



Contractor



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Project **FORTH REPLACEMENT CROSSING**

Document title

**AIR QUALITY MONITORING REPORT**  
**JUNE 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 June 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. Seven automatic light scatter meters have also been installed at various sensitive locations to measure real time particulate matter (PM<sub>10</sub>) concentrations and the Total Suspended Particle (TSP) concentrations. 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.

**Table 1: Air Quality Monitoring Locations**

Ref:	Monitoring Location	Monitoring Equipment	Installation Date	Construction Activities in June
M1	Whinny Hill	Frisbee	21/03/12	Drilling for blasting Blasting Rock Removal Breaking out rock
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	Utility works Site clearance at Society Road Marine works
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

Ref:	Monitoring Location	Monitoring Equipment	Installation Date	Construction Activities in June
		Automatic light scatter meter	17/10/11	Earthworks Drainage works Rock excavation
M11	Linn Mill	Frisbee	22/08/11	Utility works Earthworks Fencing Drainage works Soil Stripping and rock excavation
		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 and rock excavation
M15	Echline	Frisbee	16/08/11	Works at Southern Compound Utility works Earthworks Drainage works Soil Stripping and rock excavation
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	Wheel bath installation Soil stripping Importing rock Drainage works
		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
		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 2012 have been presented in a monthly chart; this can be found in Appendix A. Results show that there were no exceedances of the PM<sub>10</sub> threshold during June, and that results were generally low throughout the period. From June, the PM<sub>10</sub> action threshold has been lowered to 45µg/m<sup>3</sup>, in line with the levels set in the updated Environmental Management Plan.

**3.1.2.** The results have been compared to the daily mean results obtained from the TEOM air quality monitoring stations located in Newton, Rosyth, Broxburn and Queensferry Road, Edinburgh. The TEOM at Newton was installed by West Lothian Council, facilitated by FCBC, during May. The results from this station have therefore been included from the start of June. 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 due to regional changes in air quality, rather than due to construction works.

**3.1.3.** Due to a loss of the power supply at Echline, the data from this meter is missing throughout June. FCBC are currently working to restore the power supply to this device.

#### **3.2. Total Suspended Particles**

**3.2.1.** The TSP results for June 2012 have been presented in a monthly chart; this can be found in Appendix B. TSP levels at all monitoring locations throughout June were low and generally found to follow a similar pattern across the site, demonstrating that the levels are influenced by regional changes in TSP levels, rather than construction works.

**3.2.2.** Due to a device error associated with the measurement of TSP at Dundas, the results for this location have been excluded from the graph. This device error resulted in the measurements of TSP being unrealistically low. However, it should be noted that, following consultation with the supplier, this was a device error that affected the measurement of TSP only.

### **3.3. Frisbee Dust Deposition Results**

**3.3.1.** The Frisbee dust deposition results for June 2012 have been presented in charts and can be found in Appendix C. 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.

**3.3.2.** Frisbee dust data deposition results are collected fortnightly, and the results averaged over this fortnight period to give a daily dust deposition rate. Two collection dates fell during June; 13 and 27 June 2012. Due to unforeseen circumstances, the collection due on the 27 June was delayed until the 28 June. This resulted in the results being averaged over a period of 15 days for the second period of this month. The next collection date is due on the 11 July.

**3.3.3.** The site action level for the dust deposition rate has been set at 250 mg/m<sup>2</sup>/day and a site review level set at 140 mg/m<sup>2</sup>/day to ensure a site

wide investigation into dust deposition levels and a review of the appropriateness and effectiveness of the mitigation measures response currently in use.

**3.3.4.** Throughout June the dust deposition rates for Groups 3, 4 and 5 were within the threshold levels. For Group 1, results for all locations were within the threshold dust deposition levels for the fortnight ending on 13 June, however there was an exceedance of the site action level at Inchgarvie Lodge for the period ending on the 27 June. The results for Group 2 show that all locations were within the threshold levels, with the exception of Springfield. For both periods within June, the site action level was exceeded at this location.

**3.3.5.** Due to the exceedances of the site action level on three occasions during June, at two different locations, FCBC conducted a review into site wide dust levels and the construction works being undertaken at these locations. Investigations into the cause of the dusts, however, indicated that the construction works were unlikely to have resulted in the exceedances. South side daily dust inspections (see section 3.4) in the vicinity of the monitoring locations at which the exceedances were recorded did not highlight any instances of high dust levels on site. Wet weather was also frequently recorded and, where dry conditions were noted, the bowser was present on site to dampen down where required. Also, as the prevailing wind direction (as recorded by the onsite weather stations) was north-easterly throughout June, this would have generally carried any dust arising on site away from the monitoring locations at which exceedances were recorded.

**3.3.6.** Additionally, it was recognised that the Frisbees at the affected locations were both situated near to, or under, trees or hedges. Due to their positioning, small particles of vegetation have been observed in the Frisbees at the time of collection. As a result of this finding, and in recognition of the exceedances of the action level, FCBC have slightly altered the location of the Frisbees at these properties in order to

reduce any impact that the surrounding vegetation may have been having on the dust deposition results. Furthermore, it should be noted that the PM<sub>10</sub> and TSP results indicate that the high dust deposition results were not related to construction works; if the dust deposition results were due to a pollution incident then it is likely that the results for the corresponding periods for both PM<sub>10</sub> and TSP would also have been high. As reported in sections 3.1 and 3.2 the PM<sub>10</sub> and TSP results were low throughout June.

