



Contractor



Forth Crossing Bridge Constructors

HOCHTIEF Solutions
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 DRAGADOS
 Morrison Construction

Project **FORTH REPLACEMENT CROSSING**

Document title

AIR QUALITY MONITORING REPORT
MARCH 2013

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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 March 2013.

- 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 and the Total Suspended Particle (TSP) concentrations (Figure 2). Table 1 lists the air quality monitoring equipment present at each monitoring location. The installation of the air quality monitoring equipment was not 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 check to assess the following:

- dust levels on site;
- suppression/dampening down; and
- transportation of materials.

In relation to these inspections, the FCBC Environmental Department hold an environmental actions register where any environmental issues, including those relating to air quality, can be noted and closed out appropriately.



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 March
M1	Whinny Hill	Frisbee	21/03/12	Breaking of rock Drilling and blast 15
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	Backfilling at S7 Excavation and rock breaking works at S6 Drilling for de-stressing wells at S6 Marine works
M8	Barracks West	Frisbee	31/08/11	Backfilling at S7 Excavation and rock breaking works at S6 Drilling for de-stressing wells at S6 Marine works
M9	Barracks East	Frisbee	31/08/11	Backfilling at S7 Excavation and rock breaking works at S6 Drilling for de-stressing wells at S6 Marine works
M10	Inchgarvie Lodge	Frisbee	22/08/11	Backfilling at S7 Excavation and temporary drainage works at launch Stabilising batters at launch Works at South Abutment, including erection of reinforcement and formwork
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	Excavation and temporary drainage works at launch Stabilising batters at launch Works at South Abutment, including erection of reinforcement and formwork
		Automatic light scatter meter	06/12/11	

M12	Clufflat	Frisbee	29/08/11	Excavation and temporary drainage works at launch Stabilising batters at launch
M13	Clufflat Brae	Frisbee	21/09/11	
		Automatic light scatter meter	24/10/11	Works at South Abutment, including erection of reinforcement and formwork
M14	Springfield	Frisbee	15/08/11	Excavation and temporary drainage works at launch Stabilising batters at launch Excavation of rock at Queensferry gyratory
M15	Echline	Frisbee	16/08/11	Excavation and temporary drainage works at launch Stabilising batters at launch Excavation of rock at Queensferry gyratory Drainage works at A904/U221
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	Drainage works Soil/embankment strip Construction of South bound bus link haul road
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	Utilities works Soil strip Excavation 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 March 2013 have been presented in a monthly chart; this can be found in Appendix A. Results show that the PM₁₀

levels were largely below threshold levels and followed the same pattern across the site. During March there were nine days on which exceedances of the threshold occurred. Table 2 lists the locations at which the exceedances occurred on these dates.

Table 2: Exceedances of the PM10 threshold

Date	Monitoring Location	Notable conditions
01/03/13	Dundas	Foggy conditions
04/03/13	Dundas	Hazy conditions
05/03/13	Dundas, Whinny Hill, Clufflat and Scotstoun	No conditions noted during inspections that would give rise to exceedances (during working hours) – exceedances appear to be due to regional conditions
06/03/13	Dundas, Whinny Hill, Clufflat, Scotstoun and Linn Mill	
07/03/13	Dundas, Whinny Hill, Clufflat, Scotstoun and Linn Mill	
08/03/13	Dundas and Whinny Hill	
18/03/13	Dundas	Snow and high winds
23/03/13	Whinny Hill	Weekend (no works at this location) – strong winds, frozen and snowy
24/03/13	Whinny Hill	

3.1.2. The exceedances are not considered to have been caused by construction works. The results show the same trend across site, indicating that the results are likely caused by regional conditions, as opposed to localised dust events caused by construction works. Frisbee results confirm that dust levels across site were low throughout the period (see 3.3 Frisbee Dust Deposition Results).

3.1.3. Furthermore, where automatic alerts were received on these days within site working hours, inspections were undertaken which confirmed no visible signs of dust. Wet or frozen ground conditions on several days would also have minimised dust generation from any construction activities. Additionally, the exceedances mostly coincide with days on which the weather conditions were such that the light scatter meter readings were affected, as set out in paragraph 2.2; snow, haze and foggy conditions were noted on the dates on which exceedances occurred.

3.1.4. The PM₁₀ results have also been compared to the daily mean results obtained from the TEOM air quality monitoring stations located in Newton, Rosyth, Broxburn, Queensferry Road, Edinburgh and St Leonards, Edinburgh (an urban background site). The TEOM at Newton was installed by West Lothian Council, facilitated by FCBC, during May 2012. 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 March was largely due to regional changes in air quality.

3.2. Total Suspended Particles

3.2.1. The TSP results for March 2013 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during March were generally low and within the threshold level. A single exceedance occurred on 7 March at Dundas. However, this exceedance is not considered to be related to construction works and is thought to be related to regional changes in air quality as discussed in relation to particulate matter concentrations in paragraphs 3.1.2 and 3.1.3. All locations were found to follow a similar pattern across the site, demonstrating that in general the levels are influenced by regional changes in TSP levels, rather than construction works.

