



Contractor



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

Project **FORTH REPLACEMENT CROSSING**

Document title

**AIR QUALITY MONITORING REPORT
SEPTEMBER 2017**

00	12/10/2017	First revision	SWR	DCK	DCK
Rev	Rev. Date	Purpose of revision	Made	Checked	Reviewed
Document status					
FOR REVIEW					
Made by Steven Westwater			Checked By: David Clark		
Initials: SWR			Initials: David Clark		
Document number					Rev
REP-00346					00

This document is intellectual property of FCBC Construction JV. Copying, distribution, usage, and information on contents of this are forbidden unless explicitly authorized.



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

Distribution

Name	Email Address	Copy Sent (Y/N)
Alan Platt	Alan.Platt@fbcjv.co.uk	



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

Contents

- 1. Introduction**
- 2. Monitoring Equipment and Locations**
- 3. Air Quality Monitoring Results**
 - 3.1. Automatic Light Scatter Meter Particulate Matter Monitoring Results**
 - 3.2. Total Suspended Particle Results**
 - 3.3. Frisbee Dust Deposition Results**
 - 3.4. Daily Dust Log and Weekly Environmental Inspections**

Appendices:

- Appendix A: Particulate Matter Results**
- Appendix B: Total Suspended Particle Results**
- Appendix C: Frisbee Dust Deposition Results**
- Appendix D: Daily Dust Log Summary**



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

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 September 2017.

- 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).



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

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 (PM₁₀) 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.



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

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 September
M1	Whinny Hill	Frisbee	21/03/12	<ul style="list-style-type: none"> • Earthworks/Fill Placement • Ferrytoll gyratory slip road works
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	<ul style="list-style-type: none"> • Internal Bridge Works
M8	Barracks West	Frisbee	31/08/11	<ul style="list-style-type: none"> • Internal Bridge Works • Sea Wall Reinstatement
M10	Inchgarvie Lodge	Frisbee	22/08/11	<ul style="list-style-type: none"> • South abutment works • Internal Bridge Works
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	<ul style="list-style-type: none"> • South abutment works • Internal Bridge Works
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	<ul style="list-style-type: none"> • South abutment works • Internal Bridge Works
M13	Clufflat Brae	Frisbee	21/09/11	
		Automatic light scatter meter	24/10/11	
M14	Springfield	Frisbee	15/08/11	<ul style="list-style-type: none"> • No works
M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> • No Works
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	<ul style="list-style-type: none"> • Works on south- bound emergency



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

		Automatic light scatter meter	14/02/12	link
M17	Dundas Home Farm	Frisbee	29/08/11	• No 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 meter results for September 2017 have been presented in a monthly chart; this can be found in Appendix A. Results for the month are generally low and all are below the action level with the exception of Scotstoun on the 17th September. This is considered to be an erroneous result as the instrument indicates a PM₁₀ spike of 4819µg/m³ between 17:15 and 17:30. This exceedance occurred on a Sunday and no FCBC activities were undertaken on that day. PM₁₀ levels generally follow a similar pattern throughout the month with the exception of the higher results recorded at Scotstoun on the 1st, 6th, 11th, 17th and 19th September. It should be noted that another construction site (not FRC project related) is located closer to the monitor.

3.1.2. The PM₁₀ 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, with



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

the exception of the results recorded at Scotstoun on 6th, 11th, 17th and 19th September.

3.2. Total Suspended Particles

3.2.1. The TSP results for September 2017 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during September were found to be generally low, with the exception of Scotstoun on the 17th September. However, all results were within the threshold level. All locations across the site were found to follow a similar pattern to that observed for PM₁₀ levels, as described in 3.1.1.

3.3. Frisbee Dust Deposition Results

- 3.3.1.** The Frisbee dust deposition results for September 2017 have been presented in a chart and can be found in Appendix C. Two collections were made in September; these occurred on the 13th and 27th September 2017.
- 3.3.2.** The site action level for the dust deposition rate has been set at 250 mg/m²/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/m²/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 September there were exceedances of the site review level at Scotstoun Park and Linn Mill for the period ending 13th September and Springfield for the period ending 27th September. With regards to the exceedance at Scotstoun, the temporary Frisbee at Scotstoun Arups, which is located closer to the FCBC works area, indicates a significantly lower result than for the permanent Frisbee during this period. This suggests that the higher result obtained at the permanent monitoring



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

location is not due to FCBC activities. The exceedances at Linn Mill and Springfield were investigated. There were no project related activities being undertaken in this area during September which would give rise to dust.

