



Contractor



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Project **FORTH REPLACEMENT CROSSING**

Document title

AIR QUALITY MONITORING REPORT
APRIL 2012

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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 April 2012.

- 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 (Figure 2). Table 1 lists the air quality monitoring equipment present at each monitoring location. The installation of the air quality monitoring equipment has not been simultaneous across the site, thus 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, weather conditions (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 records the weather conditions at the time of the inspection.

2.5. Frequent environmental site inspections are also undertaken by members of the FCBC Environmental Department. These inspections include a dust and odour check to assess the following:

- signs of dust or odour leaving site;
- any burning occurring on site;
- adequate suppression and monitoring to prevent the spread of dust; and
- materials damped down or covered in vehicles leaving/entering the site.



Figure 1: Example of an Installed Frisbee Gauge Meters



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 April
M1	Whinny Hill	Frisbee	21/03/12	Excavation
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	Marine works only
M8	Barracks West	Frisbee	31/08/11	Marine works Site Clearance
M9	Barracks East	Frisbee	31/08/11	Marine works Site Clearance
M10	Inchgarvie Lodge	Frisbee	22/08/11	Utility works Trial holes
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	Utility works Trial holes
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	Utility works (including soil stripping) Trial holes
M13	Clufflat Brae	Frisbee	21/09/11	
		Automatic light scatter meter	24/10/11	
M14	Springfield	Frisbee	15/08/11	Construction of Southern Compound Utility works (including soil stripping)
M15	Echline	Frisbee	16/08/11	Construction of Southern Compound Utility works (including soil stripping)
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	Utilities works LMA fencing Vegetation mulch and removal
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	Utilities works LMA fencing Vegetation mulch and removal
		Automatic light scatter meter	23/02/12	
M18	Newton	Frisbee	22/08/11	None

3. AIR QUALITY MONITORING RESULTS

3.1. Automatic Light Scatter Dust Meter Monitoring Results

3.1.1. Light scatter results for April 2012 have been presented in a monthly chart; this can be found in Appendix A. Results show that the PM₁₀ concentrations were generally low throughout April 2012. The results have been compared to the daily mean results obtained from the TEOM air quality monitoring stations located in Rosyth, Broxburn and Queensferry Road, Edinburgh. This demonstrates that the results acquired using the light scatter meters on site follow the same pattern at a similar level to those results collected by the TEOMs; this indicates that the pattern observed throughout April was due to regional changes in air quality, rather than due to construction works.

3.1.2. During March, essential device maintenance was undertaken on all the light scatter meters. Due to device errors, the light scatter meters located at Echline and Linn Mill required maintenance works offsite. These monitors were reinstalled onsite during April; the meter at Linn Mill was reinstalled on 11 April, and the meter at Echline on 12 April. Data is, therefore, missing for the beginning of April for these locations.

3.1.3. The readings at Dundas during April continued to read low in comparison to the other meters on site, as in previous months. As meters across the site would be expected to read similarly, with the exception of during a location specific air pollution incident, these low readings were investigated in consultation with the supplier. The supplier has confirmed that the meter is reading low by a factor of approximately 10, thus the results have been updated to reflect this.

Table 2: April exceedances of the PM₁₀ Threshold

Date	Location(s)	PM ₁₀ Value (µg/m ³)
01/04/12	Inchgarvie	51.43
19/04/12	Dundas	73.3
19/04/12	Whinny Hill	50.79

3.1.4. Three exceedances of the PM₁₀ action level occurred during April. Table 2 lists the dates and locations of the April exceedances of the PM₁₀ threshold, recorded by the light scatter monitors on site. These exceedances each occurred as single daily peaks and were found to coincide with peaks of the daily mean results obtained from the TEOM monitoring stations at various regional locations. This, therefore, demonstrates that the exceedances were not related to construction works. This is also reflected in the dust checks for these days (Section 3.3).

3.2. Frisbee Dust Deposition Results

3.2.1. The Frisbee dust deposition results for April 2012 have been presented in charts and can be found in Appendix B. To present results, all the monitoring locations have been grouped, based on locality, into the following:

- **Group 1:** M7 Butlaw Fisheries, M8 Barracks West, M9 Barracks East, M10 Inchgarvie Lodge and M11 Linn Mill;
- **Group 2:** M12 Clufflat, M13 Clufflat Brae, M14 Springfield and M15 Echline;
- **Group 3:** M16 Scotstoun Park and M17 Dundas Home Farm;
- **Group 4:** M18 Newton; and
- **Group 5:** M1 Whinny Hill.