3.3. Frisbee Dust Deposition Results

3.3.1. The Frisbee dust deposition results for March 2013 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 were collected fortnightly, and the results averaged over this fortnight period to give a daily dust deposition rate. Two collection dates fell during March; one on the 6 March, with another a fortnight later on the 20 March 2013. Due to unforeseen circumstances related to the delivery of the samples to the testing laboratory, the collection due on 20 March was delayed until 22 March. This resulted in the results being averaged over 16 days between 6 March and 22 March rather than the usual fortnightly period.

3.3.3. The site action level for the dust deposition rate has been set at 250 mg/m²/day. Exceedances of this will be treated as a potential incident and a formal review of the works in the vicinity of the site will be instigated. A lower, site review level has been set at 140 mg/m²/day. Where concentrations exceed the lower action threshold the site works will be reviewed to ensure good practice is implemented; it is essentially a warning that additional controls may be required.

3.3.4. During March there were no exceedances of the threshold levels. Frisbee results from all monitoring locations across site were found to be low.

3.4. Daily Dust Log and Environmental Inspections

3.4.1. A summary of the daily dust log for March can be found in Appendix D. No instances of visual dust on site were noted in either the southern or northern networks areas during March.

3.4.2. During this period a number of environmental inspections were also undertaken across the site. These were undertaken weekly and covered areas of site where works were being undertaken. In March no instances of air quality issues were noted during any of these inspections and therefore no actions relating to air quality were noted within the environmental actions register during this period.



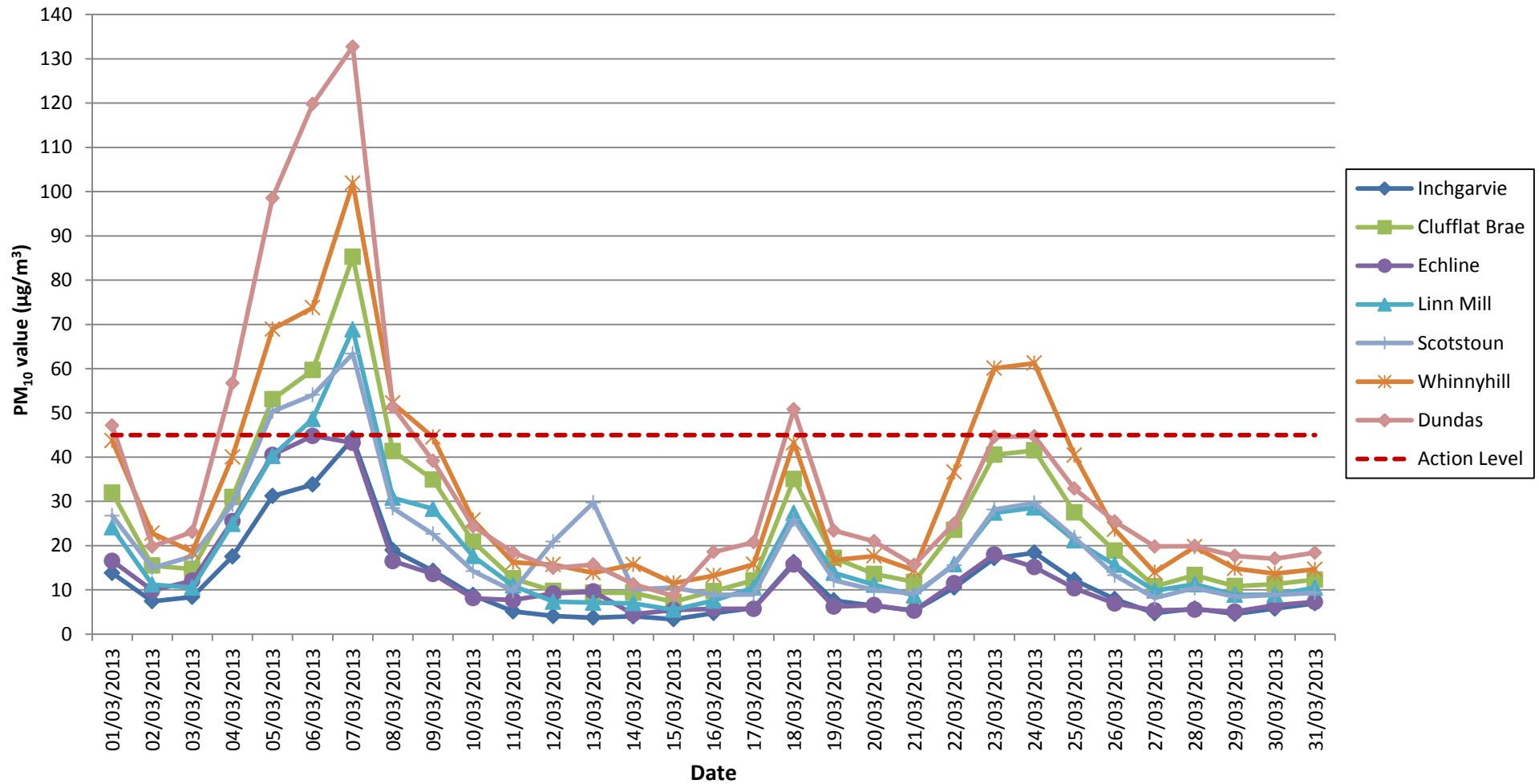
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APPENDIX A: LIGHT SCATTER METER RESULTS

