



Contractor



**FCBC**  
Queensferry  
Crossing

DRAGADOS | AMERICAN BRIDGE INTERNATIONAL  
HOCHTIEF | MORRISON CONSTRUCTION

Project **FORTH REPLACEMENT CROSSING**

Document title

**AIR QUALITY MONITORING REPORT  
FEBRUARY 2016**

00	07/03/2016	First revision	SWR	MRN	MRN
<b>Rev</b>	<b>Rev. Date</b>	<b>Purpose of revision</b>	<b>Made</b>	<b>Checked</b>	<b>Reviewed</b>

Document status

**FOR REVIEW**

Made by Steven Westwater      Checked By: Michael Richardson

Initials: SWR      Initials: MRN

Document number

**REP-00270**

Rev  
**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)
Michael Martin	<a href="mailto:Michael.martin@fbcjv.co.uk">Michael.martin@fbcjv.co.uk</a>	



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 February 2016.
  
- 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 (PM<sub>10</sub>) 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**



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL  
HOCHTIEF | MORRISON CONSTRUCTION

**Table 1: Air Quality Monitoring Locations**

Ref:	Monitoring Location	Monitoring Equipment	Installation Date	Construction Activities in February
M1	Whinny Hill	Frisbee	21/03/12	<ul style="list-style-type: none"> <li>• Earthworks/Fill Placement</li> <li>• New Ferrytoll Road</li> <li>• Bridge works at Ferrytoll</li> <li>• Roadworks</li> </ul>
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	<ul style="list-style-type: none"> <li>• Pier S1 rebar, formwork &amp; concrete works</li> <li>• Pier S2 rebar, formwork &amp; concrete works</li> <li>• Central Tower rebar, formwork, concreting works, deck table installation works</li> <li>• South Tower rebar, formwork, concreting works, deck table installation works</li> <li>• South Tower Deck Segment Lifts</li> </ul>
M8	Barracks West	Frisbee	31/08/11	<ul style="list-style-type: none"> <li>• Pier S1 rebar, formwork &amp; concrete works</li> <li>• Pier S2 rebar, formwork &amp; concrete works</li> <li>• Central Tower rebar, formwork, concreting works, deck table installation works</li> <li>• South Tower rebar, formwork, concreting works, deck table installation works</li> <li>• South Tower Deck Segment Lifts</li> </ul>
M10	Inchgarvie Lodge	Frisbee	22/08/11	<ul style="list-style-type: none"> <li>• AVS Scaffolding, shuttering and reinforcement to deck</li> <li>• Main carriageway earthworks</li> <li>• Pier S1 rebar, formwork &amp; concrete works</li> <li>• Pier S2 formwork and concrete works</li> <li>• South Tower rebar, formwork, concreting works, deck table installation works.</li> <li>• South Tower Deck Segment Lifts</li> </ul>
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	<ul style="list-style-type: none"> <li>• AVS Scaffolding, shuttering and reinforcement to deck</li> <li>• Main carriageway earthworks</li> <li>• South Tower Deck Segment Lifts</li> </ul>
		Automatic light scatter meter	06/12/11	

M12	Clufflat	Frisbee	29/08/11	<ul style="list-style-type: none"> <li>• AVS Scaffolding, shuttering and reinforcement to deck</li> <li>• Main carriageway earthworks</li> </ul>
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"> <li>• AVS Scaffolding, shuttering and reinforcement to deck</li> <li>• Main carriageway earthworks</li> </ul>
M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> <li>• AVS Scaffolding, shuttering and reinforcement to deck</li> <li>• Main carriageway earthworks</li> </ul>
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	<ul style="list-style-type: none"> <li>• Footpath works</li> <li>• Utility works</li> <li>• B800 Piling Works</li> <li>• North-bound bus link</li> </ul>
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	<ul style="list-style-type: none"> <li>• Utility works</li> <li>• B800 Piling Works</li> <li>• Main carriageway works</li> <li>• North-bound bus link</li> </ul>
		Automatic light scatter meter	23/02/12	
M18	Newton	Frisbee	22/08/11	<ul style="list-style-type: none"> <li>• None</li> </ul>
		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 February 2016 have been presented in a monthly chart; this can be found in Appendix A. Results show that the PM<sub>10</sub> levels were well below threshold levels throughout February. All monitors generally follow the same pattern throughout the month.