3.4. Daily Dust Log and Environmental Inspections

- 3.4.1.** A summary of the daily dust log for September 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.



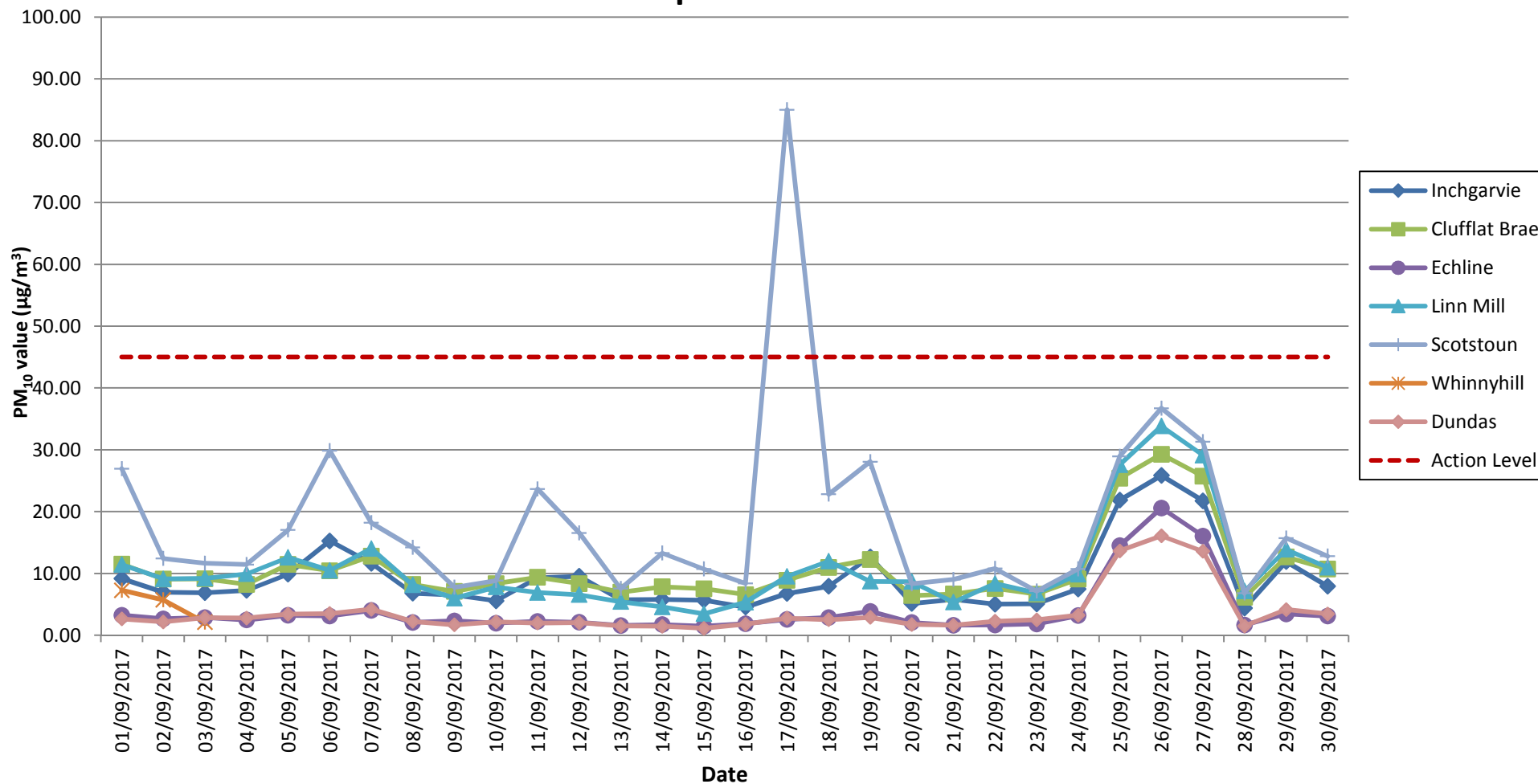
DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