Air Quality Monitoring

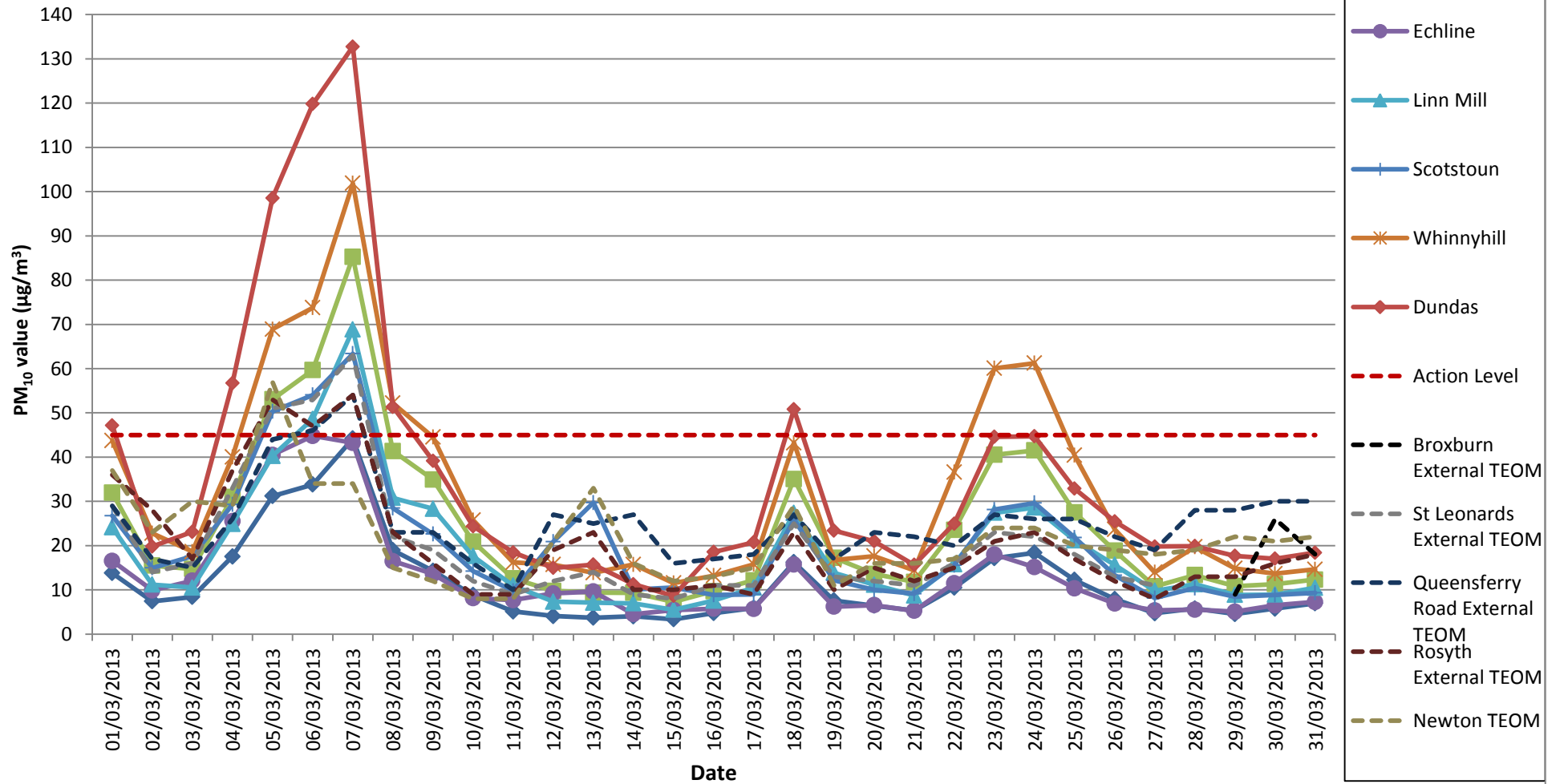
Particulate Matter (PM10) Results for all Monitoring Locations

March 2013



Note: The exceedances of the threshold are not related to construction works. Please refer to section 3 of the Air Quality Monitoring Report: March 2013