**3.1.2.** The PM<sub>10</sub> 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



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL  
HOCHTIEF | MORRISON CONSTRUCTION

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, including a peak on 15 February, indicating that the pattern observed throughout February was largely driven by regional changes in air quality.

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

**3.2.1.** The TSP results for February 2016 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during February were found to be low and all within the threshold. All locations across the site were found to follow a similar pattern (similar to that observed for PM<sub>10</sub> levels). As with PM<sub>10</sub> it is considered that the TSP levels across site were influenced by regional changes in TSP levels.

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

**3.3.1.** The Frisbee dust deposition results for February 2016 have been presented in a chart and can be found in Appendix C. Two collections were made in February; these occurred on the 3<sup>rd</sup> and 17<sup>th</sup> February 2016.

**3.3.2.** The site action level for the dust deposition rate has been set at 250 mg/m<sup>2</sup>/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/m<sup>2</sup>/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.



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL  
HOCHTIEF | MORRISON CONSTRUCTION

**3.3.3.** During February there were two exceedances of the review level at Scotstoun for the fortnight concluding 3<sup>rd</sup> February and 14<sup>th</sup> February. Although there were FCBC earthworks on the mainline in the area (approx. 190 metres), the ground conditions for the period were mostly wet and damp and there was no dust observed on site. In addition, the light scatter meters at Scotstoun indicated very low levels of PM<sub>10</sub> and TSP during this fortnight. These exceedances may have been caused from another construction site (not part of the FRC project) that is located closer to the Scotstoun frisbee, on the other side of the B800 (approx. 80 metres). This other construction work started in December with earthworks being undertaken. It is considered unlikely that FCBC construction works caused these exceedances. However, FCBC will continue to monitor this area closely as works progress and provide mitigation as necessary. FCBC will also provide an additional temporary Frisbee at Scotstoun to further investigate the exceedances.