APPENDIX A: LIGHT SCATTER METER RESULTS

Air Quality Monitoring

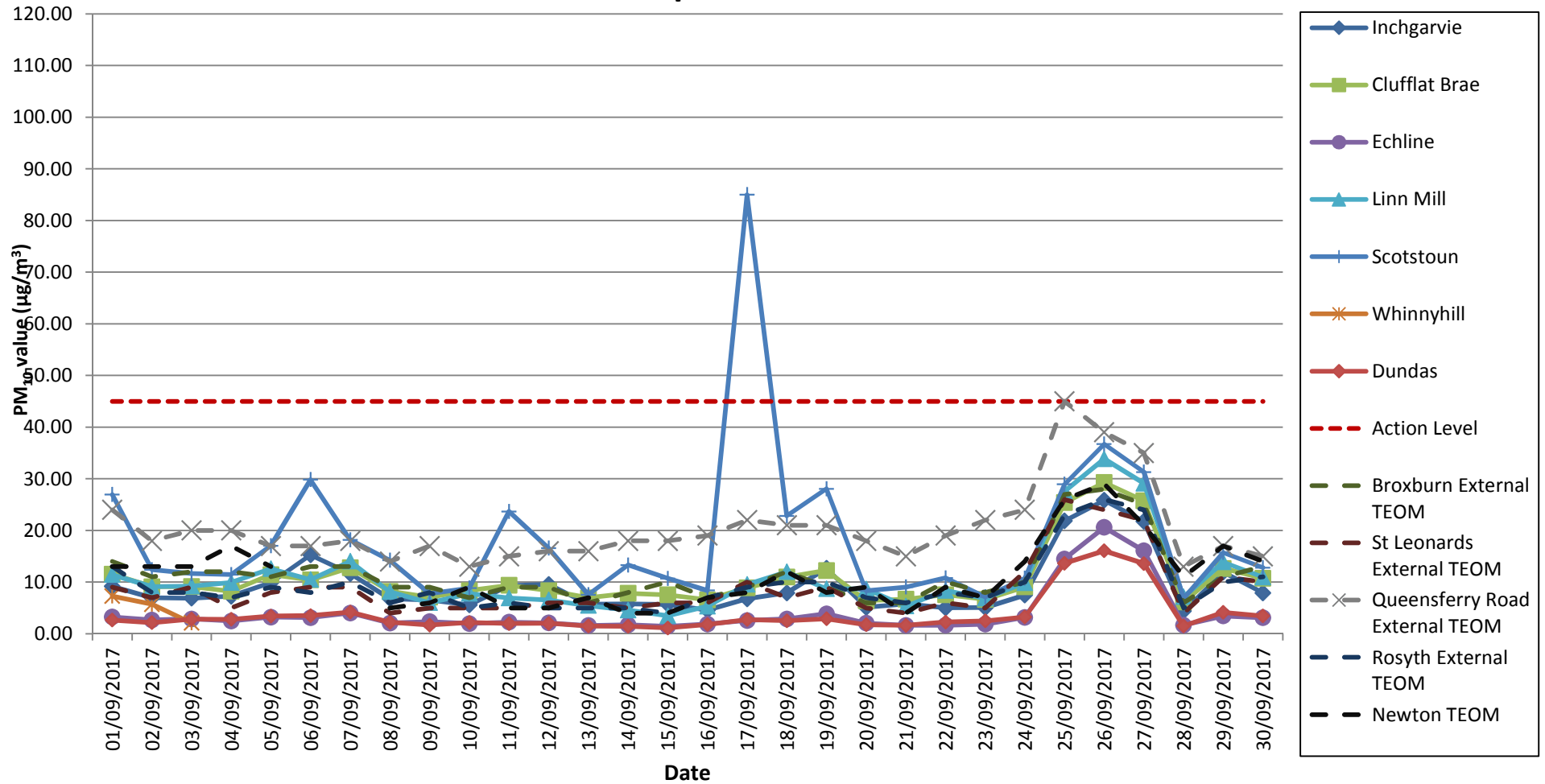
Particulate Matter (PM10) Results for all Monitoring Locations

September 2017



Note: There is no data at the the Whinnyhill monitor between 04/09/2017 and 30/09/2017 due to a electrical problem with the monitor. Probable erroneous reading at Scotstoun on 17 September.

