



Contractor



Forth Crossing Bridge Constructors

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Project **FORTH REPLACEMENT CROSSING**

Document title

AIR QUALITY MONITORING REPORT
MAY 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 May 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 (PM_{10}) 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 May
M1	Whinny Hill	Frisbee	21/03/12	Overburden Removal Removal of loose rock
		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 Earthworks Drainage works Tarring of track
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	Utility works Earthworks Drainage works
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	Utility works Earthworks Drainage works
M13	Clufflat Brae	Frisbee	21/09/11	
		Automatic light scatter meter	24/10/11	
M14	Springfield	Frisbee	15/08/11	Works at Southern Compound Utility works Earthworks Drainage works Soil Stripping
M15	Echline	Frisbee	16/08/11	Compound Utility works Earthworks Drainage works Soil Stripping
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	LMA fencing Vegetation mulch and removal
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	Utilities works
		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 May 2012 have been presented in a monthly chart; this can be found in Appendix A. Results show that there were no exceedances of the PM₁₀ threshold during May, and that results were generally low throughout the period. 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 generally follow the same pattern at a similar level to those results collected by the TEOMs; this indicates that the pattern observed throughout May was largely due to regional changes in air quality, rather than due to construction works.
- 3.1.2.** Due to some periods of dry weather occurring during May, all locations were closely monitored. Real time monitoring of particulate matter enabled immediate action to be taken when instances of high particulate matter were recorded over a short period of time. Such triggers ensured that the bowser was in use across the site during these periods. In particular, Linn Mill was closely monitored on 22 and 28 May to ensure that the threshold was not breached.
- 3.1.3.** Due to low readings at Dundas during previous months, in comparison to the other meters on site, the meter at this location was remotely re-calibrated by the manufacturer on 23 May. Results from the date of re-calibration forward are shown in the monthly chart; due to uncertainties concerning the accuracy of the May results prior to this date, data has not been shown for the period from 1 May to 23 May. Additionally, due to a loss of the power supply at Echline, the data from this meter is missing from 19 May onwards. FCBC are currently working to restore the power supply to this device.

3.2. Frisbee Dust Deposition Results

3.2.1. The Frisbee dust deposition results for May 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 are collected fortnightly, and the results averaged over this fortnight period to give a daily dust deposition rate. Three collection dates fell during May; 2 May, 16 May and 30 May 2012. Due to delay in the return of the equipment from the supplier following testing, the collection due on the 16 May was delayed until the 22 May. This resulted in the results being averaged over a period of 20 days between 2 May and 22 May and averaged over a shorter period of only 8 days from 22 May to 30 May. The next collection date is due on the 13 June.

3.2.3. The site action level for the dust deposition rate has been set at 250 mg/m²/day and a site review level set at 140 mg/m²/day to ensure a site wide investigation and review into dust deposition levels and the appropriateness and effectiveness of the mitigation measures response currently in use. Dust deposition rates were largely low throughout May and were found to be below the action level throughout May. The results for the period ending on 30 May showed that the review level

had been exceeded at two locations in both Groups 1 and 2 (Group 1: Inchgarvie Lodge and Barracks East; Group 2: Springfield and Echline).

- 3.2.4.** During the period for which dust levels were found to exceed the site review level, the weather conditions were dry. As a result, dust levels on site were closely monitored (aided by the real time particulate matter monitoring - see 3.1.2, daily dust inspections – 3.3.1 and environmental inspections – 3.3.2) and appropriate mitigation measures were implemented on site. A bowser was present on site throughout the period of dry weather to dampen down the track as required to prevent the spread of dust from the areas in which earthworks were on-going. Due to the exceedance a review of the current mitigation measures was undertaken, and further mitigation measures were not considered necessary on site at present.

3.3. Daily Dust Log and Environmental Inspections

- 3.3.1.** A summary of the daily dust log for May can be found in Appendix C. For the Southern work areas, 3 instances of dust due to construction works were noted. On each of these occasions, small plumes of dust were noted to be rising due to vehicle movements on dry tracks. However, it should be noted that the bowser was present on site to dampen down the tracks where dust plumes were noted. Dust was also noted on two occasions in the North work areas. Both of these instances were also due to vehicle movements. The bowser was present at the time to dampen down the tracks.
- 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. Eleven inspections across the site were undertaken by the FCBC Environmental Department during May, focussing on areas in which