Air Quality Monitoring Particulate Matter (PM10) Results for all Monitoring Locations March 2013



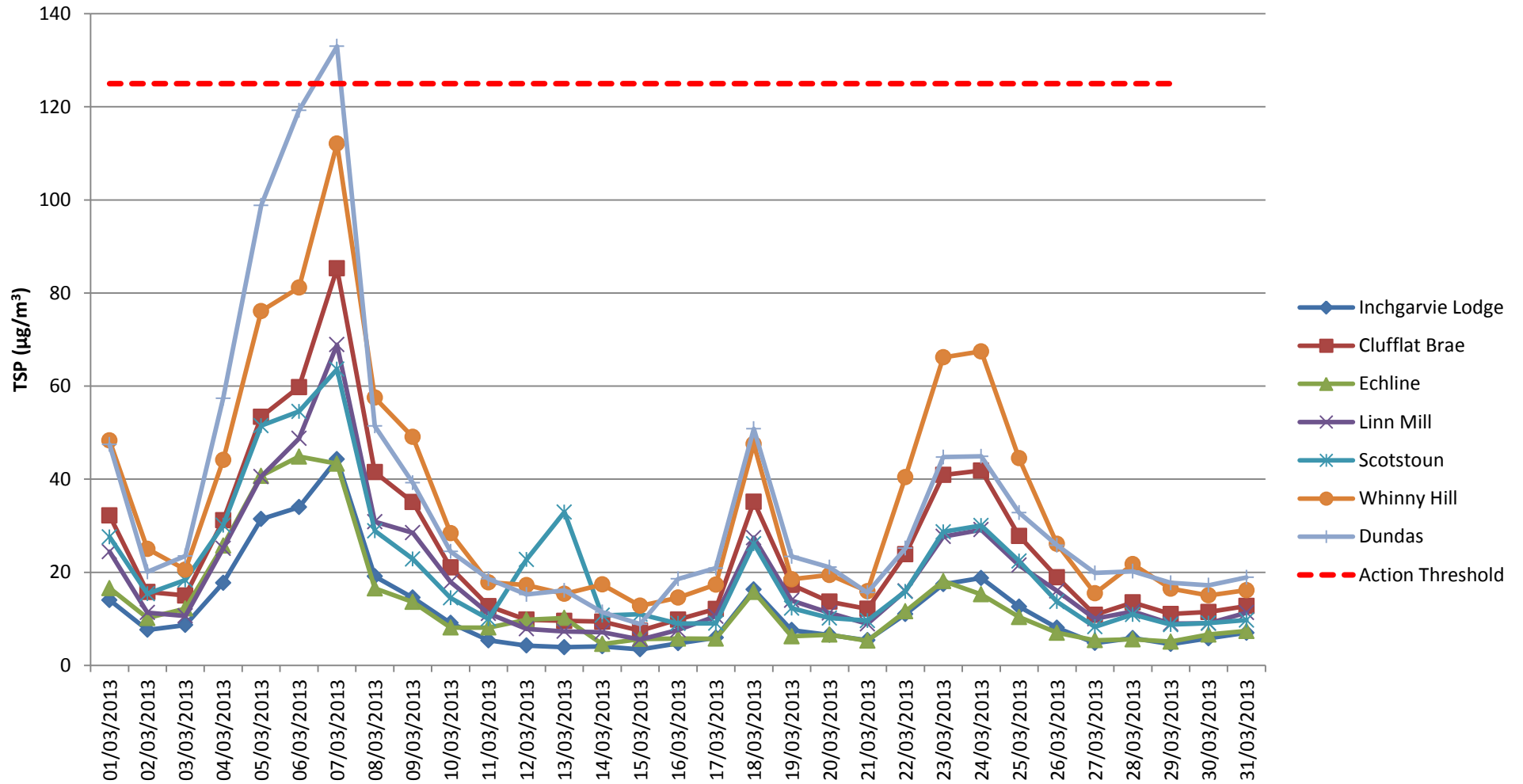
Note: The exceedances of the threshold are not related to construction works. Please refer to section 3 of the Air Quality Monitoring Report: March 2013



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APPENDIX B: TOTAL SUSPENDED PARTICLES