### **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. For the Southern work areas, no instances of dust due to construction works were noted. During dry periods the bowser was on site and dampening down materials where required. Dust was noted on two occasions in the North work areas. The daily dust check found drilling works, associated with blasting activities at Whinny Hill, to be causing dust on 14 June. The appropriate network senior engineer was contacted by the FCBC environmental team to ensure that the dust levels from this activity were reduced. Vehicle movements were found to cause small plumes of dust on 18 June; the bowser was present on site to dampen down the tracks as required.
- 3.4.2.** 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 E. Seven inspections across the site were undertaken by the FCBC Environmental Department during June, focussing on areas in which works were being undertaken. Vehicle movements on dry tracks at Dundas Estate were noted to be causing dust and no suppression was noted at the time of the environmental inspection. This was reported to the senior section engineer for the southern network works area to ensure that mitigation measures, notably dampening down, were



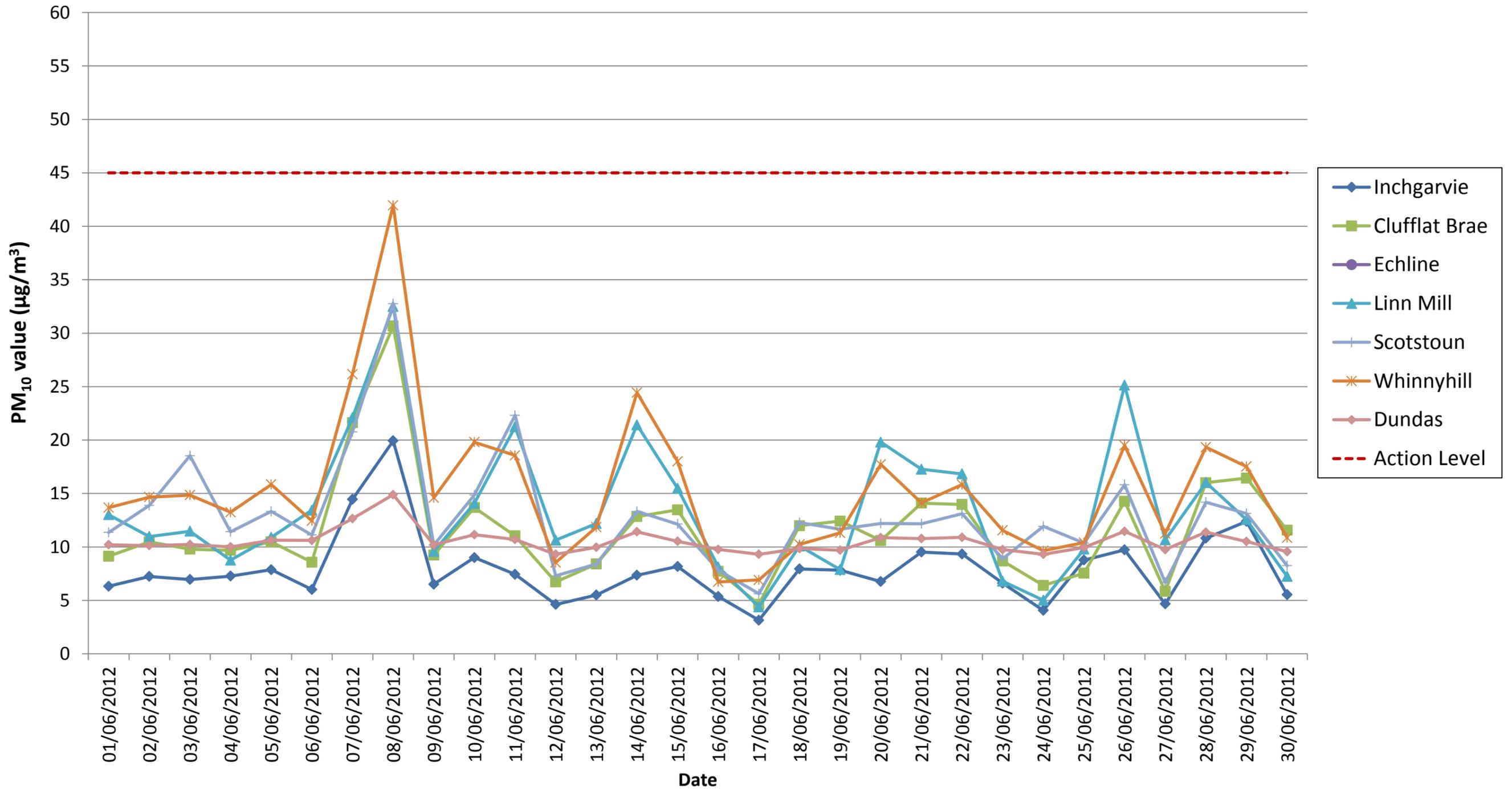
employed. Due to the wet weather conditions, particularly at the end of June, dust levels throughout June were generally not found to be an issue.