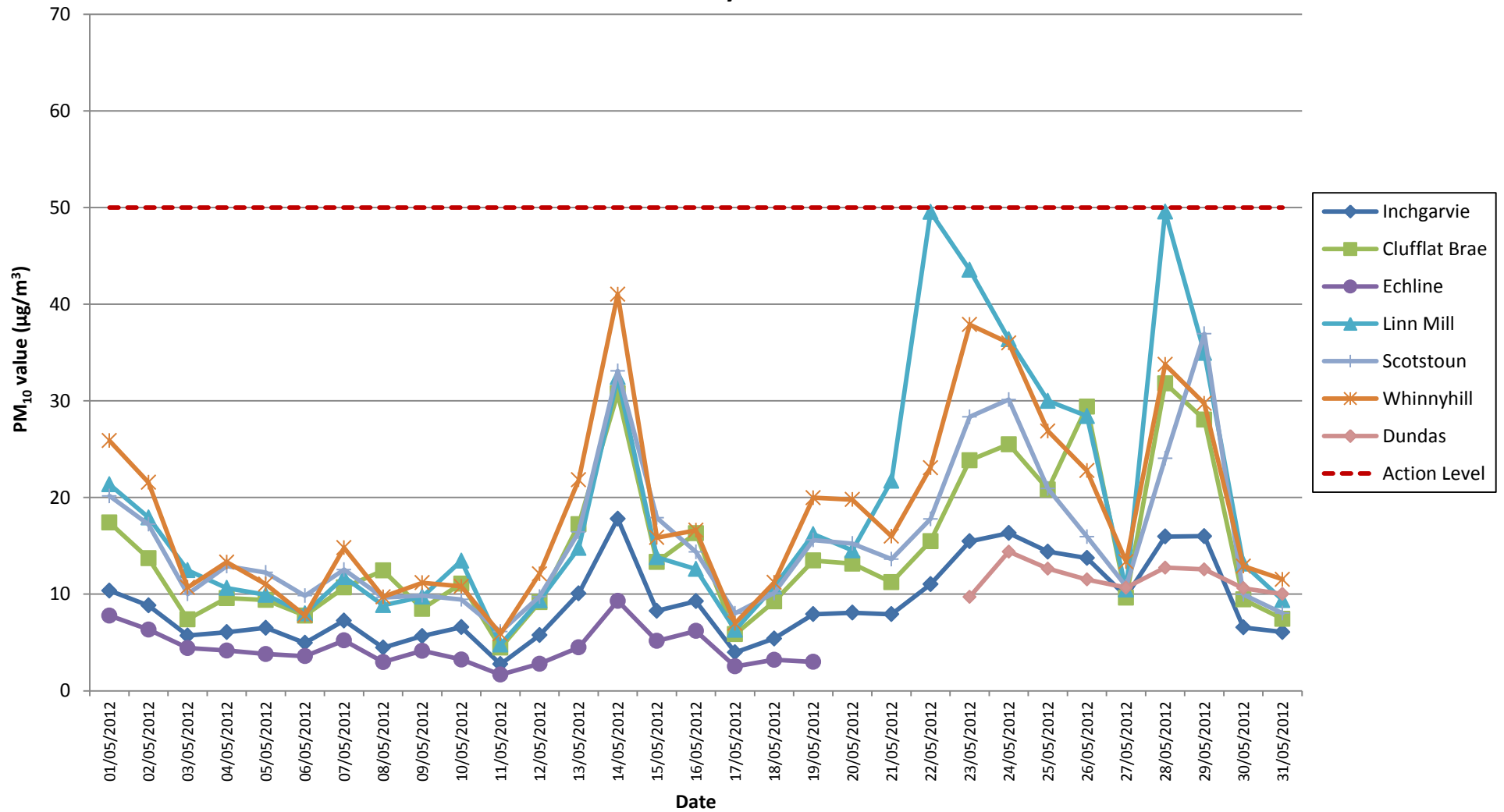
works were being undertaken. One instance of low levels of dust leaving the site was noted on 21 May at Inchgarvie House and no bowser was seen to be present on site. Low dust levels were also noted at St Margaret's Marsh on 1 May, although on this occasion dust was not found to be leaving the site. On both instances, the environmental team contacted the appropriate network senior engineers to ensure that mitigation measures, in particular dampening down of materials, were implemented in these locations.