- 3.2.2.** Frisbee dust data deposition results have been collected fortnightly, and the results averaged over this fortnight period to give a daily dust deposition rate. Two collection dates fell during April; 4 April 2012 and 18 April 2012. The next collection date is due on the 2 May 2012, thus the dust data covering the final weeks of April will be presented in a subsequent report covering May 2012.
- 3.2.3.** The site action level for the dust deposition rate has been set at 250 mg/m²/day. During April an additional review level was set and implemented; a site review level was set at 140 mg/m²/day to ensure early investigations into dust deposition levels. Dust deposition rates were low throughout April and were found to be below both the review and action levels with the exception of Inchgarvie Lodge on 4 April 2012, when levels were 226 mg/m²/day, thus exceeding the review level of 140 mg/m²/day.
- 3.2.4.** The exceedance of the site review level at Inchgarvie initiated an investigation into dust levels in the area. During the two weeks prior to 4 April the weather was warm and dry. One daily dust check for the period noted dust on the southern site at the top of Echline field at the end of March (30/03/12 – see Air Quality Monitoring Report – March 2012) due to generation of dust by vehicles. It should be noted, however, that there were no exceedances of the review level at monitoring locations close to the works at the top of Echline field and that during this period no works were being undertaken at the lower end of Echline field, near to Inchgarvie Lodge. Furthermore, no exceedances of PM₁₀ levels during this period were found to be attributable to construction. Additionally, appropriate mitigation measures were implemented at the top of Echline field, where necessary, such as dampening down of the track, to prevent the spread of dust.

3.2.5. Therefore, the results obtained from Frisbee dust deposition monitoring show that there have been no instances of dust from construction works causing a nuisance to nearby residential and other sensitive areas.

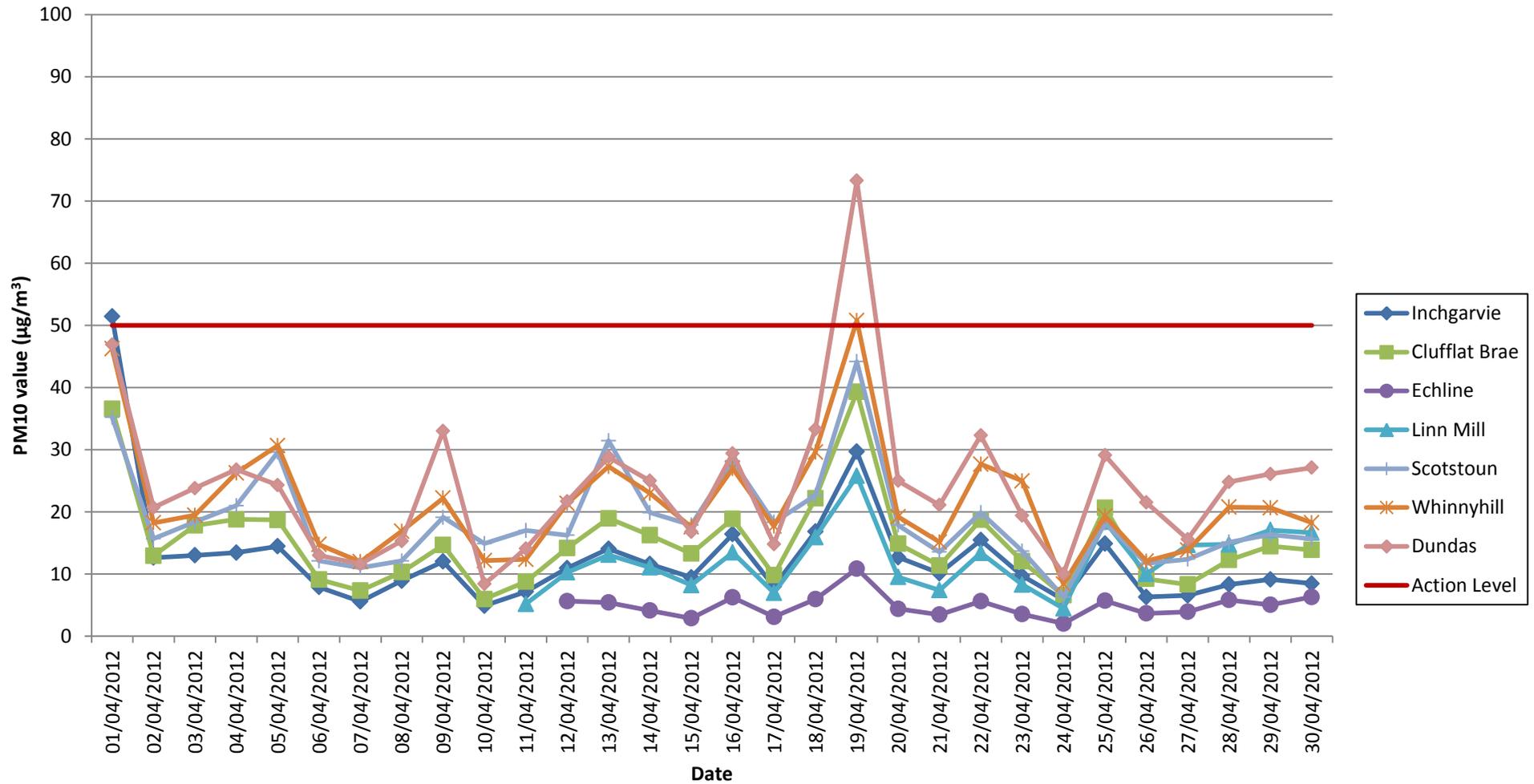
3.3. Daily Dust Log and Environmental Inspections

3.3.1. The daily dust log for April, for both the Northern and the Southern sites, did not show any occurrences of dust being generated due to construction works. Damp and wet ground conditions were dominant throughout April, thus preventing dust generation. A summary of the daily dust logs can be found in Appendix C.