## **APPENDIX A: LIGHT SCATTER METER RESULTS**

# PM10 Results

## All Monitoring Locations

### June 2012

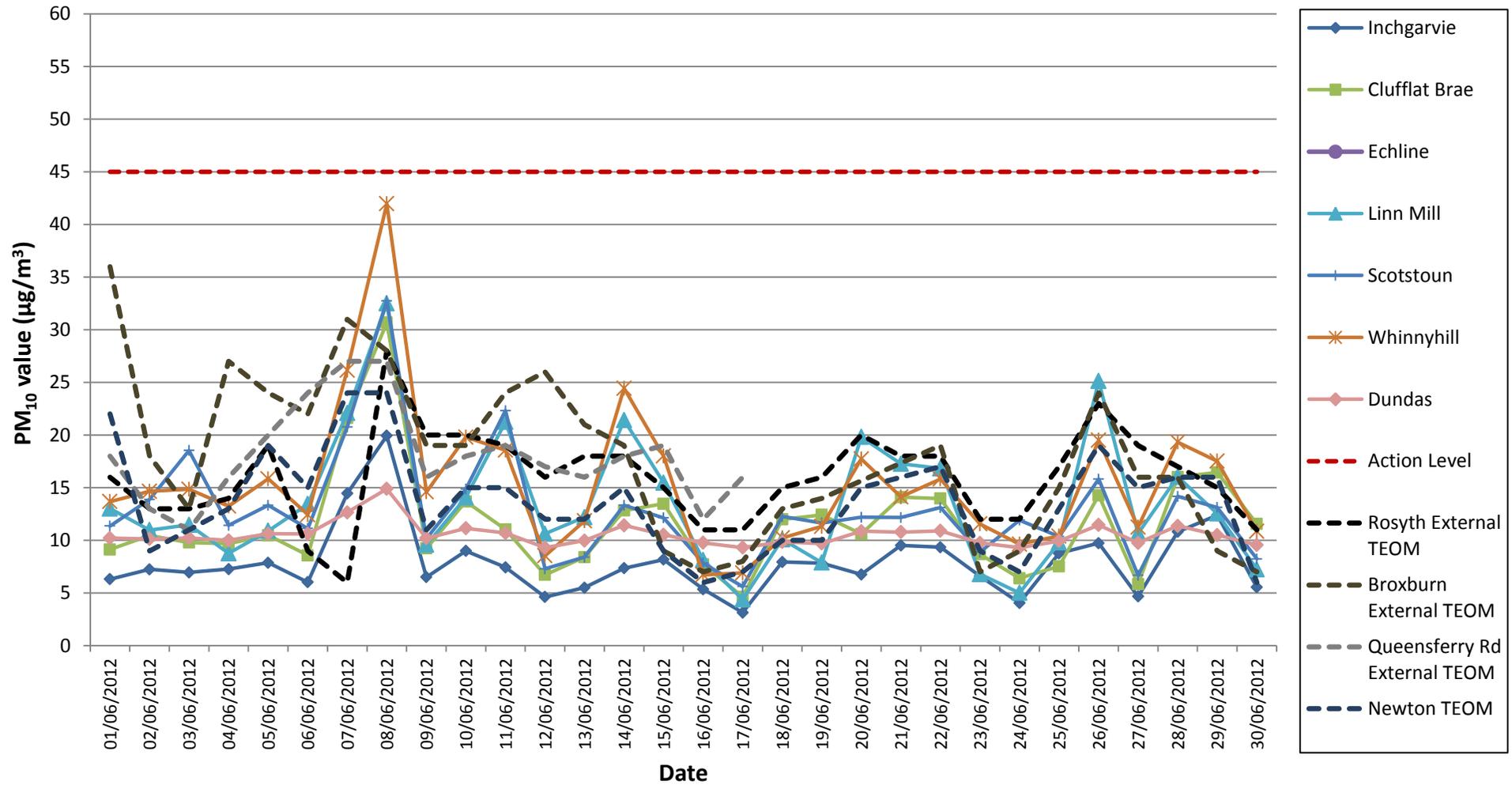


**Note:** Due to a power failure at Echline, no PM<sub>10</sub> data is available for this location

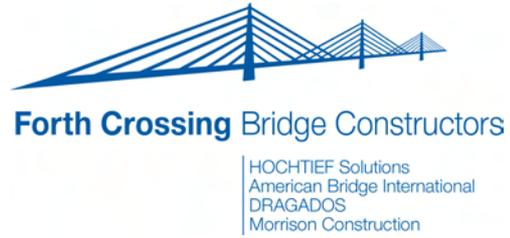
# PM10 Results (including TEOM Results)