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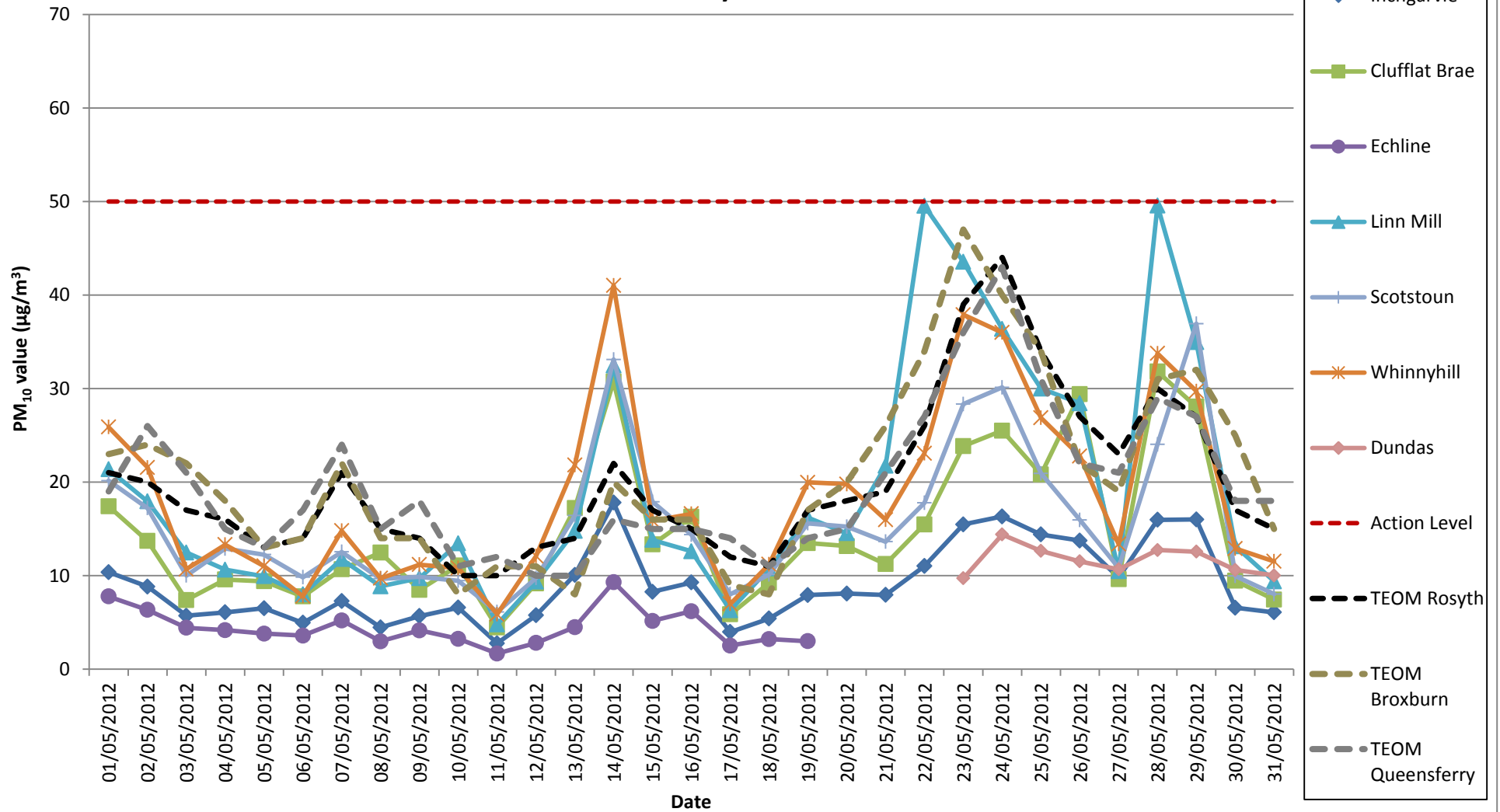
APPENDIX A: LIGHT SCATTER METER RESULTS

Air Quality (Particulate Matter) Results All Monitoring Locations May 2012



Note: Due to a loss of power at Echline, no PM₁₀ data is available for this location from 19/05/12 to 31/05/12. Due to an error with the calibration of the device at Dundas, this data has been excluded for 01/05/12 to 22/05/12; the device was recalibrated on 23/05/12.

Air Quality (Particulate Matter) Results (including external TEOM results) All Monitoring Locations May 2012