3.3.2. During this period a number of environmental inspections were also undertaken across the site. A summary of the Dust and Air Quality section of these environmental checks has been included in Appendix D. Six inspections across the site were undertaken by the FCBC Environmental Department during April, focussing on areas in which works were being undertaken. Light dust was noted at St Margaret's Marsh on 2 April; although dust was not leaving the site, the environmental check ensured that the situation was monitored.

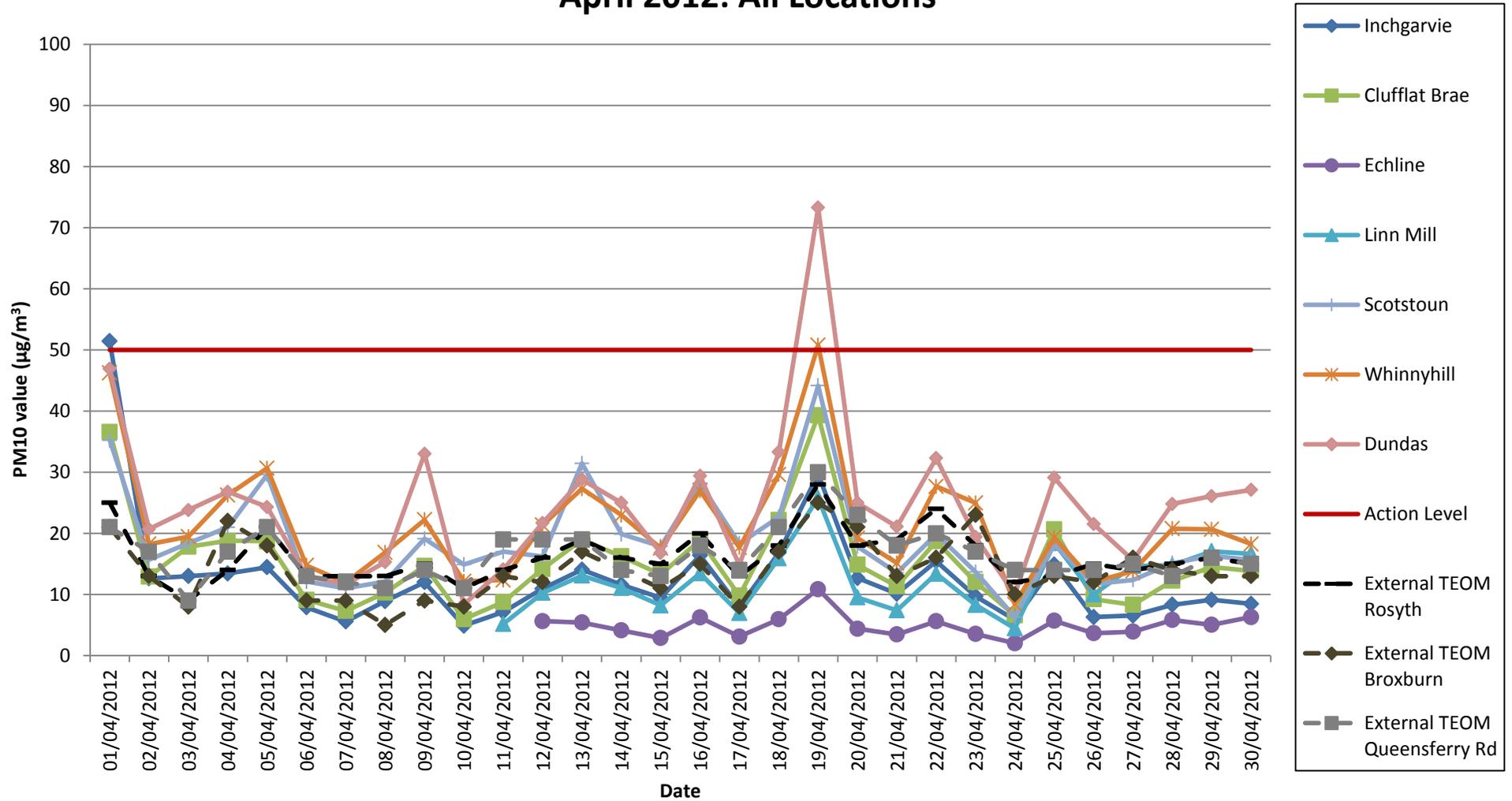
APPENDIX A: LIGHT SCATTER METER RESULTS

PM10 Results April 2012: All Locations



Note: The results for Dundas have been multiplied by 10 following consultation with the supplier. The device at Linn Mill was reinstalled following maintenance on 11/04/12 and the device at Echline was reinstalled on 12/04/12, also following maintenance.