#### **3.4. Daily Dust Log and Environmental Inspections**

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



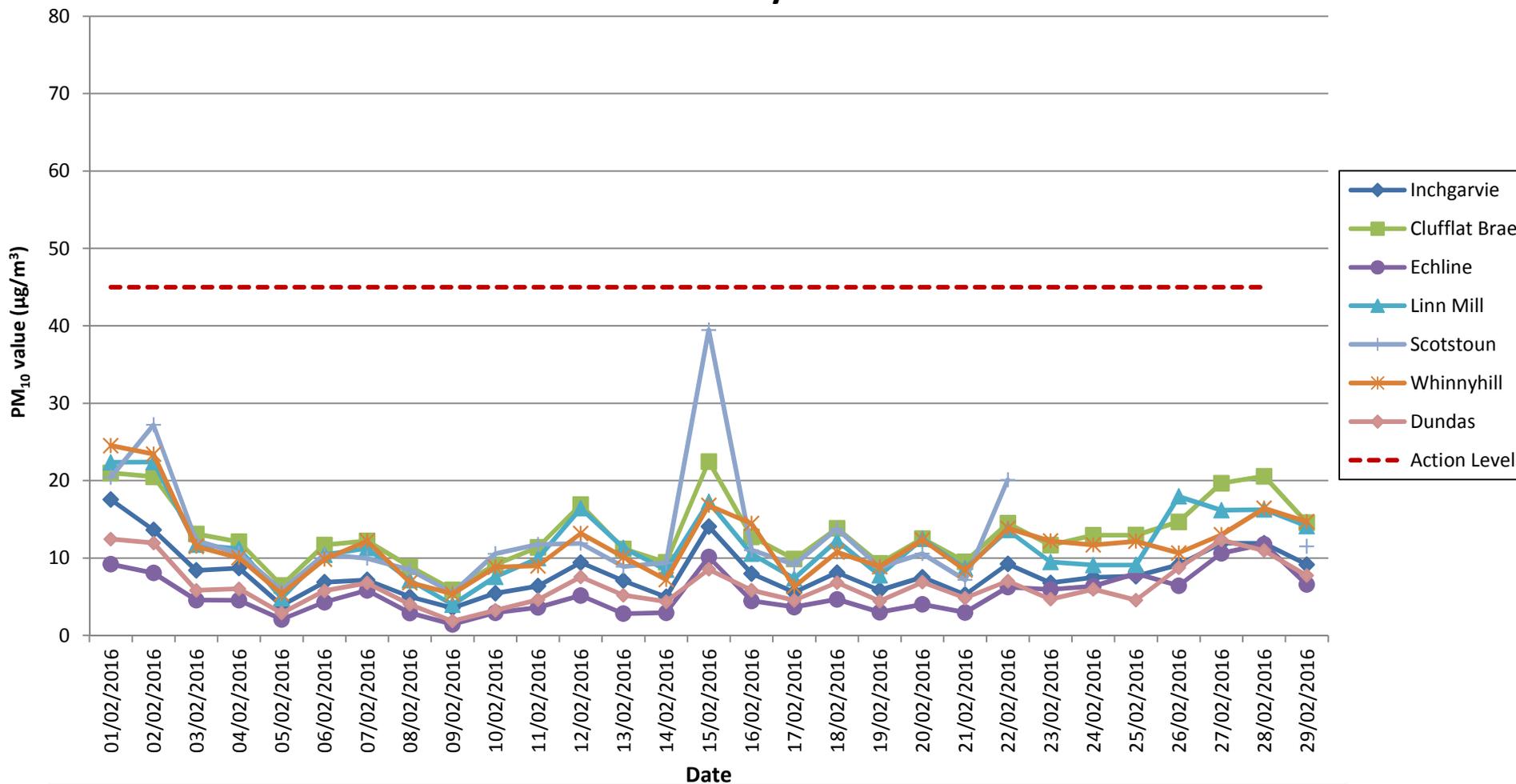
DRAGADOS | AMERICAN BRIDGE INTERNATIONAL  
HOCHTIEF | MORRISON CONSTRUCTION

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

# Air Quality Monitoring

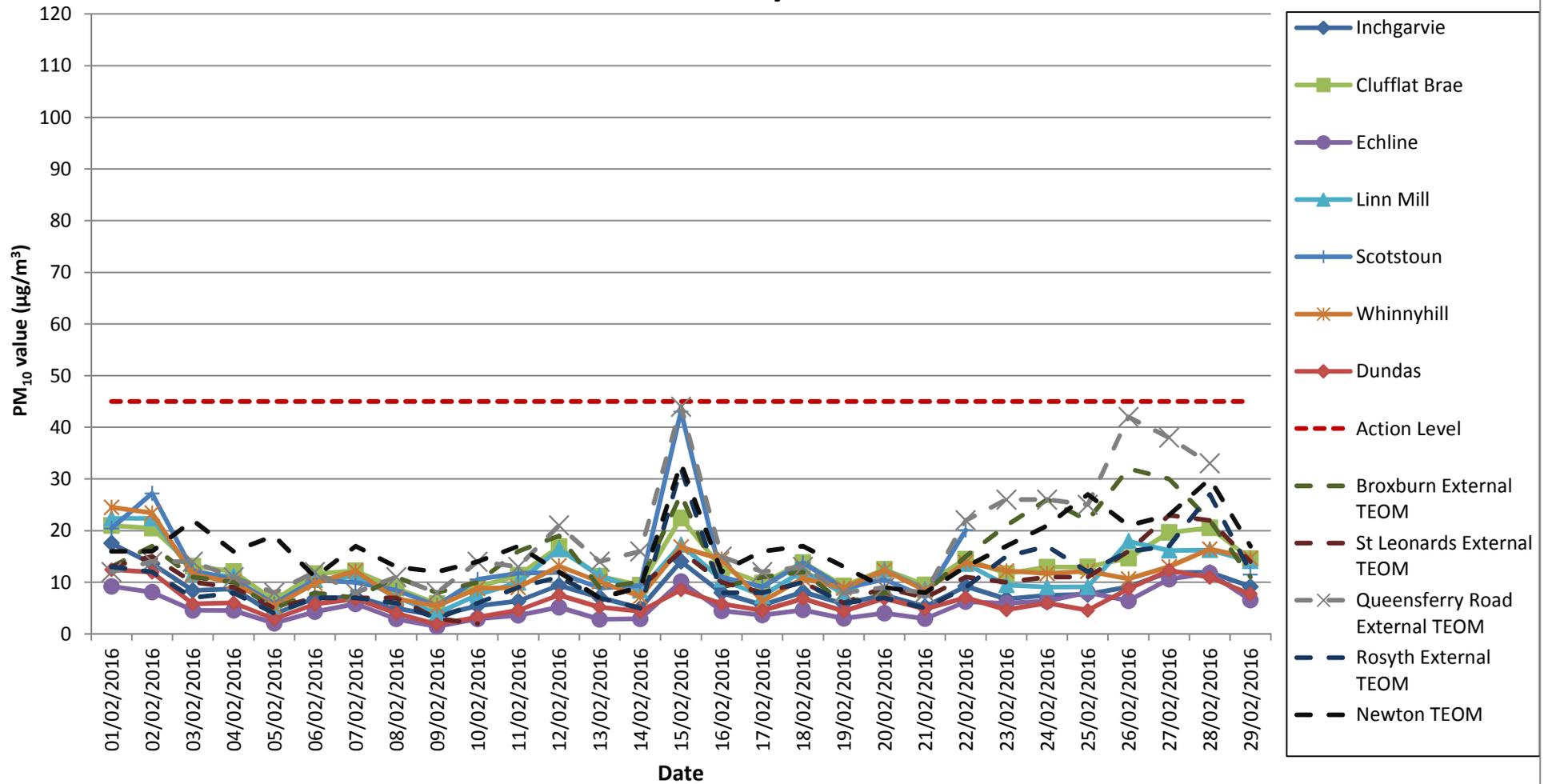
## Particulate Matter (PM10) Results for all Monitoring Locations