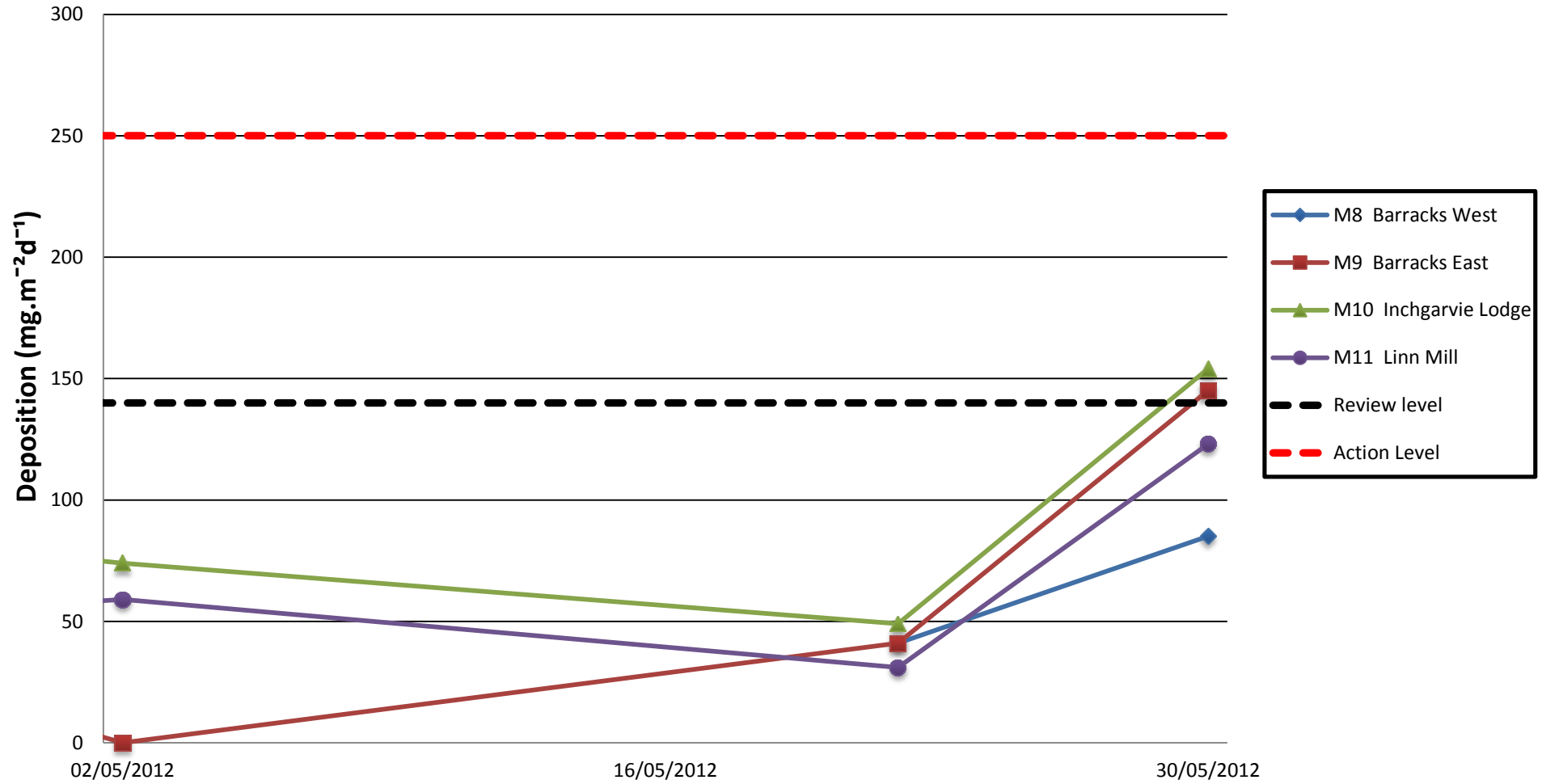


Note: Due to a loss of power at Echline, no PM₁₀ data is available for this location from 19/05/12 to 31/05/12. Due to an error with the calibration of the device at Dundas, this data has been excluded for 01/05/12 to 22/05/12; the device was recalibrated on 23/05/12.