PM10 Results April 2012: All Locations

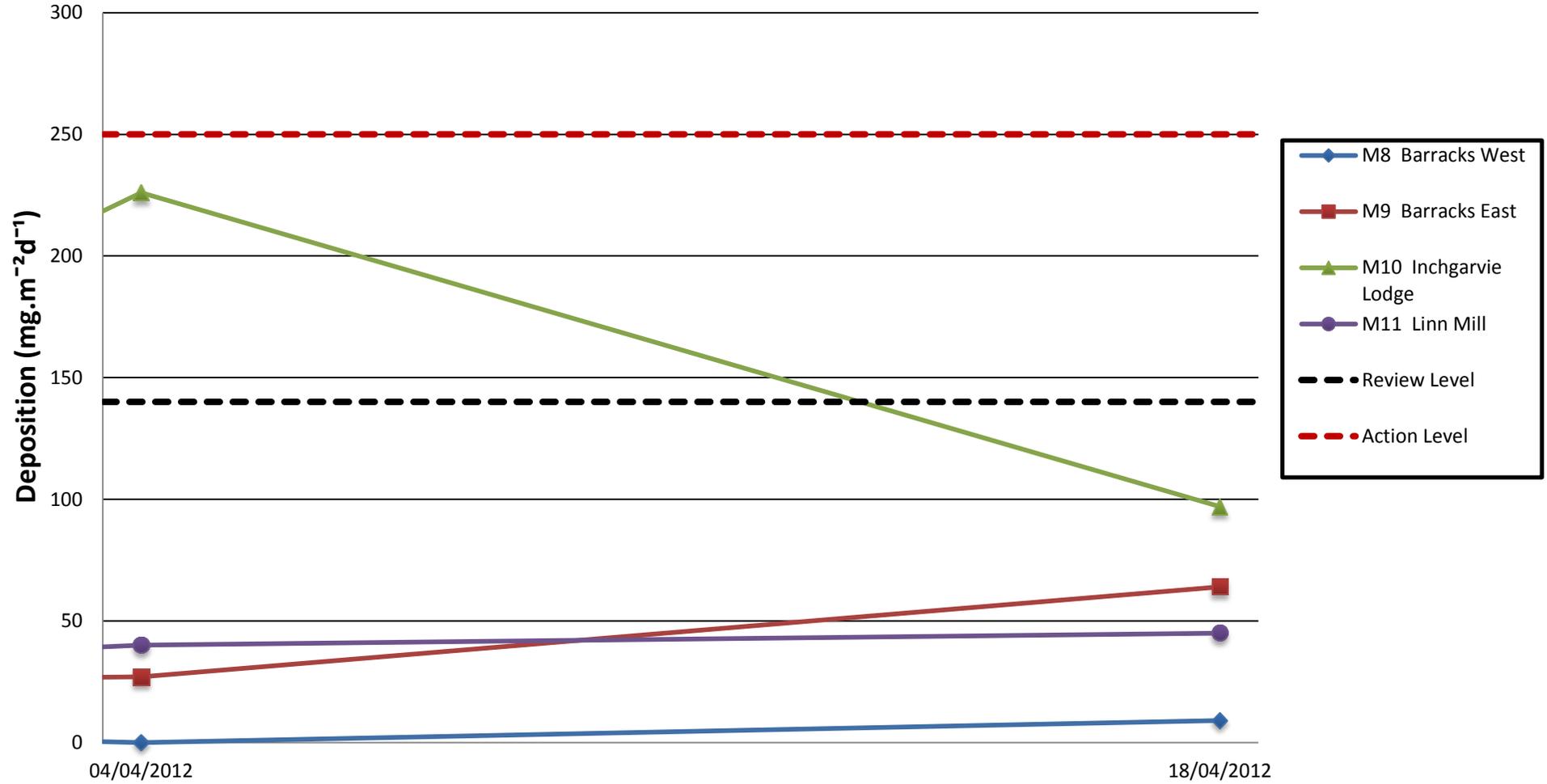


Note: The results for Dundas have been multiplied by 10 following consultation with the supplier. The device at Linn Mill was reinstalled following maintenance on 11/04/12 and the device at Echline was reinstalled on 12/04/12, also following maintenance.