## All Monitoring Locations

### June 2012

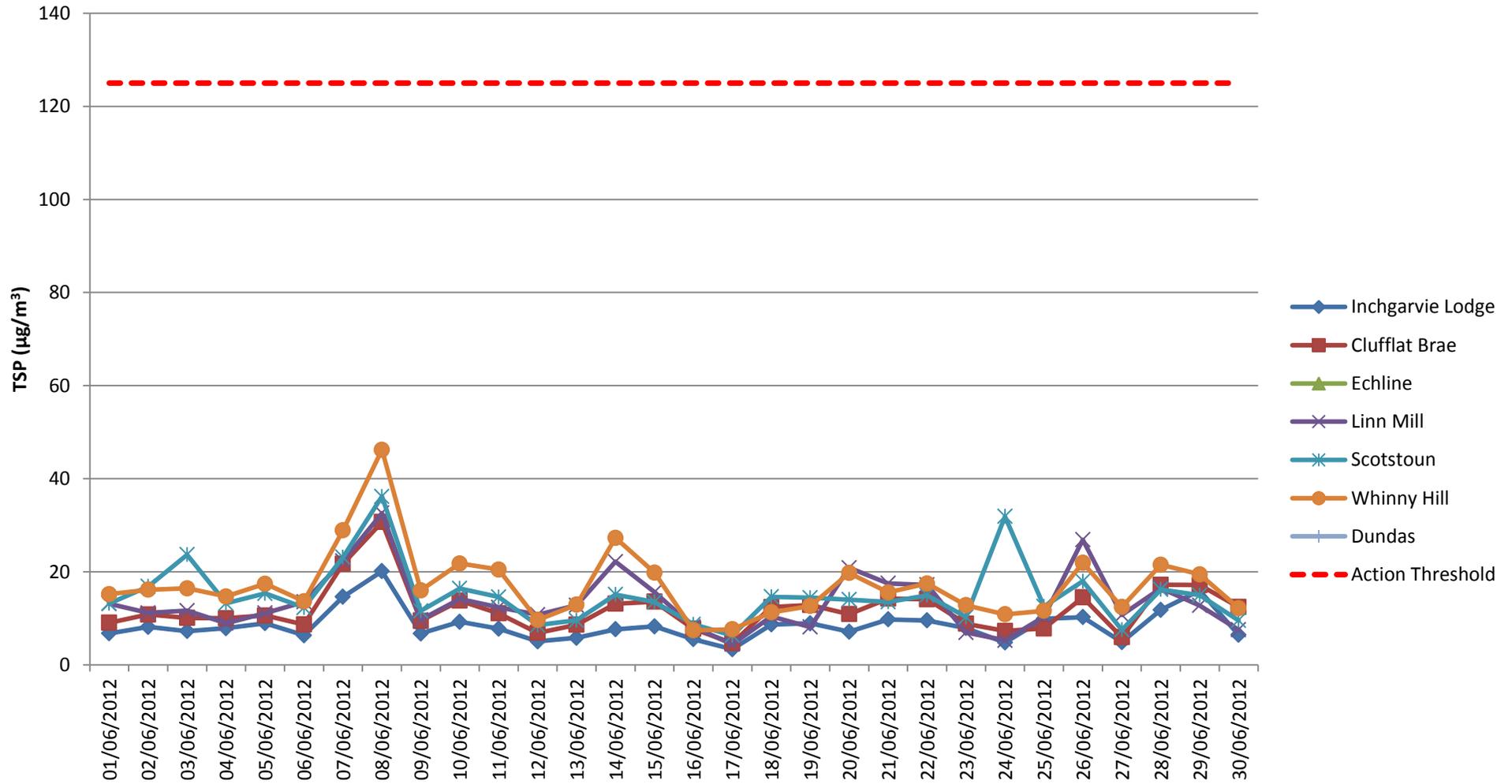


**Note:** Due to a power failure at Echline, no PM<sub>10</sub> data is available for this location



## **APPENDIX B: TOTAL SUSPENDED PARTICLES**

## Total Suspended Particles (TSP) Results June 2012

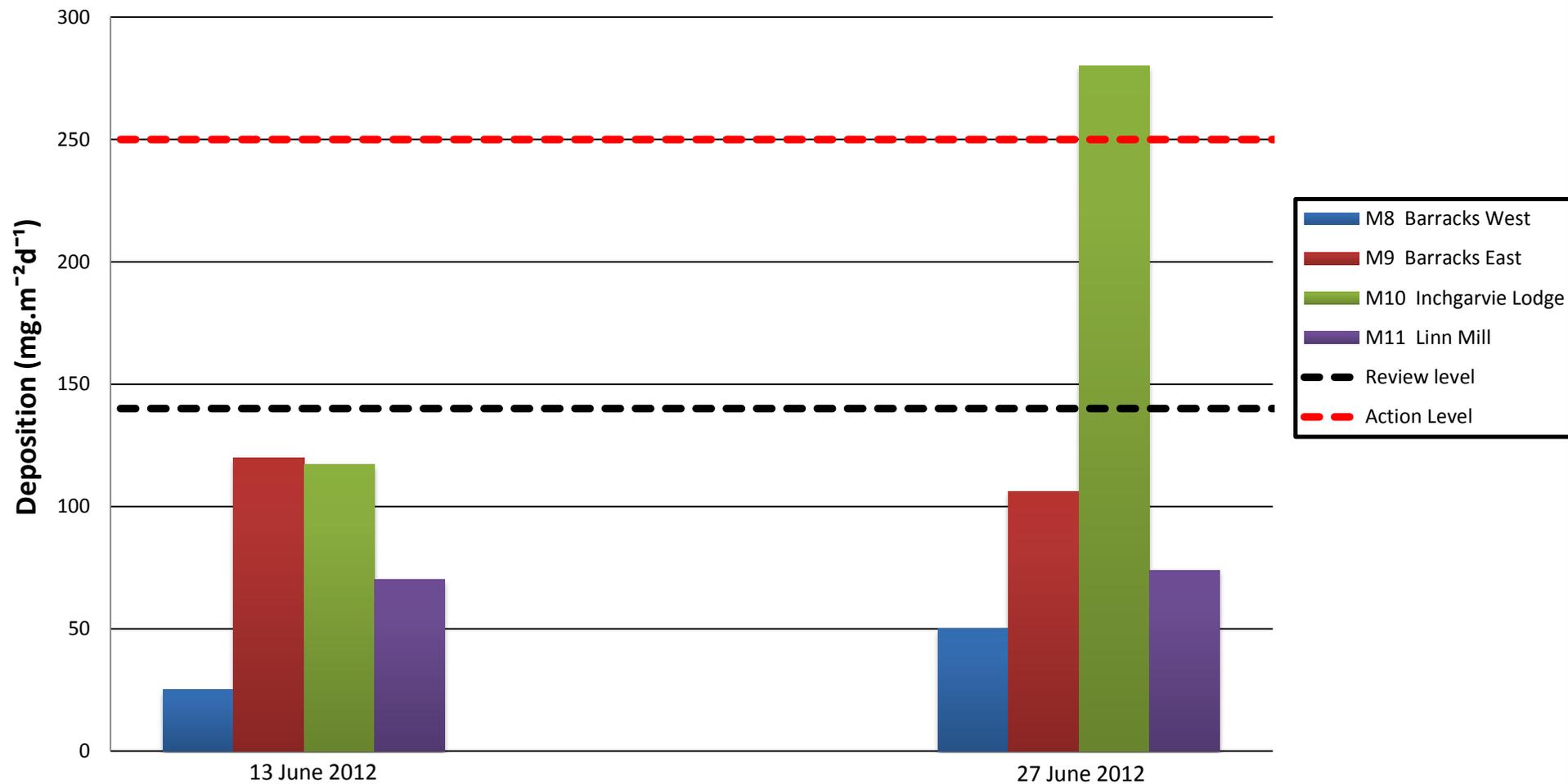