### February 2016



Note: There is no data at the Scotstoun monitor between 23/02/2016 and 28/02/2016 due to a electrical problem at the monitor. This was back online on the 29/02/2016

## Air Quality Monitoring: Particulate Matter (PM10) Results for all Monitoring Locations, including TEOM data February 2016



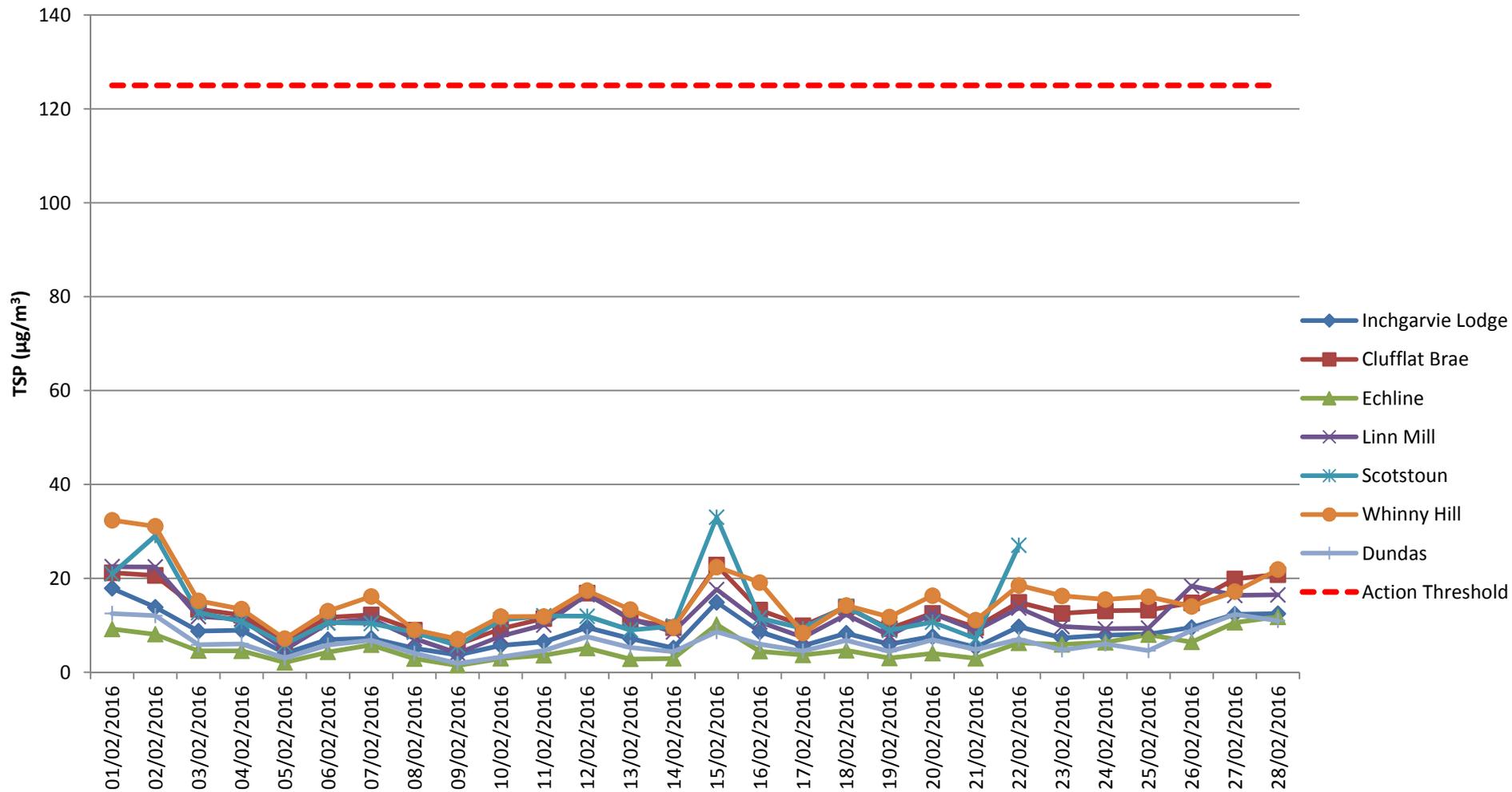
**Note:** There is no data at the Scotstoun monitor between 23/02/2016 and 28/02/2016 due to a electrical problem at the monitor. This was back online on the 29/02/2016



