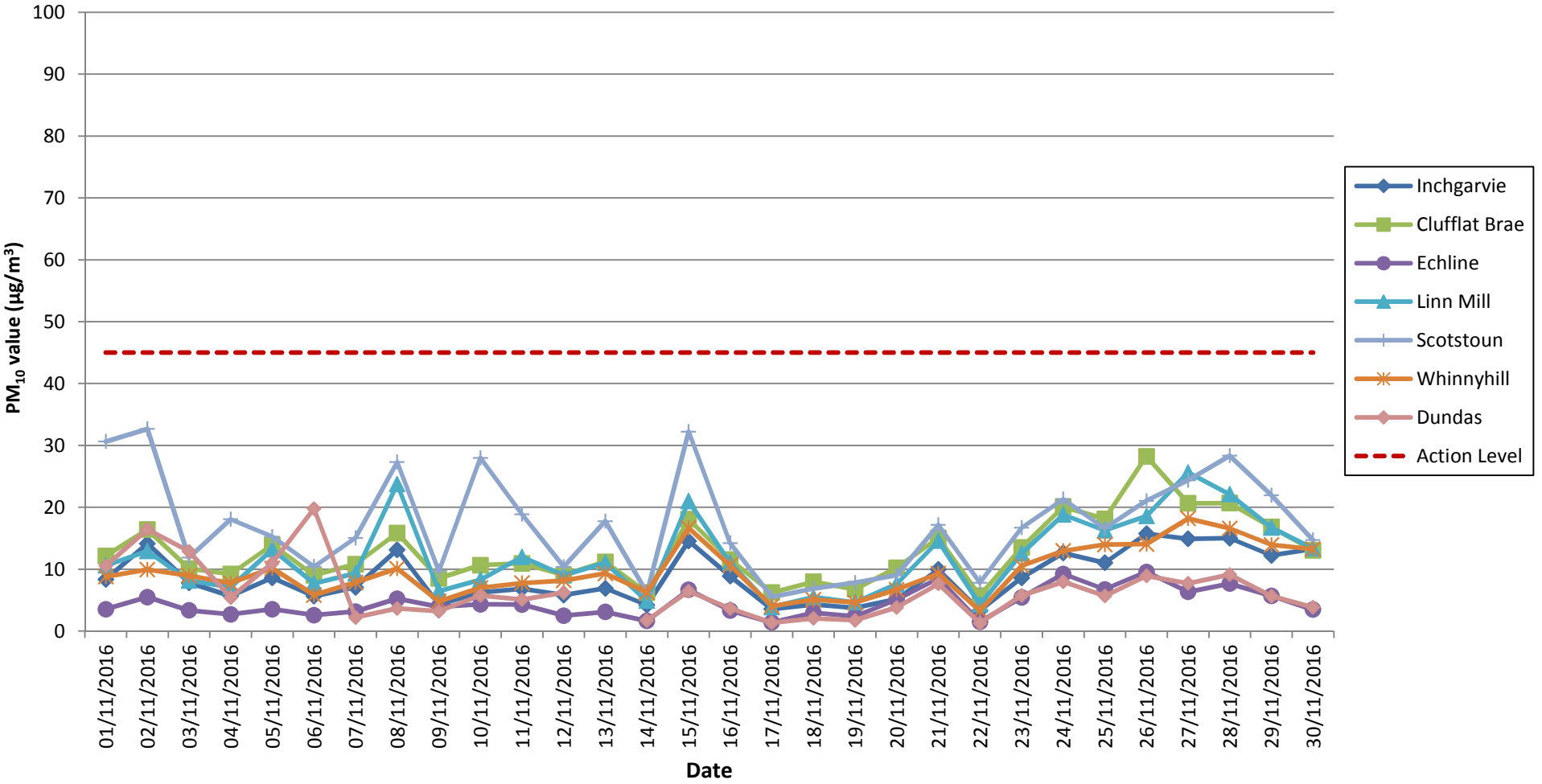
3.4. Daily Dust Log and Environmental Inspections