Total Suspended Particles (TSP) Results March 2013

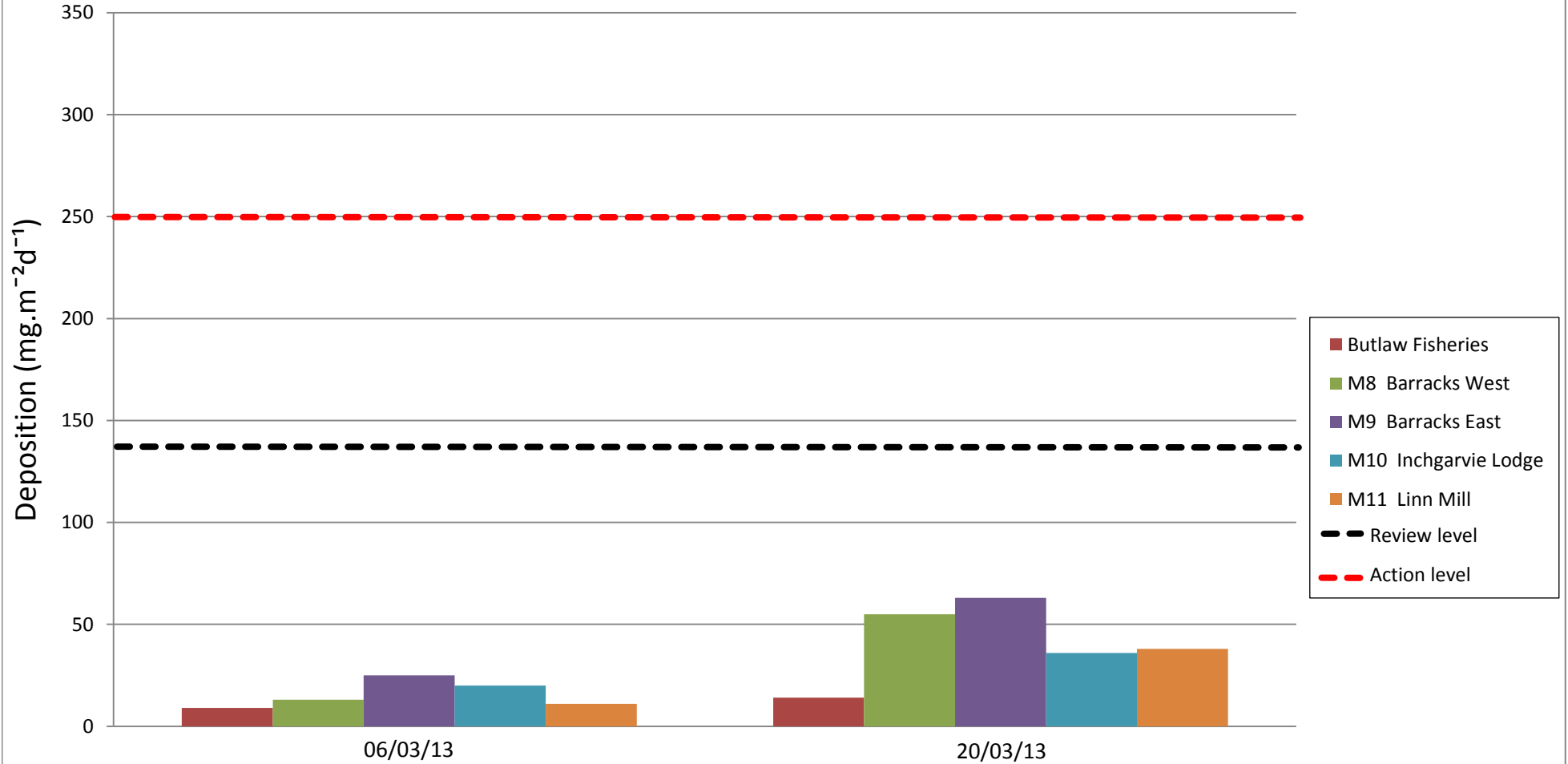




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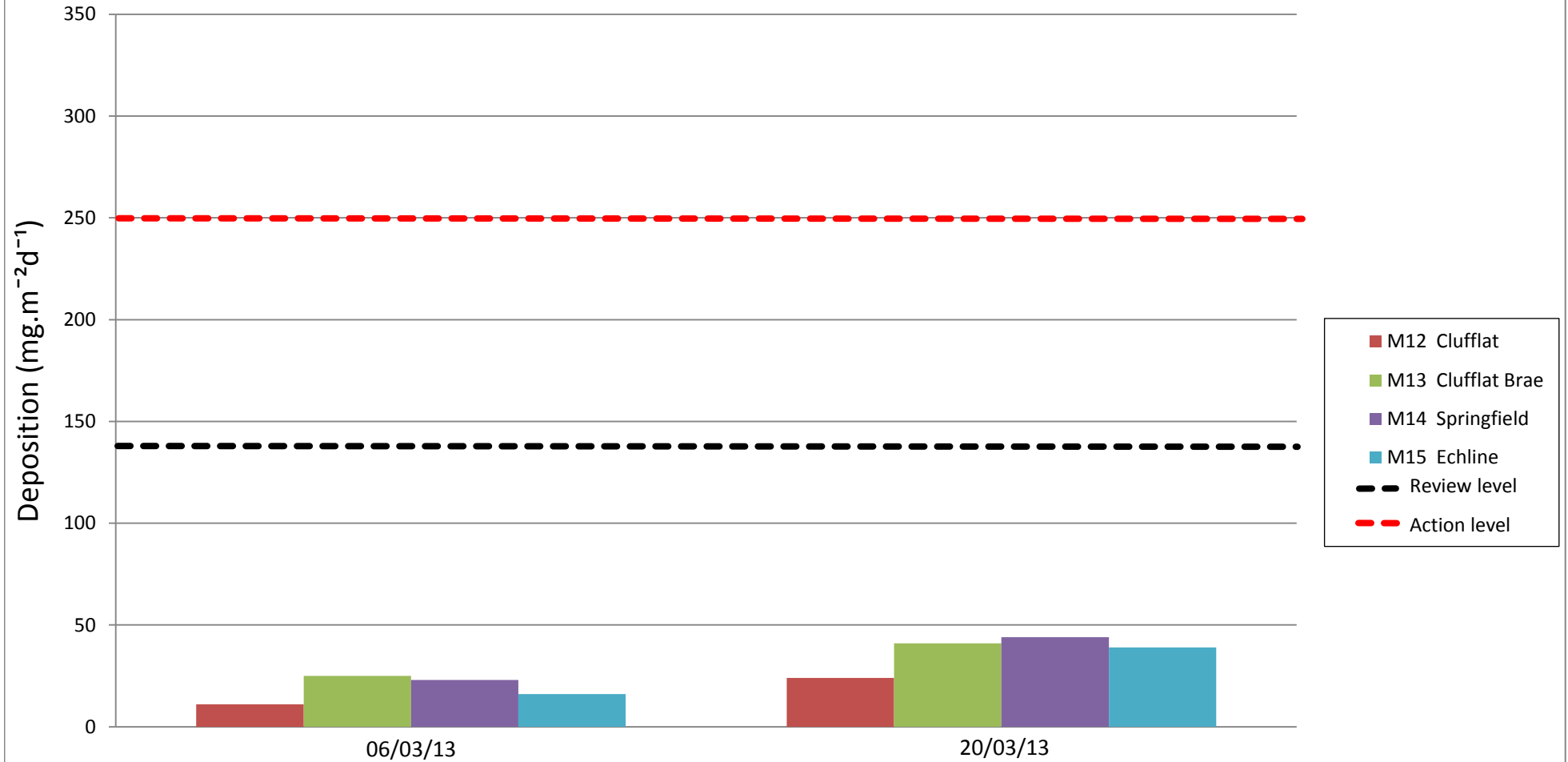