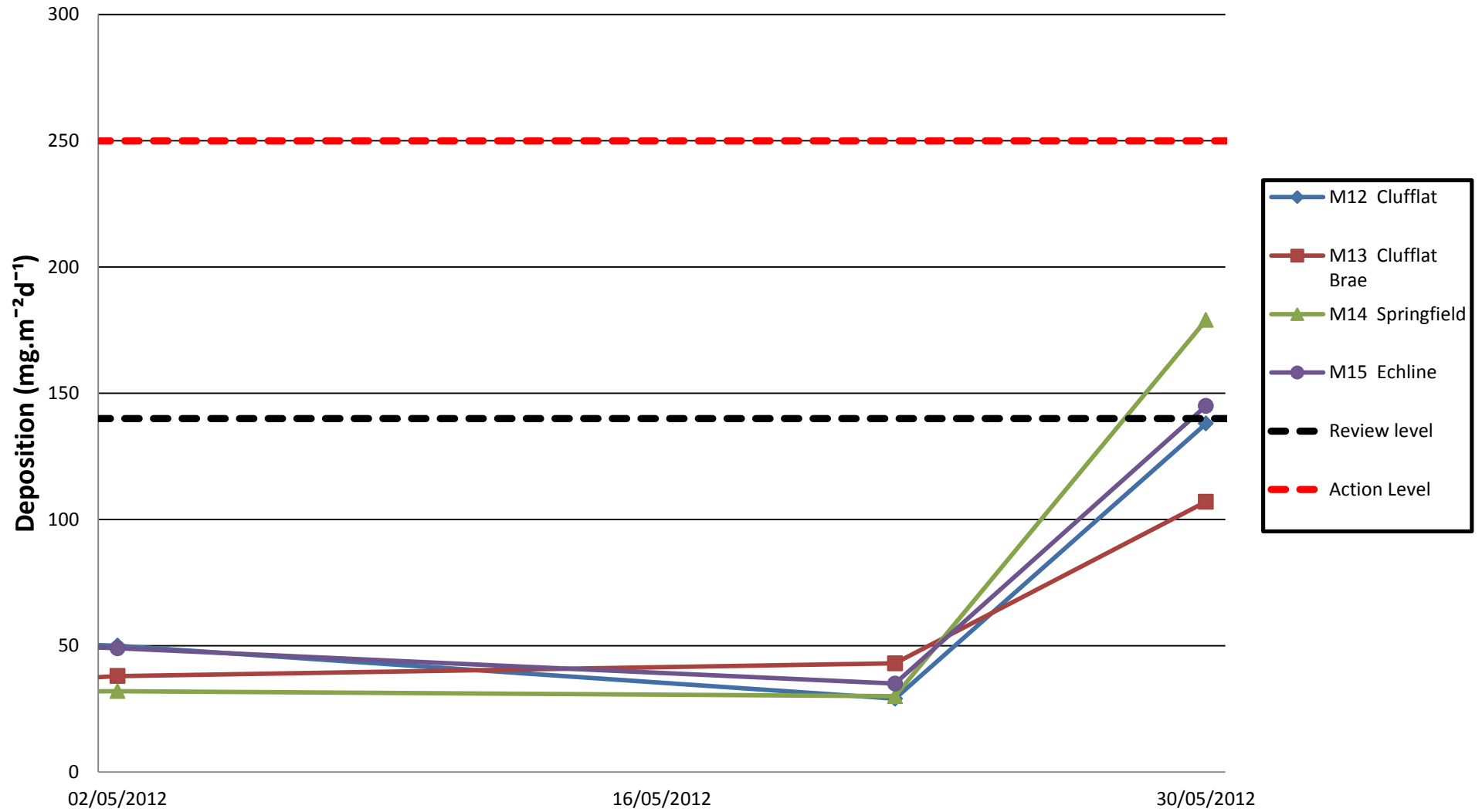
APPENDIX B: FRISBEE GAUGE RESULTS

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



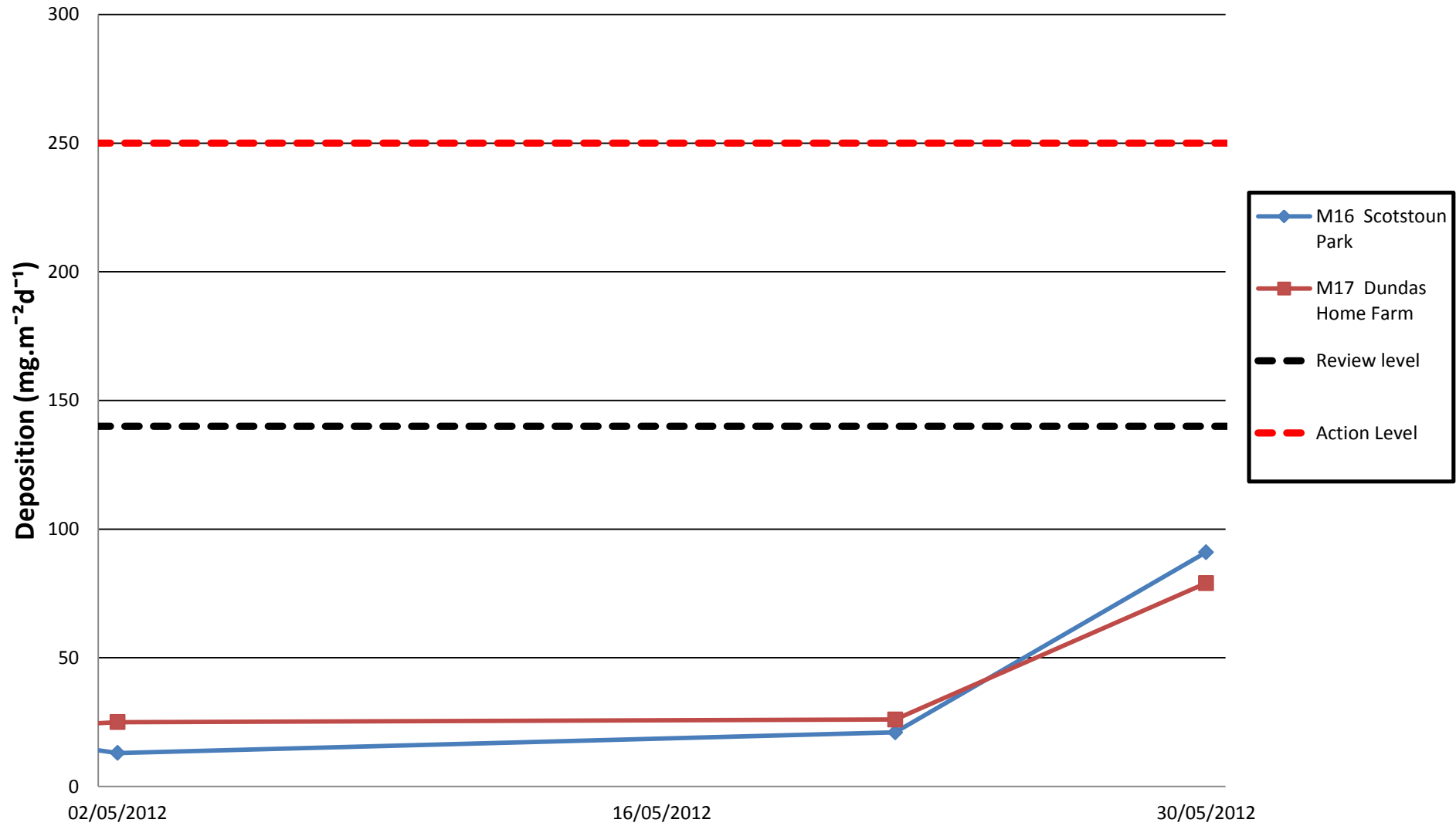
Frisbee Dust Deposition Results: Group 2 - May 2012