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

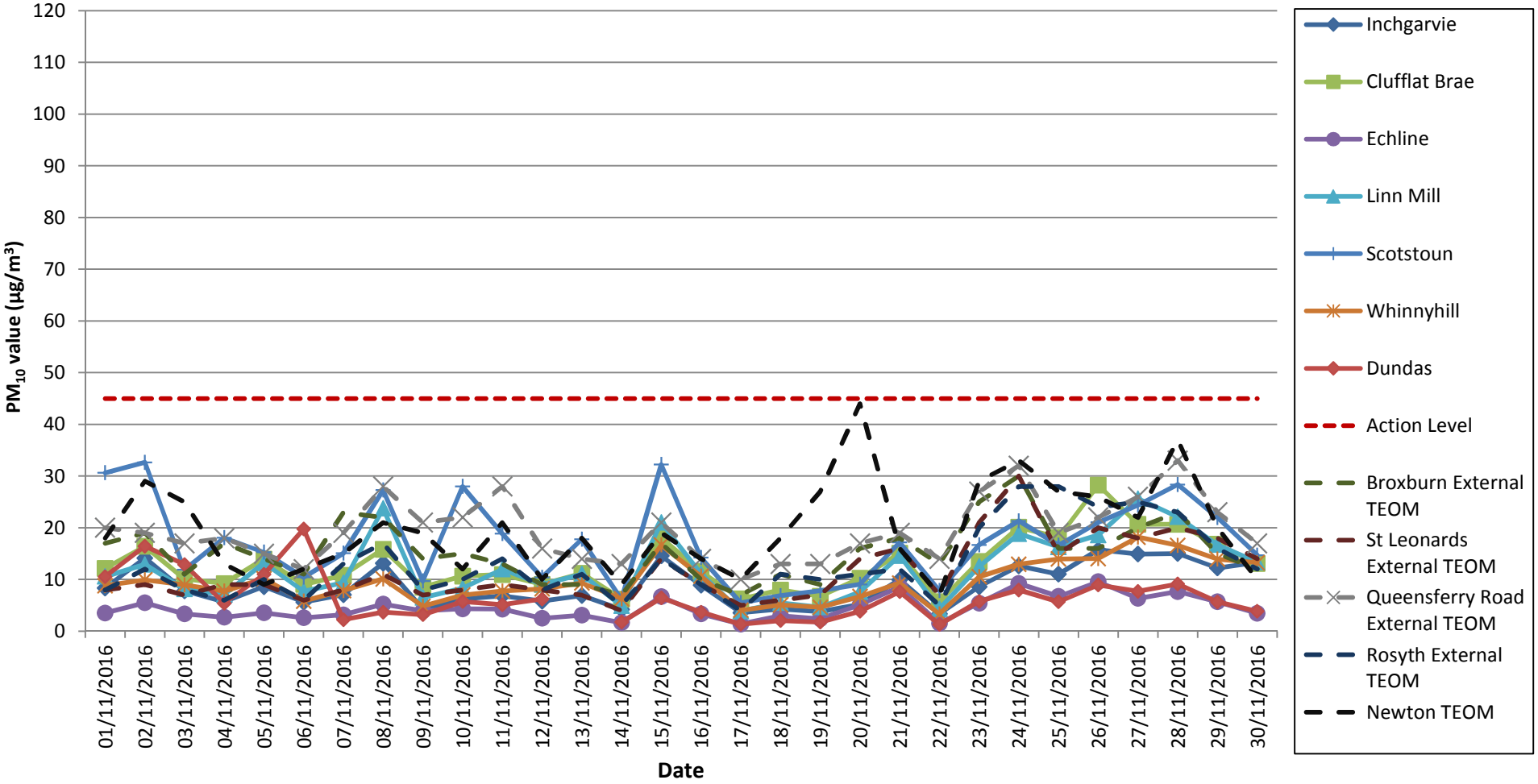
3.4.2. During this period full environmental inspections were also undertaken across the site and covered areas where works were being carried out.