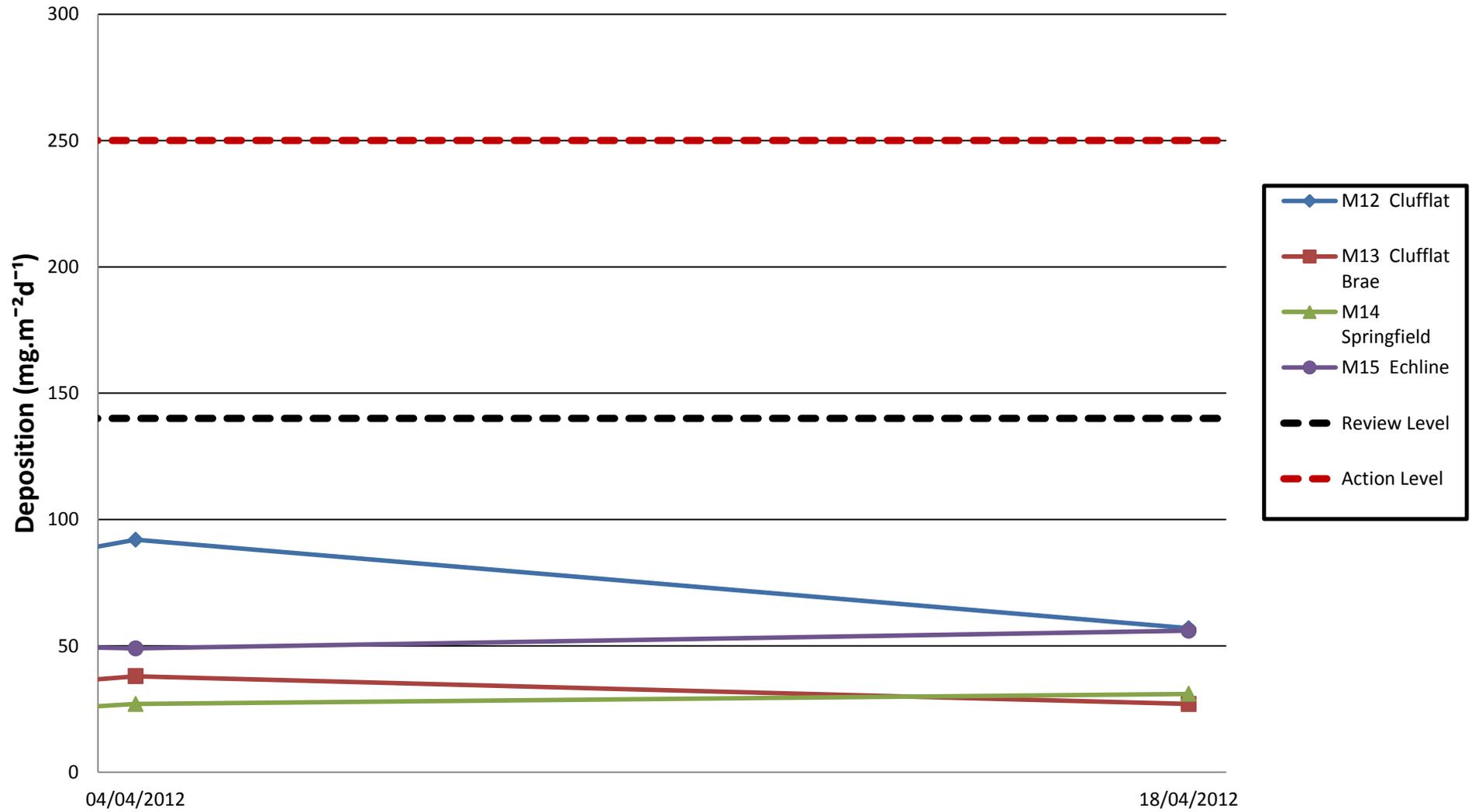
APPENDIX B: FRISBEE GAUGE RESULTS

Frisbee Dust Deposition Results: Group 1 - April 2012
Locations: M7 Butlaw Fisheries, M8 Barracks West, M9 Barracks East, M10 Inchgarvie Lodge and M11 Linn Mill



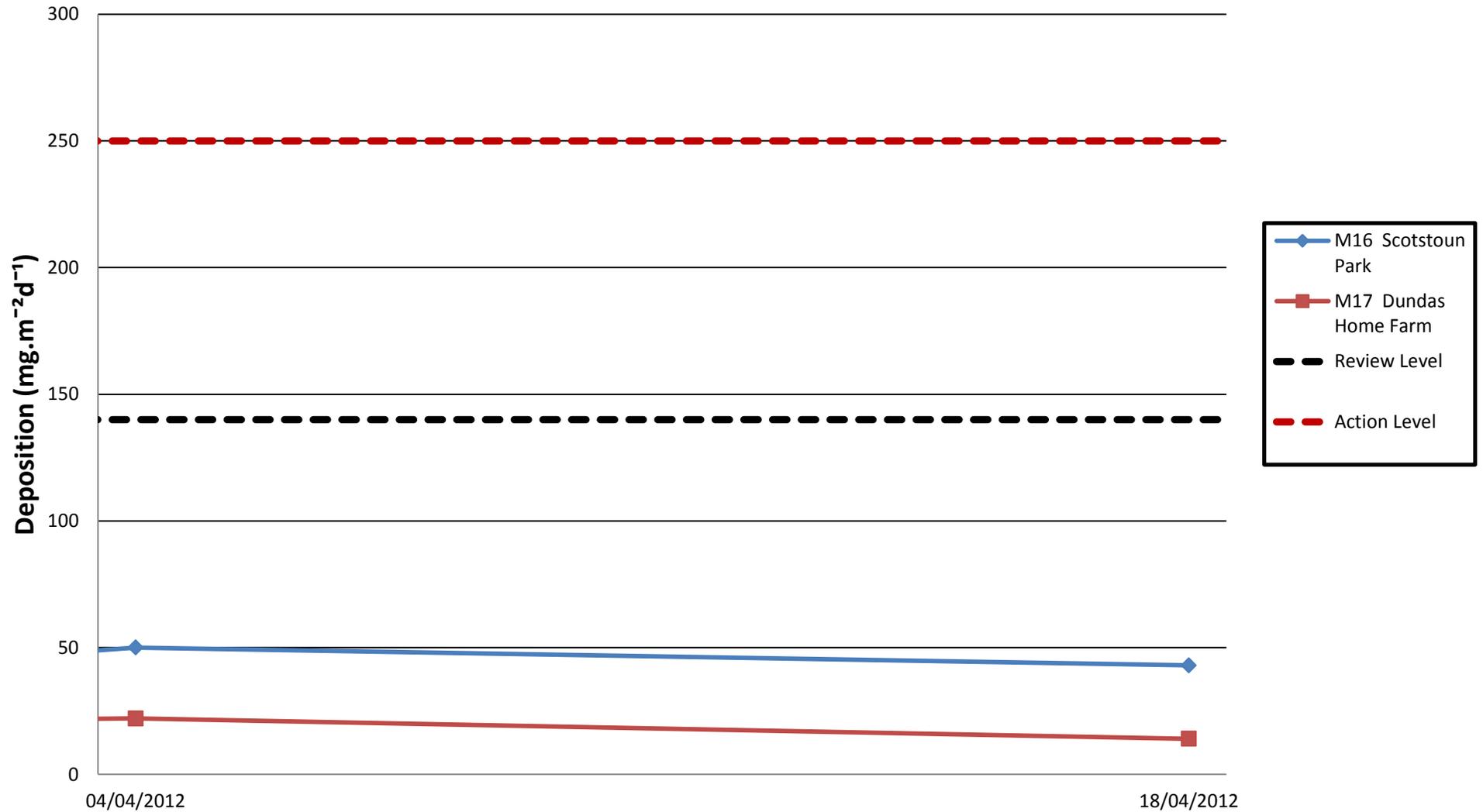
Frisbee Dust Deposition Results: Group 2- April 2012