**Note:** Due to a loss of power at Echline, no TSP results are available for this location throughout June. Due to errors associated with the TSP results for Dundas, these results have been excluded.

## **APPENDIX C: FRISBEE GAUGE RESULTS**

# Frisbee Dust Deposition Results: Group 1

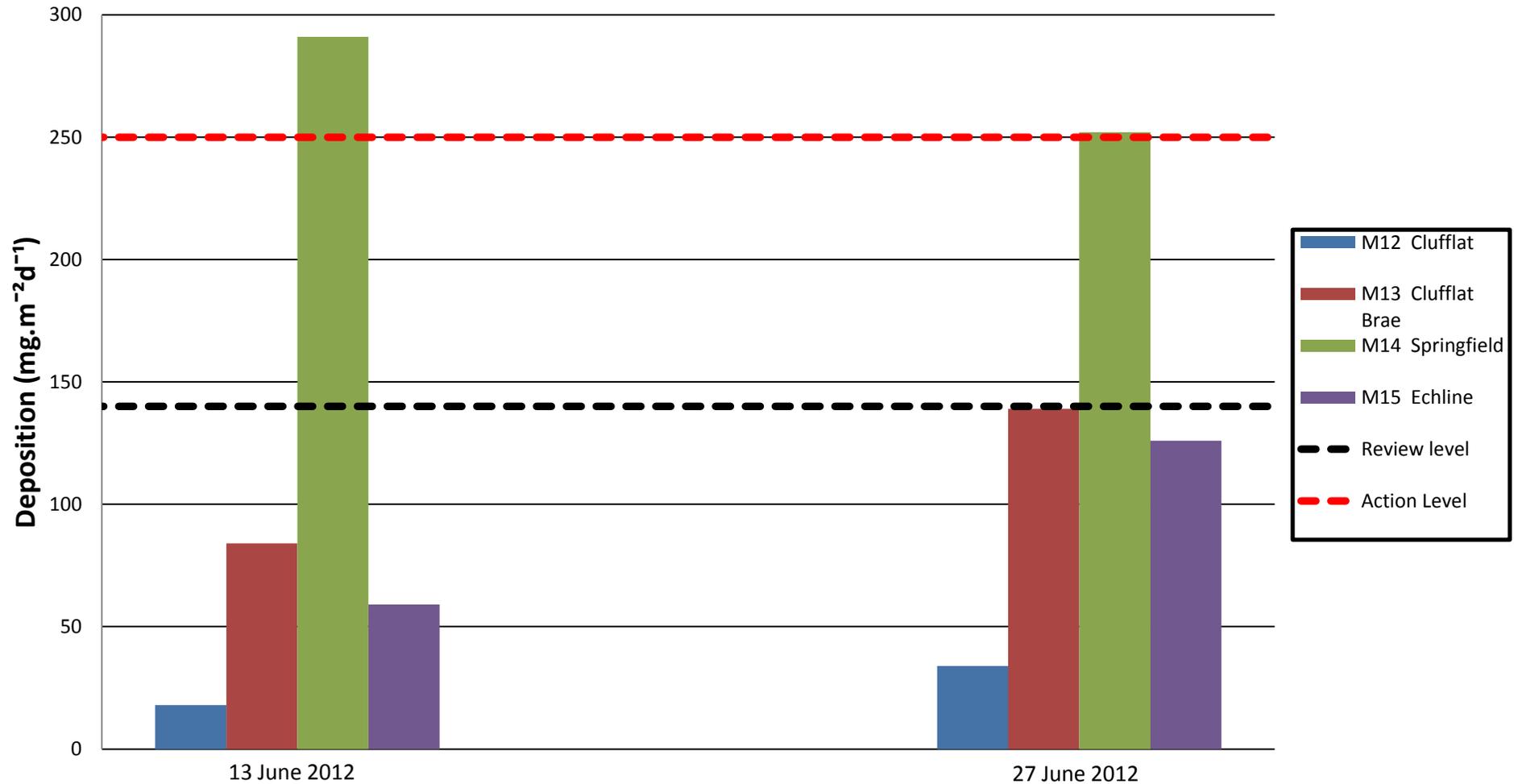
Locations: M7 Butlaw Fisheries, M8 Barracks West, M9 Barracks East, M10 Inchgarvie Lodge and M11 Linn Mill