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



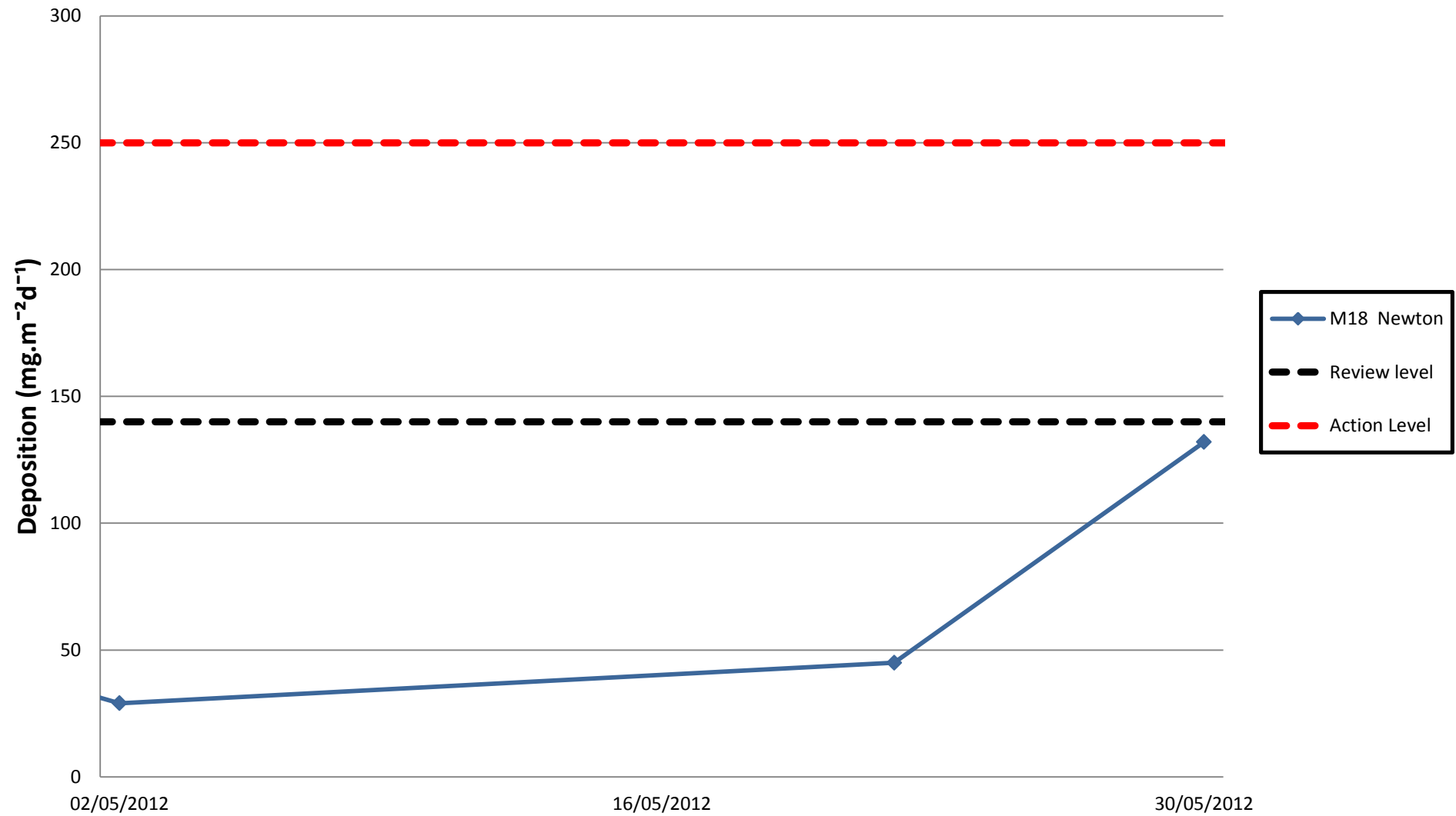
Frisbee Dust Deposition Results: Group 3 - May 2012