APPENDIX A: LIGHT SCATTER METER RESULTS

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

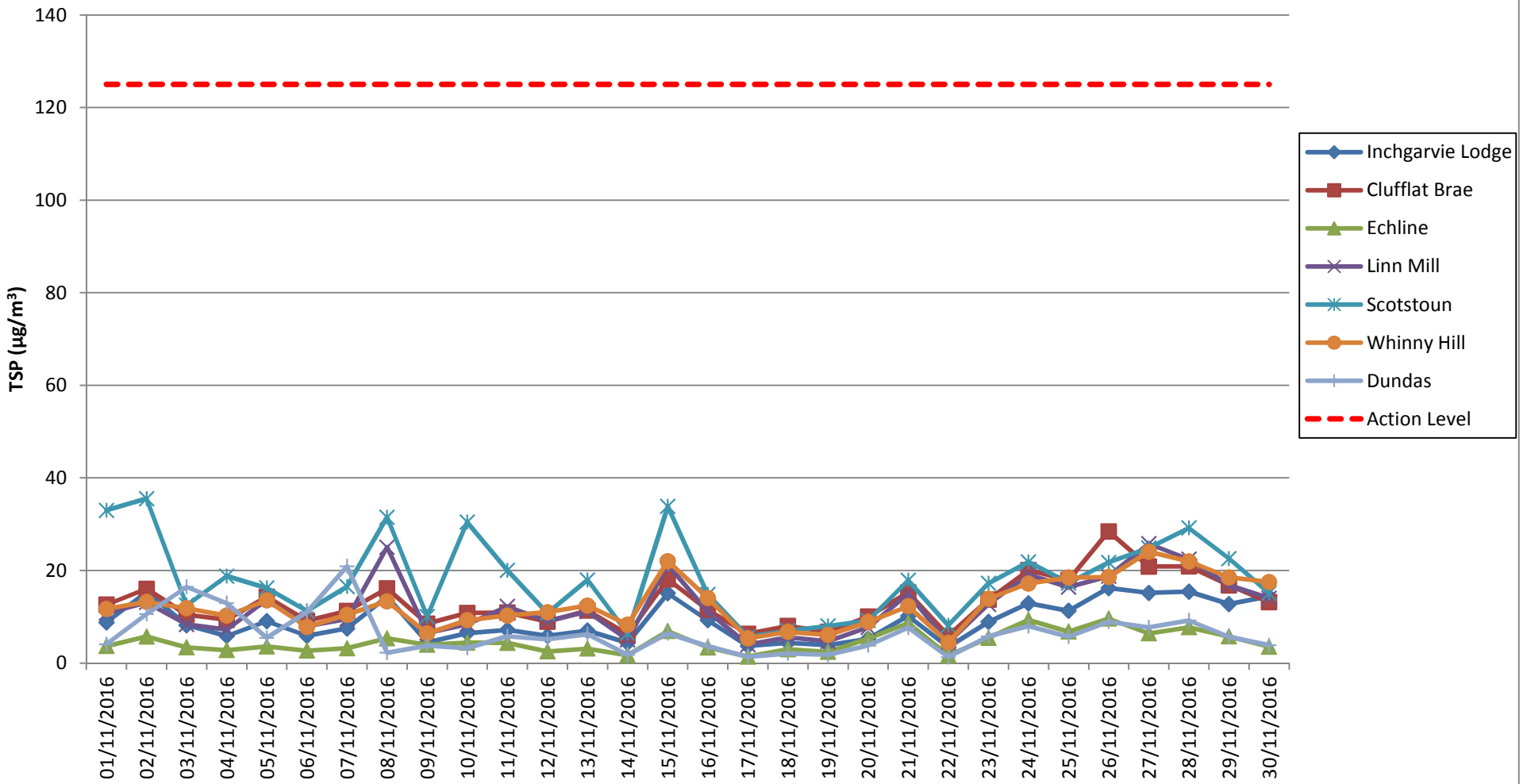


Air Quality Monitoring: Particulate Matter (PM10) Results for all Monitoring Locations, inlcuding TEOM data
November 2016