APPENDIX C: FRISBEE GAUGE RESULTS

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



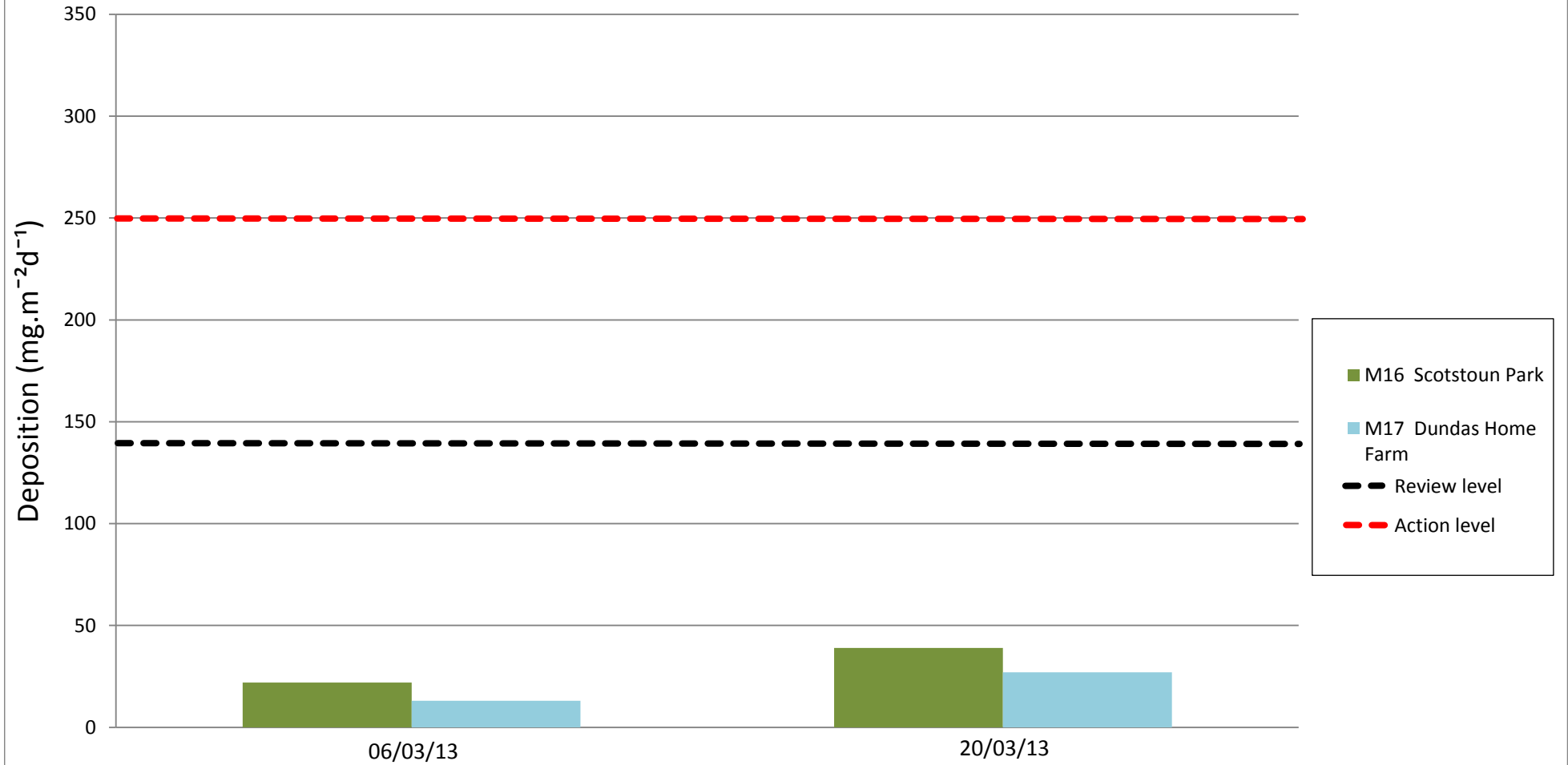
Frisbee Dust Deposition Results: Group 2