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL  
HOCHTIEF | MORRISON CONSTRUCTION

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

## Total Suspended Particles (TSP) Results February 2016



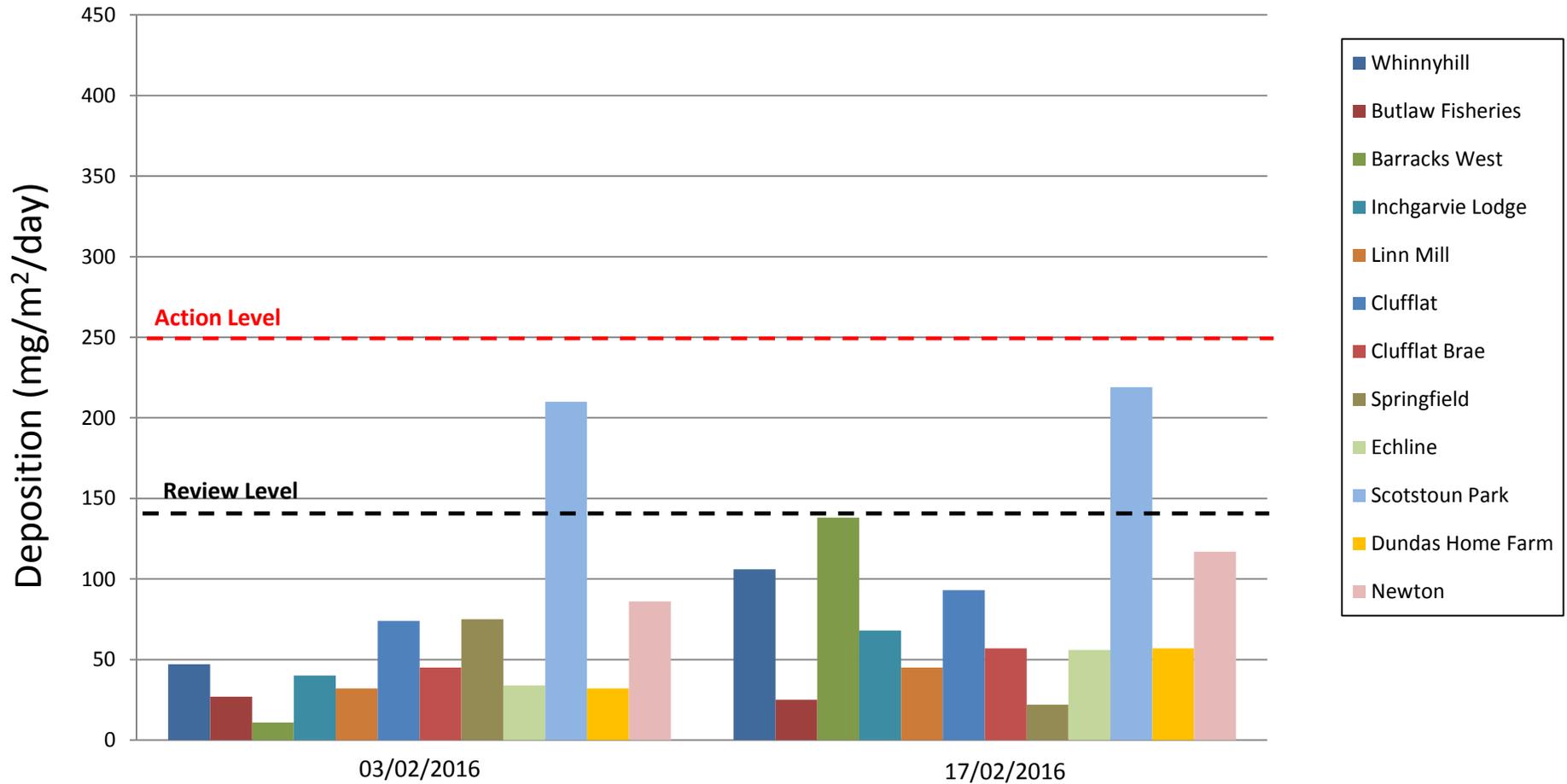
Note: There is no data at the Scotstoun monitor between 23/02/2016 and 28/02/2016 due to a electrical problem at the monitor. This was back online on the 29/02/2016