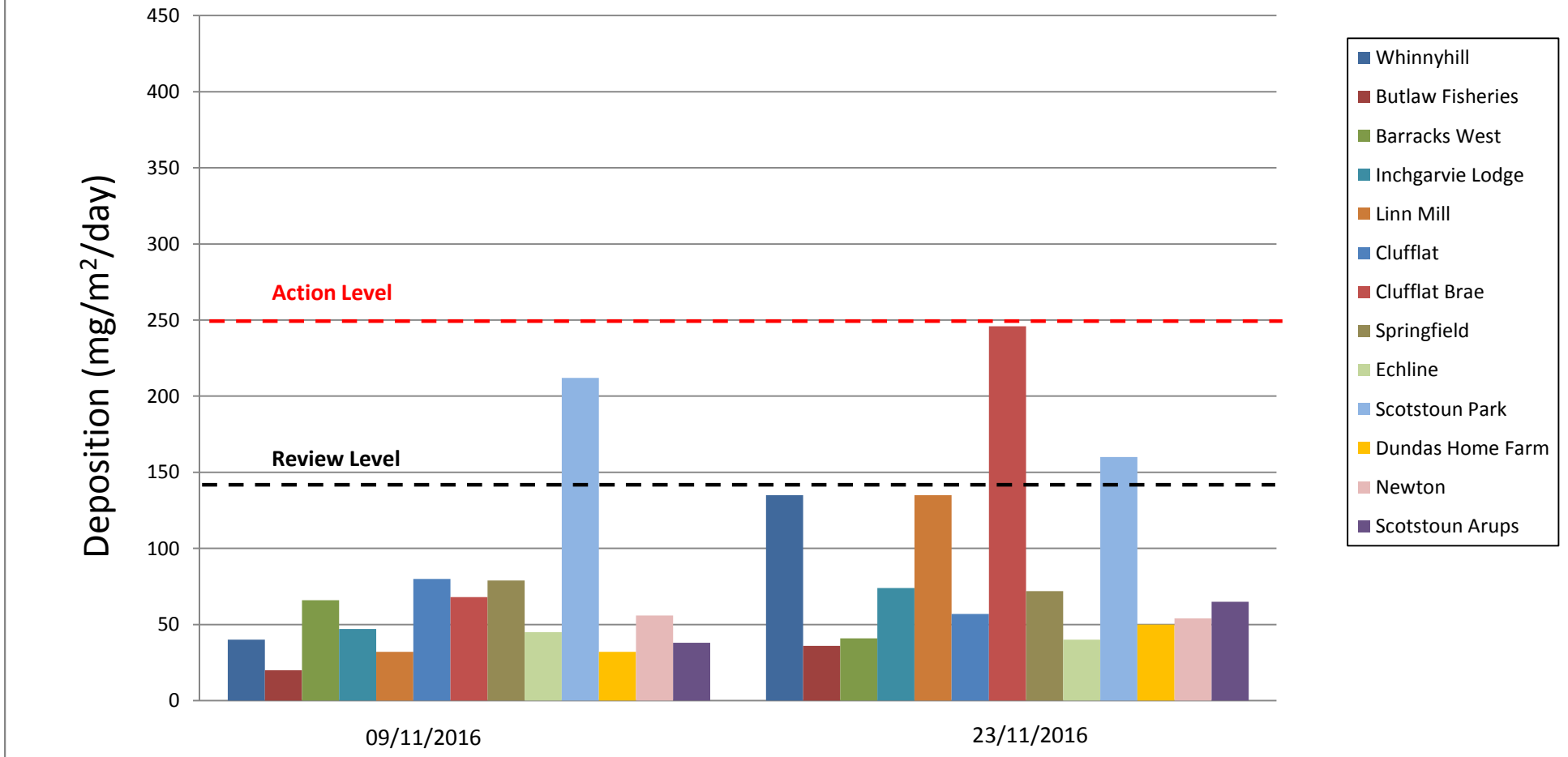
APPENDIX B: TOTAL SUSPENDED PARTICLES

Total Suspended Particles (TSP) Results
November 2016



APPENDIX C: FRISBEE GAUGE RESULTS

Frisbee Dust Deposition Results: November 2016



APPENDIX D: DAILY DUST LOG

Daily Dust Log - North - November 2016

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

Daily Dust Log - South - November 2016

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