**Note:** Please see paragraphs 3.3.5 and 3.3.6 of the monitoring report for details regarding the exceedance at Inchgarvie Lodge.

## Frisbee Dust Deposition Results: Group 2

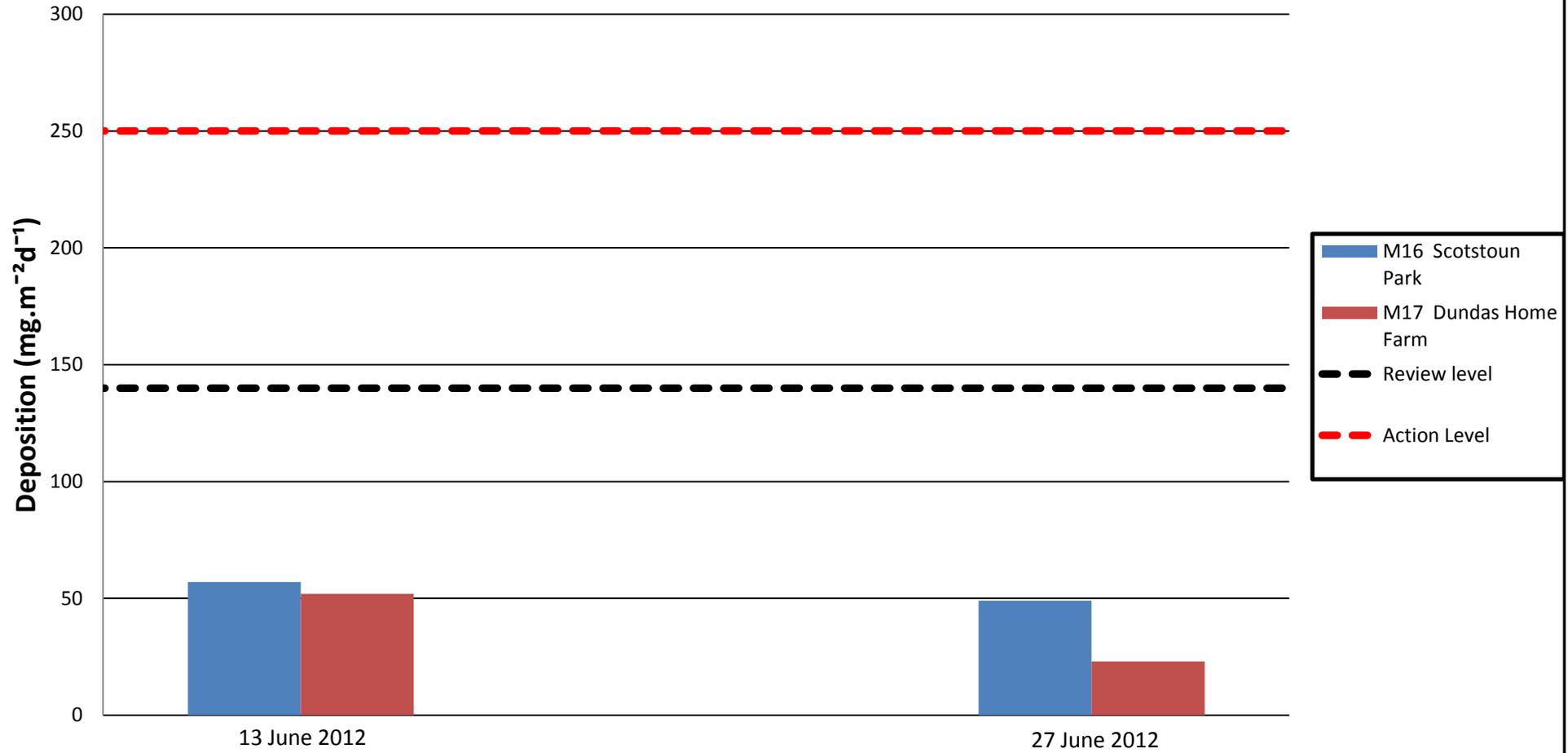
Locations: M12 Clufflat, M13 Clufflat Brae, M14 Springfield and M15 Echline