Locations: M12 Clufflat, M13 Clufflat Brae, M14 Springfield and M15 Echline



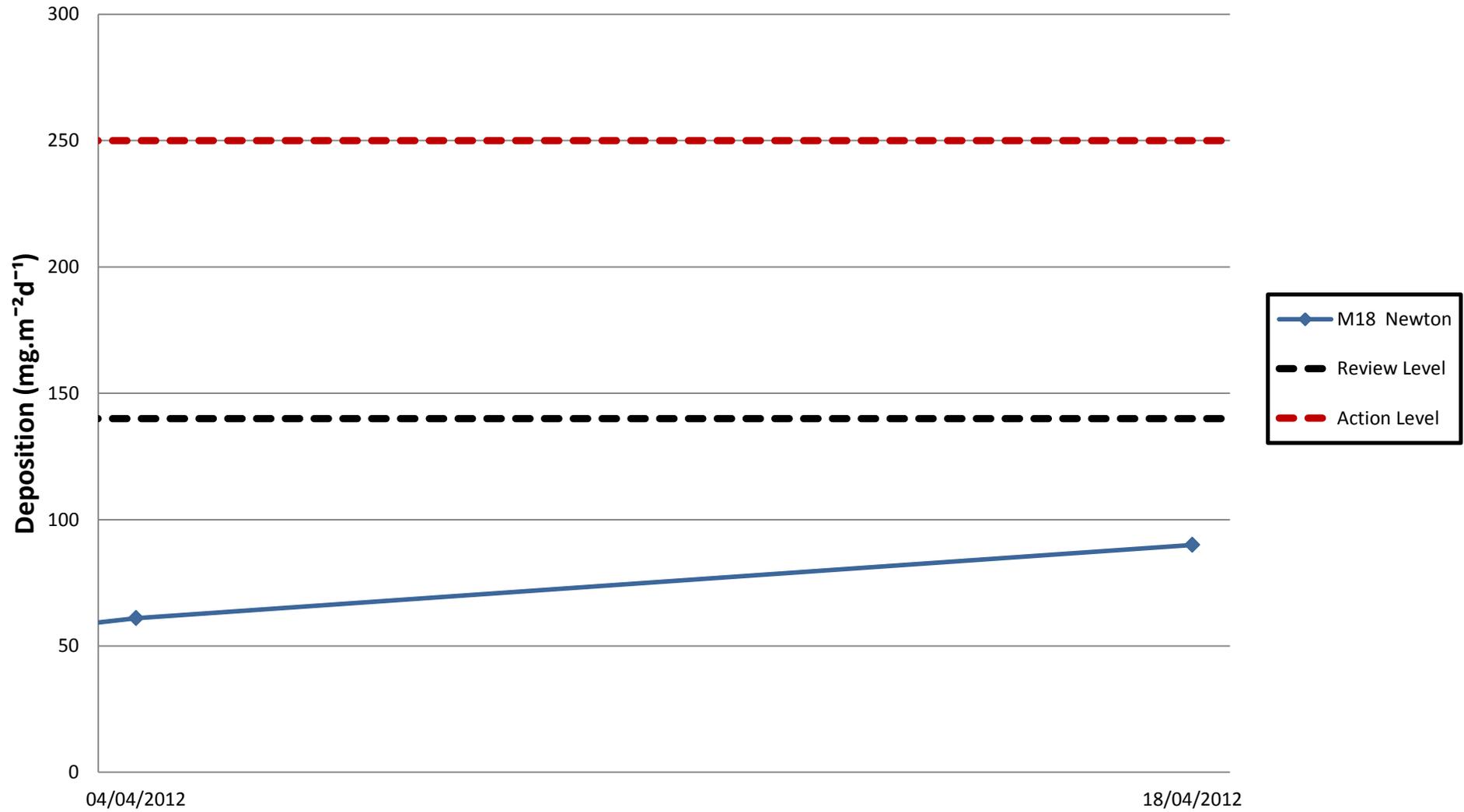
Frisbee Dust Deposition Results: Group 3 - April 2012