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL  
HOCHTIEF | MORRISON CONSTRUCTION

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

# Frisbee Dust Deposition Results: February 2016





DRAGADOS | AMERICAN BRIDGE INTERNATIONAL  
HOCHTIEF | MORRISON CONSTRUCTION

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

### Daily Dust Log - North - February 2016

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/02/2016	N	MEDIUM	SW	WET	N			
02/02/2016	N	LIGHT	SW	WET	N			
03/02/2016	N	LIGHT	SE	DAMP	N			
04/02/2016	N	LIGHT	SE	WET	N			
05/02/2016	N	LIGHT	E	DAMP	N			
06/02/2016	N							
07/02/2016	N							
08/02/2016	N	LIGHT	SE	DAMP	N			
09/02/2016	N	LIGHT	SW	WET	N			
10/02/2016	N	LIGHT	SE	DRY	N			
11/02/2016	N	LIGHT	S	WET	N			
12/02/2016	N	LIGHT	E	DAMP	N			
13/02/2016	N							
14/02/2016	N							
15/02/2016	N	LIGHT	S	DRY	N			
16/02/2016	N	LIGHT	S	DAMP	N			
17/02/2016	N	LIGHT	S	WET	N			
18/02/2016	N	LIGHT	SW	DAMP	N			
19/02/2016	N	LIGHT	SW	DAMP	N			
20/02/2016	N							
21/02/2016	N							
22/02/2016	N	LIGHT	SW	DRY	N			
23/02/2016	N	LIGHT	S	DRY	N			
24/02/2016	N	LIGHT	SW	DRY	N			
25/02/2016	N	LIGHT	S	DRY	N			
26/02/2016	N	LIGHT	SE	DRY	N			
27/02/2016	N							
28/02/2016	N							
29/02/2016	N	LIGHT	S	DRY	N			

### Daily Dust Log - South - February 2016

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/02/2016	S	MEDIUM	W	WET	N			
02/02/2016	S	MEDIUM	NW	WET	N			
03/02/2016	S	LIGHT	SE	DAMP	N			
04/02/2016	S	LIGHT	SE	WET	N			
05/02/2016	S	LIGHT	E	DAMP	N			
06/02/2016	S							
07/02/2016	S							
08/02/2016	S	LIGHT	SE	DAMP	N			
09/02/2016	S	LIGHT	W	WET	N			
10/02/2016	S	LIGHT	W	DRY	N			
11/02/2016	S	LIGHT	W	WET	N			
12/02/2016	S	LIGHT	S	DAMP	N			
13/02/2016	S							
14/02/2016	S							
15/02/2016	S	LIGHT	SE	DRY	N			
16/02/2016	S	LIGHT	W	DAMP	N			
17/02/2016	S	LIGHT	W	WET	N			
18/02/2016	S	LIGHT	W	DAMP	N			
19/02/2016	S	MEDIUM	W	DAMP	N			
20/02/2016	S							
21/02/2016	S							
22/02/2016	S	LIGHT	W	DRY	N			
23/02/2016	S	LIGHT	SW	DRY	N			
24/02/2016	S	LIGHT	SW	DRY	N			
25/02/2016	S	LIGHT	W	DRY	N			
26/02/2016	S	LIGHT	SW	DRY	N			
27/02/2016	S							
28/02/2016	S							
29/02/2016	S	LIGHT	W	DRY	N			