Air Quality Monitoring: Particulate Matter (PM10) Results for all Monitoring Locations, including TEOM data September 2017



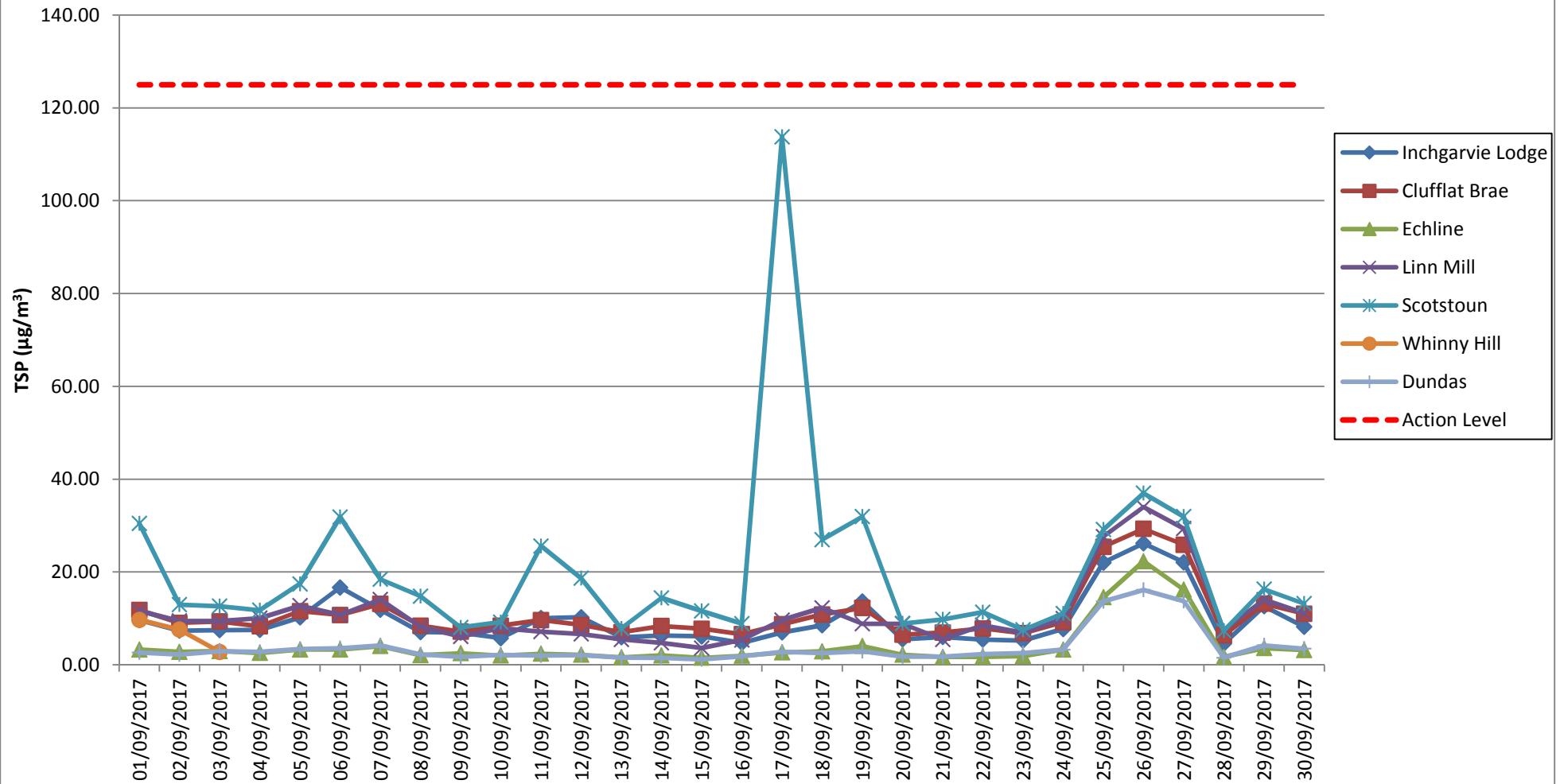
Note: There is no data at the the Whinnyhill monitor between 04/09/2017 and 30/09/2017 due to a electrical problem with the monitor.
Probable erroneous reading at Scotstoun on 17 September.