Locations: M16 Scotstoun Park and M17 Dundas Home Farm



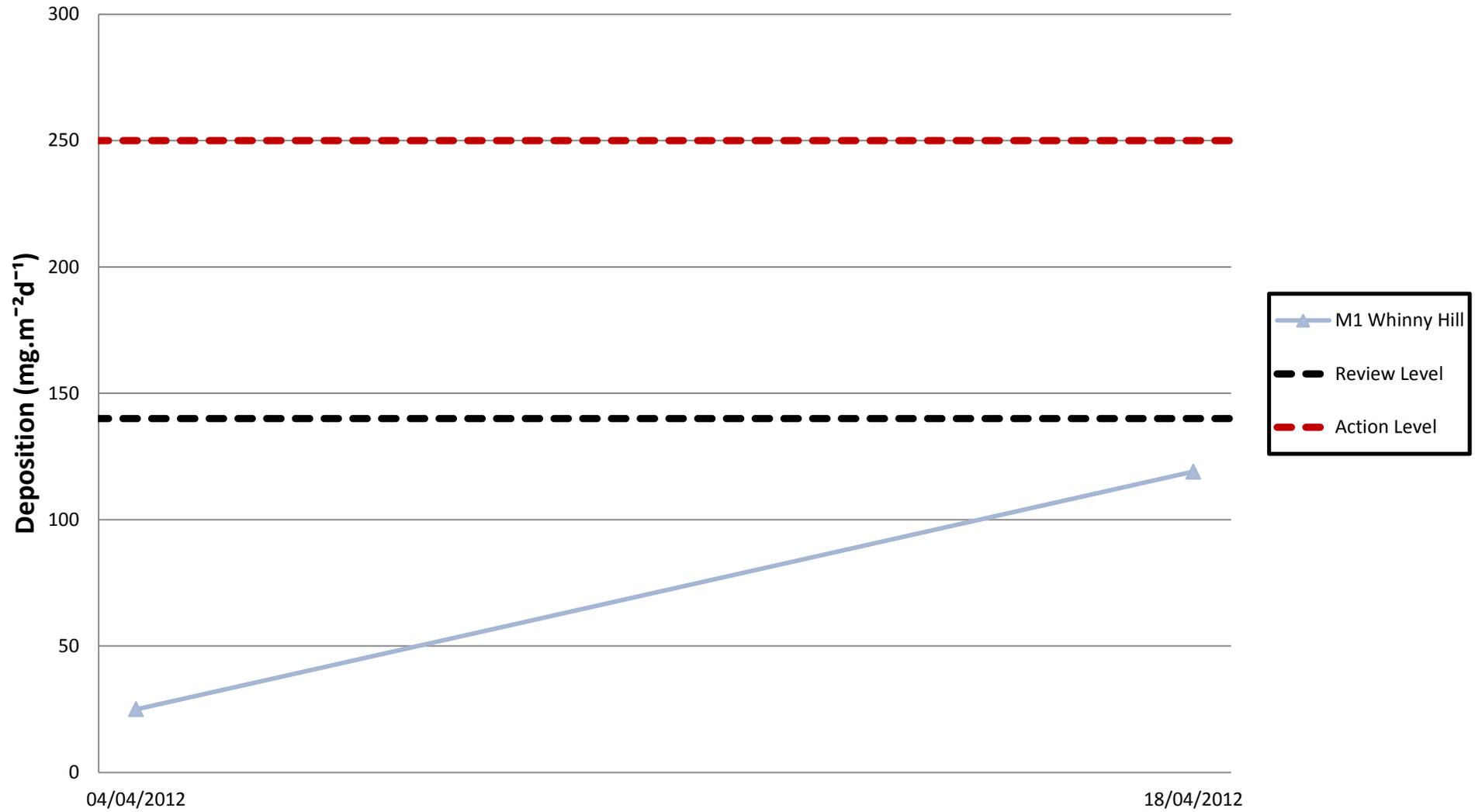
Frisbee Dust Deposition Results: Group 4 - April 2012