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



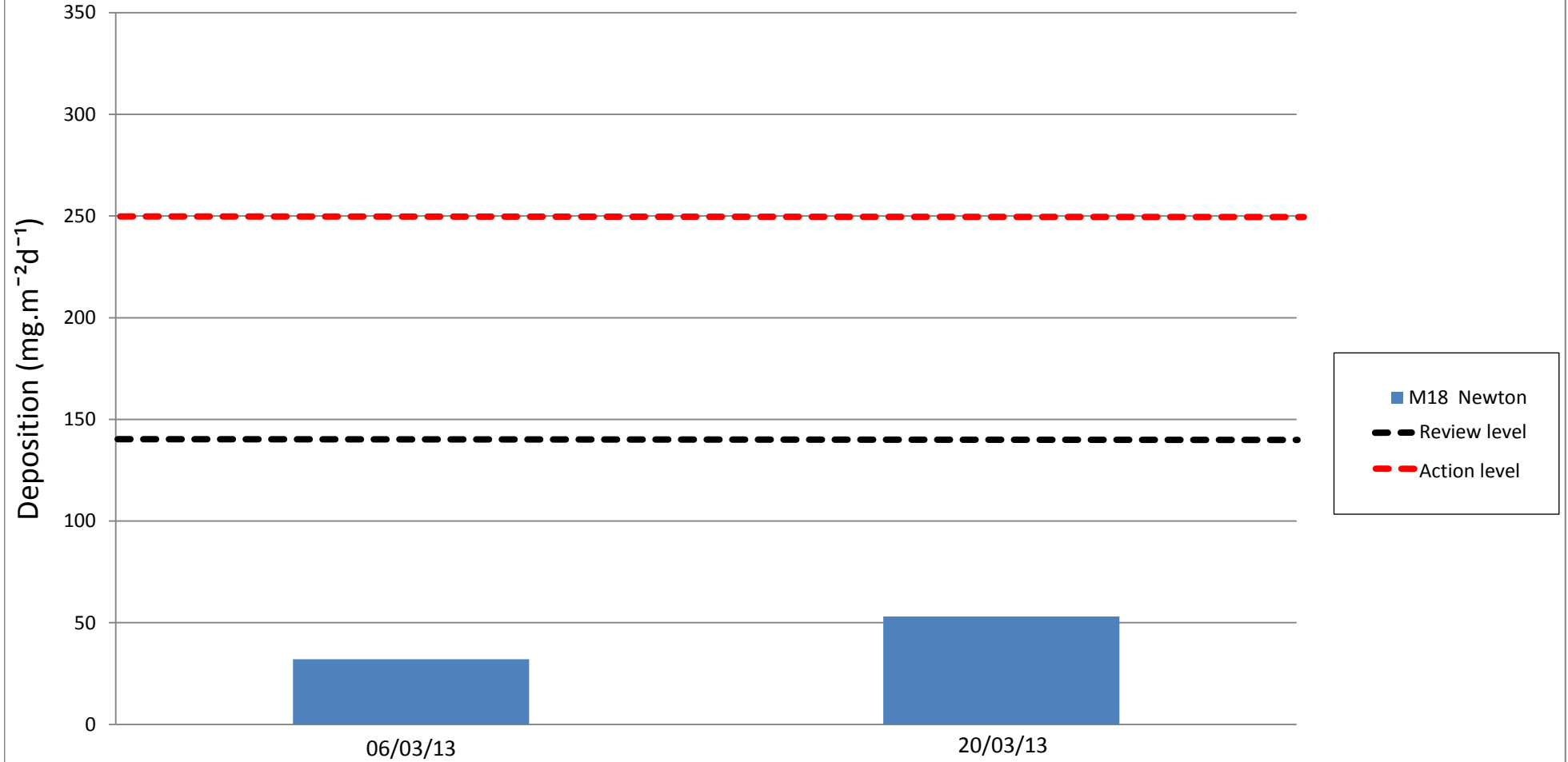
Frisbee Dust Deposition Results: Group 3