Locations: M16 Scotstoun Park and M17 Dundas Home Farm



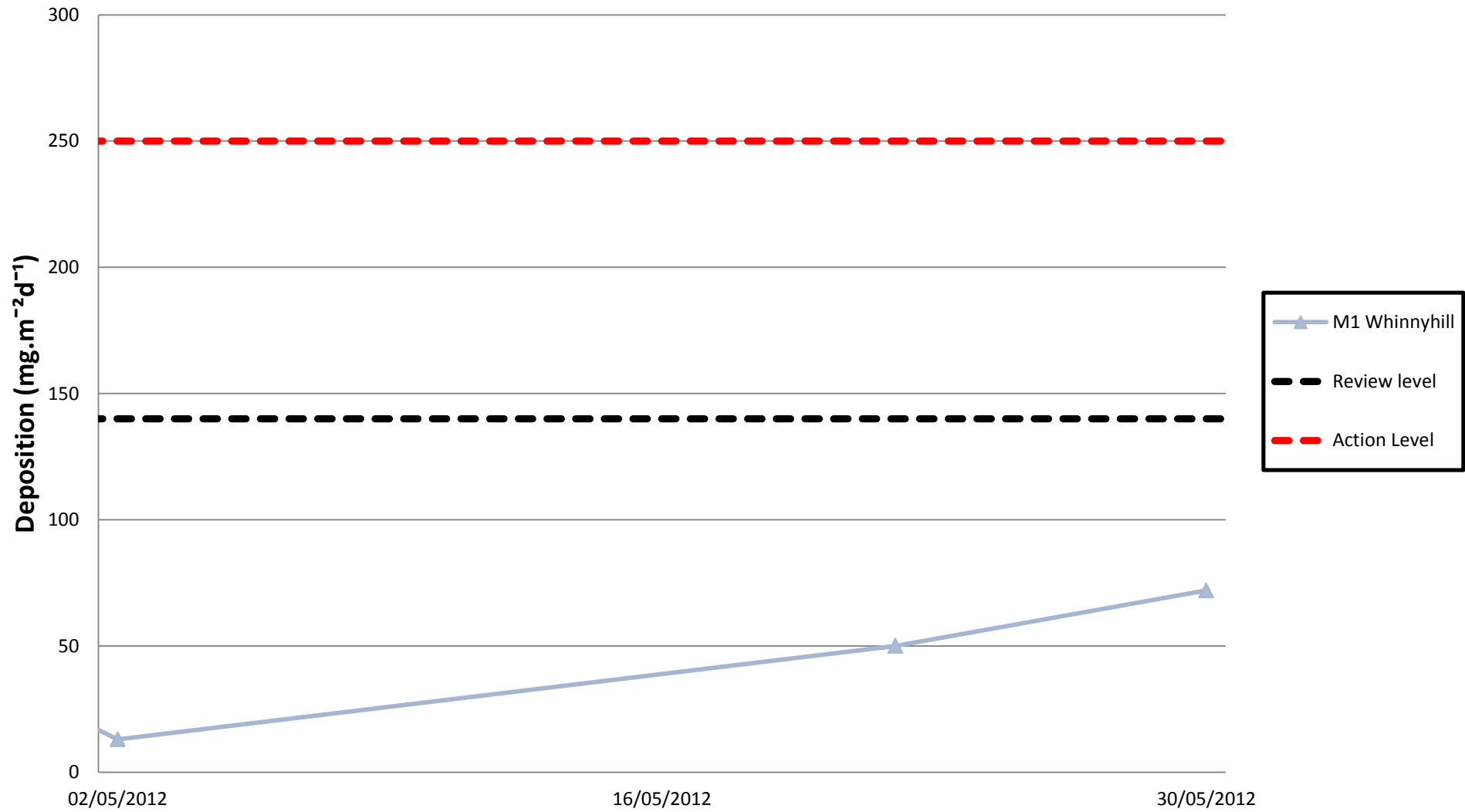
Frisbee Dust Deposition Results: Group 4 - May 2012

Location: M18 Newton



Frisbee Dust Deposition Results: Group 5 - May 2012

Location: M1 Whinny Hill



APPENDIX C: DAILY DUST LOG

Daily Dust Log - North - May 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)
01/05/2012	LSN	PM	N	LIGHT	SE	DRY	Y	Y	Machinery	Dust in area below N abutment. Small amounts but should be monitored	Contact with site agent to ensure mitigation measures implemented
02/05/2012	LSN	PM	N	NONE	NE	DRY	N			No site vehicles active during inspection	
03/05/2012	SSD	AM	N	NONE	NE	DAMP	N				
04/05/2012	ESE	PM	N	LIGHT	NW	DAMP	N				
05/05/2012											
06/05/2012											
07/05/2012	ESE	AM	N	LIGHT	NE	DRY	N			No works ongoing - Bank Holiday	
08/05/2012	SSD	AM	N	LIGHT	W	DAMP	N				
09/05/2012	SSD	AM	N	LIGHT	W	WET	N				
10/05/2012	SSD	PM	N	LIGHT	W	WET	N				
11/05/2012	SSD	PM	N	LIGHT	W	WET	N				
12/05/2012											
13/05/2012											
14/05/2012	LSN	PM	N	LIGHT	W	WET	N			Very wet	
15/05/2012	LSN	PM	N	LIGHT	W	DRY	N			No dust at Whinny Hill - lots of construction traffic in area	
16/05/2012	ESE	AM	N	LIGHT	W	DAMP	N				
17/05/2012	SSD	AM	N	LIGHT	SW	WET	N				
18/05/2012	SSD	AM	N	LIGHT	W	WET	N				
19/05/2012											
20/05/2012											
21/05/2012	LSN	PM	N	LIGHT	W	DRY	N			Bowser on site - dust not present during dry conditions	
22/05/2012	ESE	PM	N	LIGHT	NE	DRY	N				
23/05/2012	SSD	AM	N	LIGHT	NE	DRY	Y	Y	Lorries and road sweeper	Works at new Ferrytoll Road - dust caused by lorries leaving and entering site and also by road sweeper causing excess dust	Contact with site agent to ensure mitigation measures implemented
24/05/2012	ESE	PM	N	NONE	NE	DRY	N				
25/05/2012	ESE	PM	N	NONE	E	DRY	N				
26/05/2012											
27/05/2012											
28/05/2012	SSD	AM	N	LIGHT	W	DRY	N				