**Note:** Please see paragraphs 3.3.5 and 3.3.6 of the monitoring report for details regarding the exceedances at Springfield.

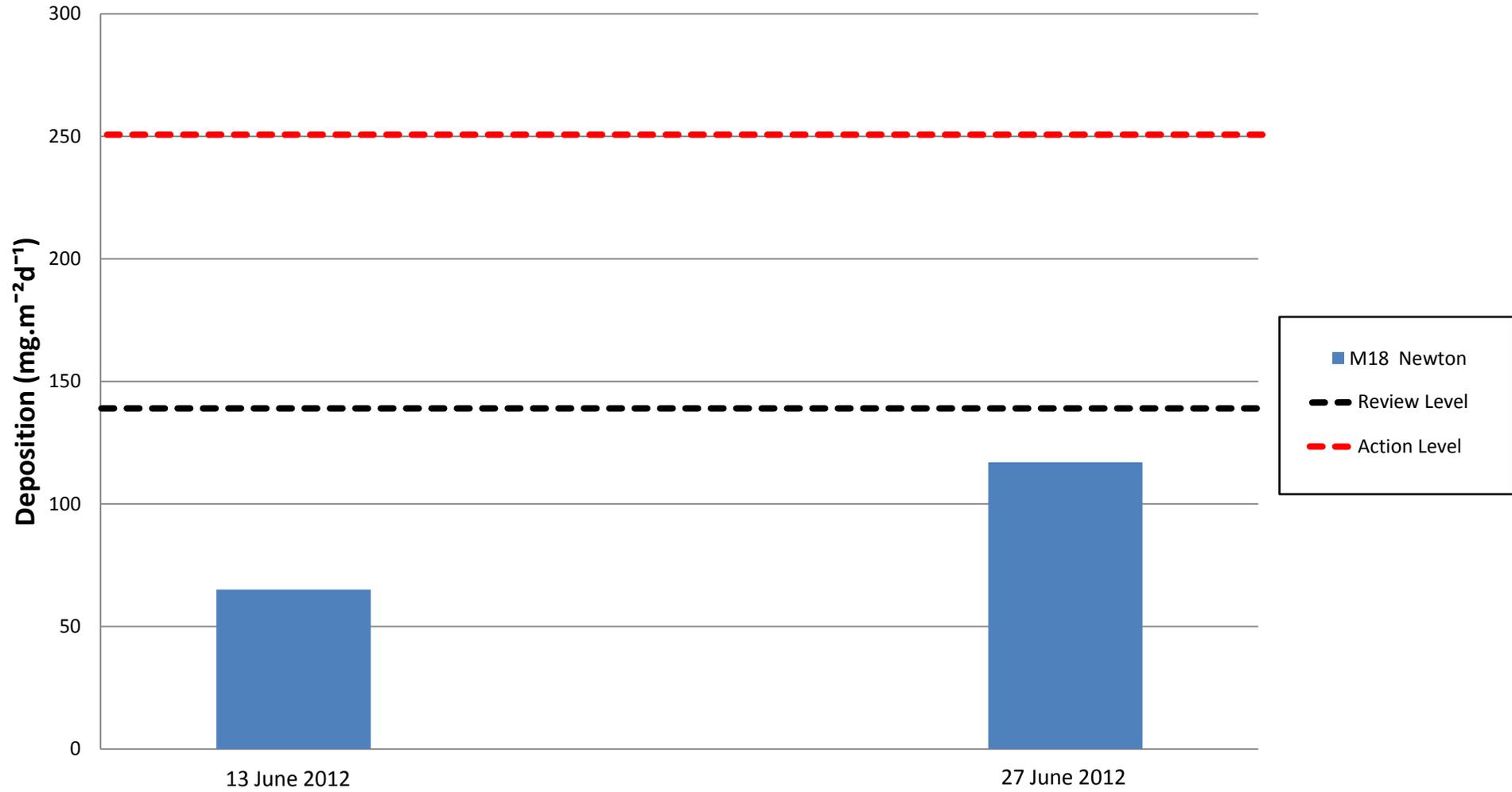
### Frisbee Dust Deposition Results: Group 3