Locations: M16 Scotstoun Park and M17 Dundas Home Farm



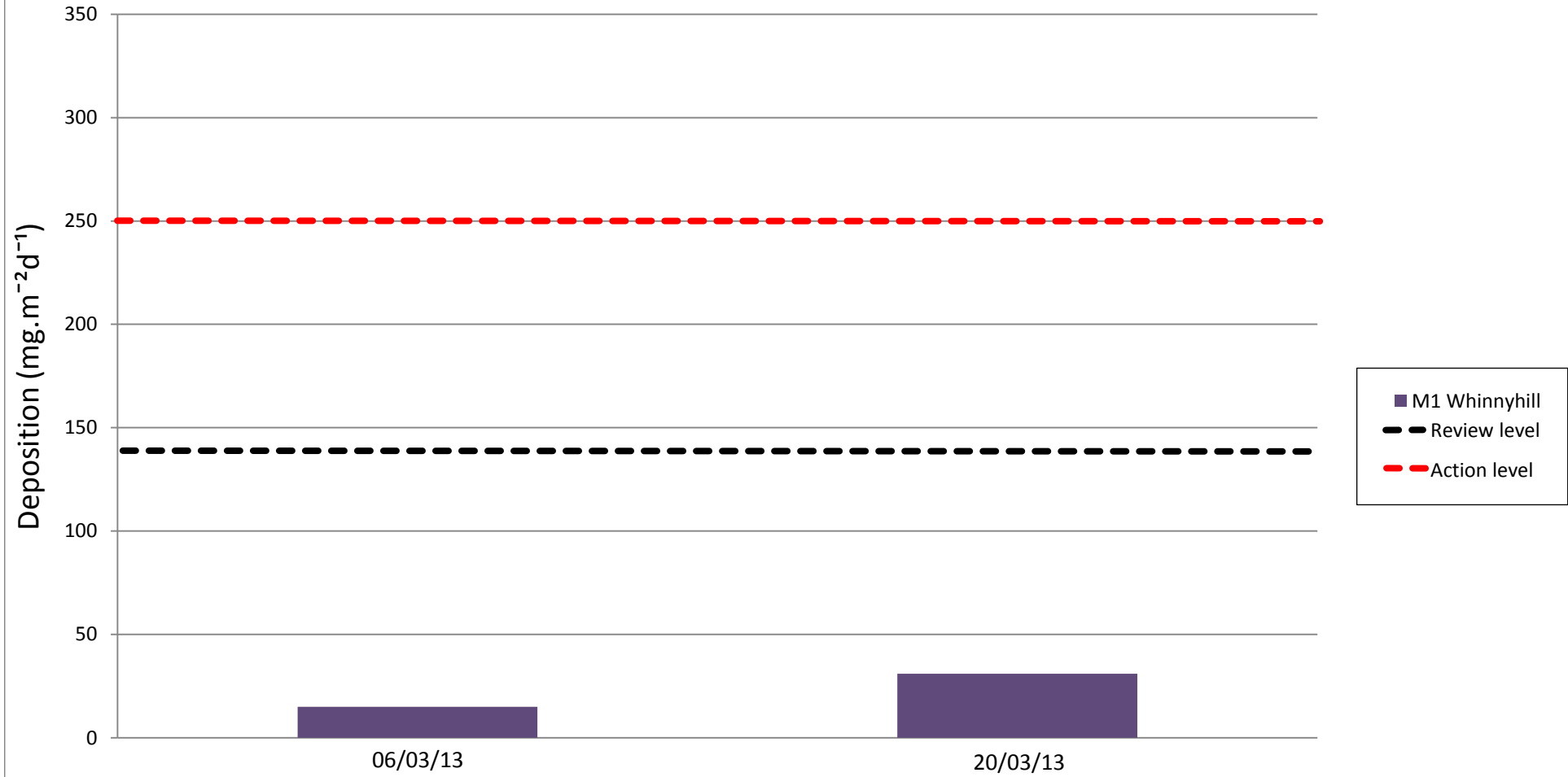
Frisbee Dust Deposition Results: Group 4

Locations: M18 Newton



Frisbee Dust Deposition Results: Group 5

Locations: M1 Whinny Hill





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APPENDIX D: DAILY DUST LOG