29/05/2012	SSD	AM	N	LIGHT	NE	DRY	N				
30/05/2012	ESE	PM	N	LIGHT	NE	DAMP	N				
31/05/2012	SSD	PM	N	LIGHT	W	WET	N				

Daily Dust Log - South - May 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)
01/05/2012	ESE	PM	S	LIGHT	SE	DAMP	N				
02/05/2012	SSD	AM	S	LIGHT	NE	DAMP	N				
03/05/2012	SSD	AM	S	NONE	NW	DAMP	N				
04/05/2012	ESE	PM	S	LIGHT	NE	DAMP	N				
05/05/2012											
06/05/2012											
07/05/2012	SSD	PM	S	LIGHT	NE	DAMP	N				
08/05/2012	SSD	PM	S	LIGHT	W	DAMP	N				
09/05/2012	SSD	PM	S	LIGHT	W	WET	N				
10/05/2012	SSD	PM	S	LIGHT	W	WET	N				
11/05/2012	SSD	PM	S	LIGHT	W	WET	N				
12/05/2012											
13/05/2012											
14/05/2012	LSN	PM	S	STRONG	W	DAMP/WET	N			Very wet	
15/05/2012	LSN	AM	S	STRONG	W	DRY	N				
16/05/2012	ESE	PM	S	LIGHT	W	DAMP	N				
17/05/2012	SSD	PM	S	LIGHT	SW	WET	N				
18/05/2012	SSD	AM	S	LIGHT	W	WET	N				
19/05/2012											
20/05/2012											
21/05/2012	LSN	PM	S	LIGHT	W	DRY	Y	Y	Trucks on access tracks	Small plumes of dust present across site due to works. No supression seen on site	ESE contacted AME and KMD - bowser present on site.
22/05/2012	ESE	PM	S	LIGHT	NE	DRY	Y	Y	Vehicles on dry track, particularly at Linn Mill	Bowser on site	ESE spoke to site foreman.
23/05/2012	ESE	PM	S	NONE	NE	DRY	Y	Y	Vehicles on dry track	Slight amount of dust. Bowser on site - evidence of dampening down	Confirmation from site agent that bowser was on site
24/05/2012	ESE	PM	S	NONE	E	DRY	N			No dust on site at time of check - bowser in use to prevent generation of dust from vehicles on track - tracks damp/wet at time of inspection	
25/05/2012	SSD	AM	S	LIGHT	W	DRY	N				
26/05/2012											
27/05/2012											
28/05/2012	SSD	PM	S	LIGHT	NE	DRY	N			Track wet - bowser present	

29/05/2012	SSD	PM	S	LIGHT	NE	DRY	N				
30/05/2012	ESE	PM	S	LIGHT	NE	DAMP	N				
31/05/2012	SSD	PM	S	LIGHT	W	WET	N				



APPENDIX D: SUMMARY OF ENVIRONMENTAL INSPECTIONS

Summary of Dust and Air Quality Section of Environmental Inspections Undertaken in May 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	
01/05/2012	St Margaret's Marsh	No	No	No	Yes	Low levels of dust in working area. No suppression noticed during inspection. Wheel wash in place.
04/05/2012	Lower Echline Field	No	No	Yes	Yes	Damp conditions
07/05/2012	North Abutment	No	No	Yes	N/A	No transportation of materials
21/05/2012	Inchgarvie	Yes	No	No	No	Some small plumes of dust. No bowser seen on site. No wheel wash present.
24/05/2012	North Abutment	No	No	Yes	N/A	No transportation of materials
24/05/2012	Echline/Springfield	No	No	Yes	N/A	Evidence of bowser on site - tracks wet/damp. No transportation of materials
28/05/2012	Linn Mill	No	No	Yes	Yes	Tracks wet - no dust rising. All trucks on site not overfilled so no dust rising from trailers.
30/05/2012	Dundas Estate	No	No	Yes	N/A	Damp conditions. No transportation of materials
30/05/2012	Dolphington/Scotstoun	No	No	Yes	N/A	Damp conditions. No transportation of materials
30/05/2012	Echline/Springfield	No	No	Yes	N/A	Damp conditions. Transportation of materials around site only - no vehicles entering/leaving the site with materials
30/05/2012	Inchgarvie	No	No	Yes	N/A	Damp conditions. Transportation of materials around site only - no vehicles entering/leaving the site with materials