#### Locations: M16 Scotstoun Park and M17 Dundas Home Farm



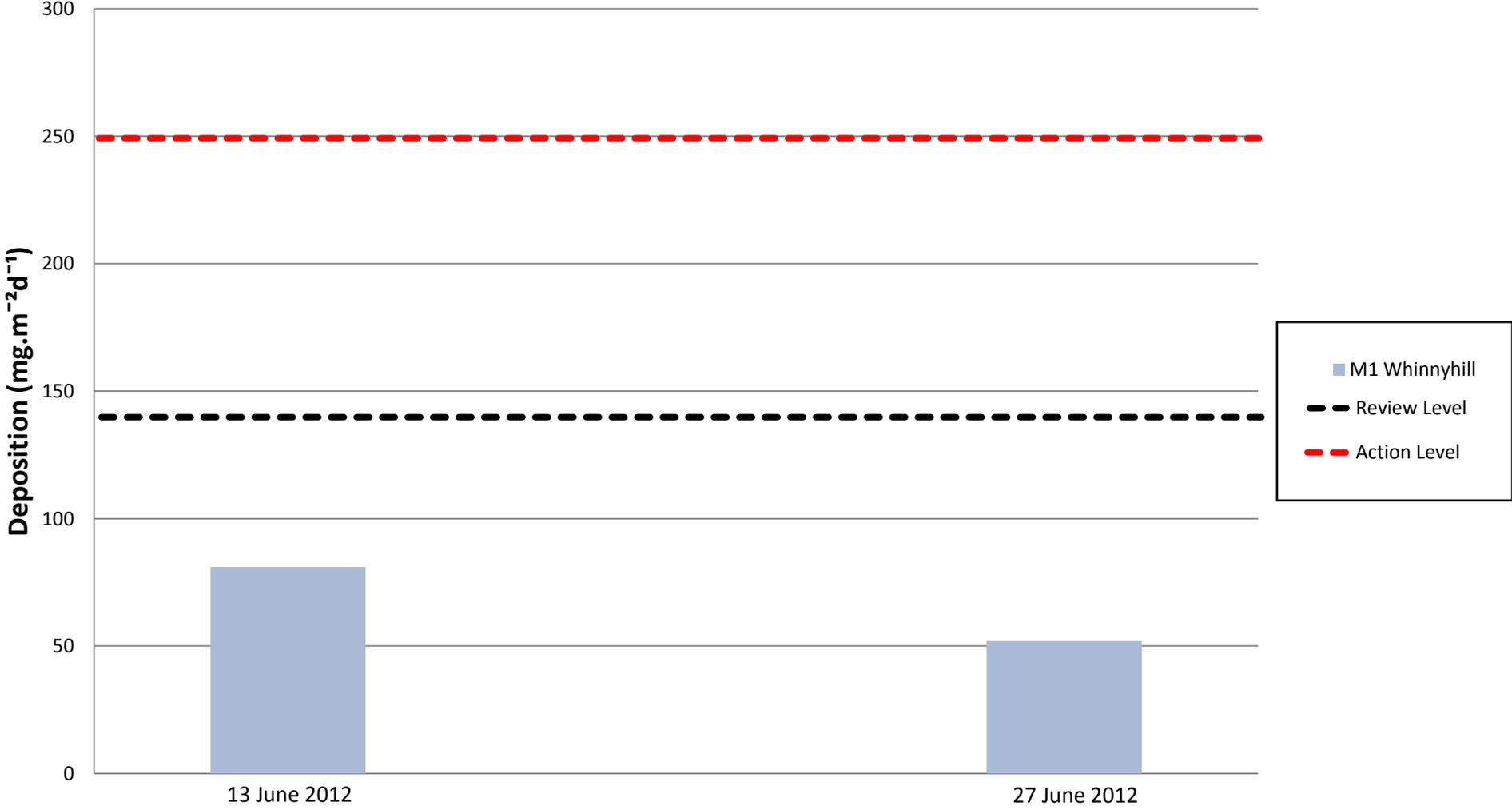
# Frisbee Dust Deposition Results: Group 4

## Location: M18 Newton



# Frisbee Dust Deposition Results: Group 5

## Location: M1 Whinny Hill



## **APPENDIX D: DAILY DUST LOG**





## **APPENDIX E: SUMMARY OF ENVIRONMENTAL INSPECTIONS**

**Summary of Dust and Air Quality Section of Environmental Inspections Undertaken in June 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	
04/06/2012	St Margaret's Marsh	No	No	Yes	N/A	No transportation of materials.
04/06/2012	North Abutment	No	No	Yes	N/A	No transportation of materials.
04/06/2012	Ferry Toll Compound	N/A	N/A	N/A	N/A	No activities that could give rise to dust. No transportation of materials at time of inspection.
13/06/2012	Dundas Estate	Yes	No	No	Yes	Dust coming up from vehicles on access track. No suppression noted at time of inspection. Tarpaulin used on trucks leaving site. Site foreman contacted to ensure the tracks were dampened down.
20/06/2012	St Margaret's Marsh	No	No	Yes	N/A	Evidence of bowser having been on site - access tracks damp
27/06/2012	Whinny Hill and Ferry Toll Compound	No	No	Yes	N/A	Wet conditions
27/06/2012	Dundas Estate	No	No	Yes	N/A	Wet conditions