Location: M18 Newton



Frisbee Dust Deposition Results: Group 5 - April 2012

Location: M1 Whinny Hill



APPENDIX C: DAILY DUST LOG

Daily Dust Log - North - April 2012

DATE	COMPLETED BY	TIME	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	OTHER COMMENTS	Actions (if applicable)
01/04/2012											
02/04/2012	LSN	PM	N	LIGHT	SW	DAMP	N	N		Damp Day - Adequate suppression across the site	
03/04/2012	SSD	PM	N	STRONG	W	DAMP/WET	N	N			
04/04/2012	ESE	PM	N	LIGHT	NW	DAMP/WET	N	N			
05/04/2012	ESE	AM	N	LIGHT	W	DAMP	N	N			
06/04/2012	ESE	PM	N	LIGHT	W	DAMP/WET	N	N			
07/04/2012											
08/04/2012											
09/04/2012	ESE	AM	N	LIGHT	S	DAMP	N	N		No construction works occurring on site.	
10/04/2012	SSD	AM	N	LIGHT	W	DAMP/WET	N	N			
11/04/2012	SSD	AM	N	LIGHT	W	DAMP/WET	N	N			
12/04/2012	SSD	AM	N	LIGHT	NW	DAMP/WET	N	N			
13/04/2012	ESE	PM	N	LIGHT	W	DAMP	N	N			
14/04/2012											
15/04/2012											
14/04/2012	SSD	PM	N	NONE	W	DAMP	N	N			
17/04/2012	SSD	PM	N	LIGHT	W	DAMP/WET	N	N			
18/04/2012	SSD	AM	N	LIGHT	NE	DAMP/WET	N	N			
19/04/2012	SSD	AM	N	LIGHT	NW	DAMP/WET	N	N			
20/04/2012	ESE	PM	N	LIGHT	W	DAMP	N	N			
21/04/2012											
22/04/2012											
23/04/2012	SSD	PM	N	LIGHT	NW	DAMP/WET	N	N			
24/04/2012	SSD	PM	N	LIGHT	W	DAMP/WET	N	N			
25/04/2012	SSD	AM	N	NONE	NW	DAMP/WET	N	N			
26/04/2012	SSD	AM	N	LIGHT	NW	DAMP/WET	N	N			
27/04/2012	SSD	AM	N	LIGHT	W	DAMP	N	N			
28/04/2012											
29/04/2012											
30/04/2012	ESE	PM	N	LIGHT	W	DAMP/WET	N	N			

Daily Dust Log - South - April 2012

DATE	COMPLETED BY	TIME	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	OTHER COMMENTS	Actions (if applicable)
01/04/2012											
02/04/2012	LSN	PM	S	LIGHT	W	DAMP/WET	N	N		Damp conditions - little to cause dust	
03/04/2012	SSD	PM	S	STRONG	W	DAMP/WET	N	N			
04/04/2012	SSD	AM	S	LIGHT	NW	DAMP/WET	N	N			
05/04/2012	ESE	PM	S	LIGHT	W	DAMP	N	N			
06/04/2012	ESE	PM	S	LIGHT	W	DAMP/WET	N	N		Little/No work on site	
07/04/2012											
08/04/2012											
09/04/2012	ESE	AM	S	LIGHT	S	DAMP	N	N		No construction on site (Bank holiday)	
10/04/2012	LSN	AM	S	LIGHT	W	DAMP/WET	N	N			
11/04/2012	SSD	PM	S	NONE	W	DAMP/WET	N	N			
12/04/2012	SSD	PM	S	LIGHT	NW	DAMP/WET	N	N			
13/04/2012	ESE	PM	S	LIGHT	W	DAMP	N	N			
14/04/2012											
15/04/2012											
16/04/2012	SSD	PM	S	NONE	W	DRY	N	N			
17/04/2012	SSD	AM	S	LIGHT	W	DAMP/WET	N	N			
18/04/2012	SSD	PM	S	LIGHT	NE	DAMP/WET	N	N			
19/04/2012	SSD	PM	S	LIGHT	NW	DAMP/WET	N	N			
20/04/2012	ESE	PM	S	LIGHT	W	DAMP	N	N			
21/04/2012											
22/04/2012											
23/04/2012	SSD	PM	S	LIGHT	NW	DAMP/WET	N	N			
24/04/2012	SSD	AM	S	NONE	NE	DAMP/WET	N	N			
25/04/2012	SSD	PM	S	LIGHT	NW	DAMP/WET	N	N			
26/04/2012	SSD	PM	S	LIGHT	NE	DAMP/WET	N	N			
27/04/2012	SSD	PM	S	LIGHT	W	DAMP	N	N			
28/04/2012											
29/04/2012											
30/04/2012	ESE	PM	S	LIGHT	W	DAMP/WET	N	N			



APPENDIX D: SUMMARY OF ENVIRONMENTAL INSPECTIONS

Summary of Dust and Air Quality Section of Environmental Inspections Undertaken in April 2012

Date	Location	Dust and Odour				Comments/Actions
		Signs of dust or odour leaving site	Burning on site	Adequate suppression/monitoring	Materials damped down/covered when entering/leaving site	
02/04/2012	St Margaret's Marsh	No	No	Yes	No	Very light dust
06/04/2012	Dundas Estate	No	No	Yes	N/A	Damp conditions. No vehicles entering/leaving site
06/04/2012	Echline Field	No	No	Yes	N/A	Damp conditions. No vehicles entering/leaving site
13/04/2012	St Margaret's Marsh	No	No	Yes	N/A	No transportation of materials
13/04/2012	Echline Field	No	No	Yes	N/A	No transportation of materials
24/04/2012	Scotstoun Woodland	No	No	N/A	N/A	No earthworks. Felling works only.