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

APPENDIX B: TOTAL SUSPENDED PARTICLES

Total Suspended Particles (TSP) Results September 2017



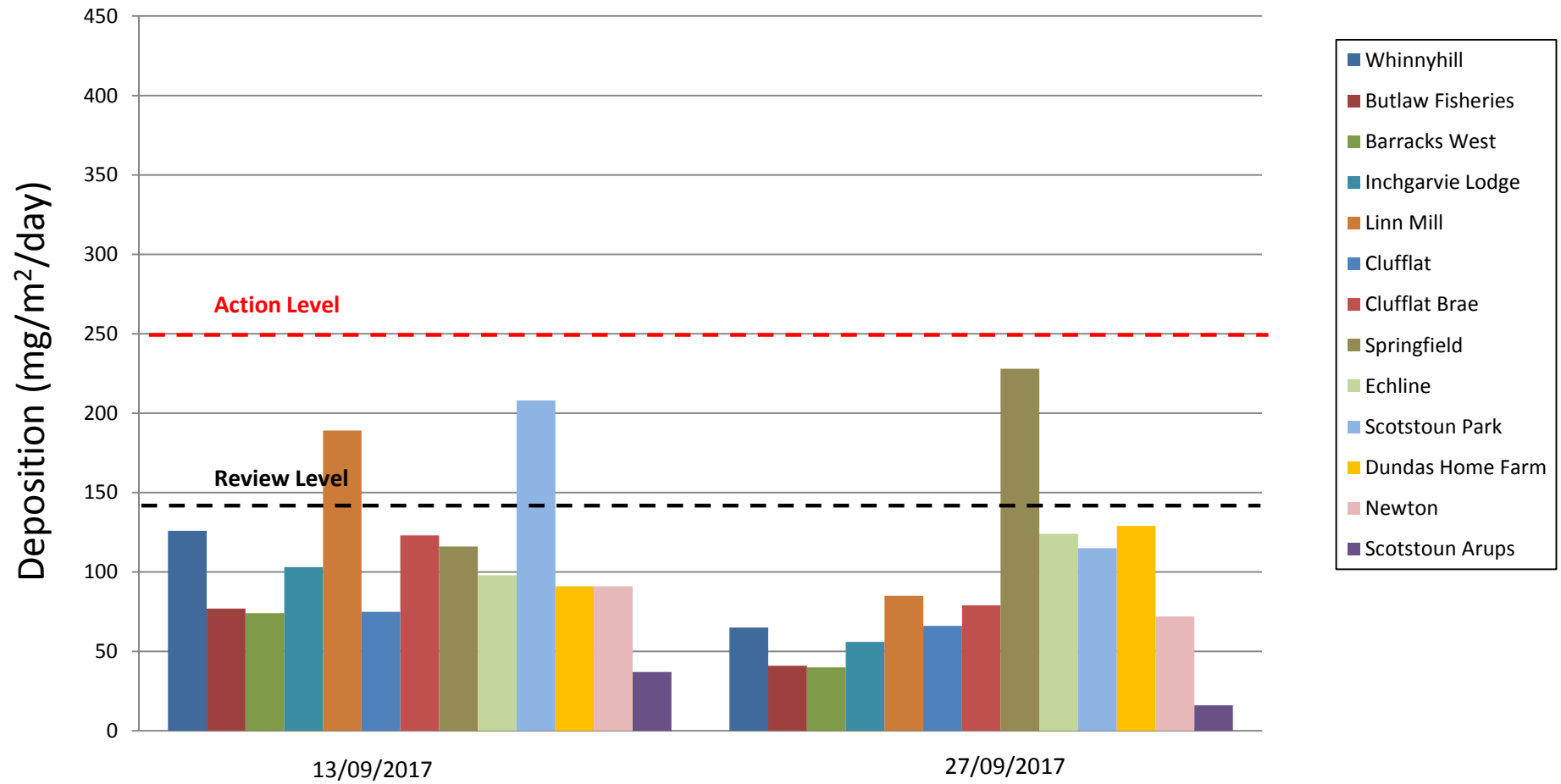
Note: There is no data at the the Whinnyhill monitor between 04/09/2017 and 30/09/2017 due to a electrical problem with the monitor. Probable erroneous reading at Scotstoun on 17 September.



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

APPENDIX C: FRISBEE GAUGE RESULTS

Frisbee Dust Deposition Results: September 2017





DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

APPENDIX D: DAILY DUST LOG

