



Contractor



Forth Crossing Bridge Constructors

- HOCHTIEF Solutions
- American Bridge International
- DRAGADOS
- Morrison Construction

Project **FORTH REPLACEMENT CROSSING**

Document title

**AIR QUALITY MONITORING REPORT
JULY 2015**

00	13/08/2015	First revision	SWR	LSN	LSN
Rev	Rev. Date	Purpose of revision	Made	Checked	Reviewed

Document status

FOR REVIEW

Made by Steven Westwater Checked By: Liam Soden

Initials: SWR Initials: LSN

Document number

REP-00242

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.



Forth Crossing Bridge Constructors

HOCHTIEF Solutions
American Bridge International
DRAGADOS
Morrison Construction

Distribution

Name	Email Address	Copy Sent (Y/N)
Michael Martin	Michael.martin@fbcjv.co.uk	

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**

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 July 2015.

- 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).

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). 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.

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 and Linn Mill (these 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 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.

In relation to these inspections, the FCBC Environmental Department register any environmental issues using a QMT (Quality Management Tool). Any issues relating to air quality can therefore be noted and closed out appropriately.



Forth Crossing Bridge Constructors

HOCHTIEF Solutions
American Bridge International
DRAGADOS
Morrison Construction



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 July
M1	Whinny Hill	Frisbee	21/03/12	<ul style="list-style-type: none"> • Earth Works/Fill Placement • New Ferrytoll Road • FT09 Works • FT19 Works • Roadworks
		Automatic light scatter meter	16/02/12	
M7	Butlaw Fisheries	Frisbee	05/10/11	<ul style="list-style-type: none"> • Pier S1 rebar, formwork & concrete works • Pier S2 foundation work • Central Tower rebar, formwork, concreting works, deck table installation works • South Tower rebar, formwork, concreting works, deck table installation works
M8	Barracks West	Frisbee	31/08/11	<ul style="list-style-type: none"> • Pier S1 rebar, formwork & concrete works • Pier S2 foundation work • Central Tower rebar, formwork, concreting works, deck table installation works • South Tower rebar, formwork, concreting works, deck table installation works
M9	Barracks East	Frisbee	31/08/11	
M10	Inchgarvie Lodge	Frisbee	22/08/11	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • Pier S1 rebar, formwork & concrete works • Pier S2 foundation work • Central Tower rebar, formwork, concreting works, deck table installation works • South Tower rebar, formwork, concreting works, deck table installation works. • Main carriageway earthworks
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • Main carriageway earthworks
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	<ul style="list-style-type: none"> • Launch – snagging and bearing installation
M13	Clufflat	Frisbee	21/09/11	



	Brae	Automatic light scatter meter	24/10/11	<ul style="list-style-type: none"> Main carriageway earthworks
M14	Springfield	Frisbee	15/08/11	<ul style="list-style-type: none"> Launch – snagging and bearing installation Main carriageway earthworks
M15	Echline	Frisbee	16/08/11	<ul style="list-style-type: none"> Launch – snagging and bearing installation Main carriageway earthworks
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	<ul style="list-style-type: none"> Arup Access works Footpath works Utility works Concrete finishing works at ESQ04 B800 North road works including bridge works (these works are directly in the location of the meter which now sits within the construction boundary).
		Automatic light scatter meter	14/02/12	
M17	Dundas Home Farm	Frisbee	29/08/11	<ul style="list-style-type: none"> Utility works Concrete finishing works at ESQ04 B800 South road works including bridge works Main carriageway works
		Automatic light scatter meter	23/02/12	
M18	Newton	Frisbee	22/08/11	<ul style="list-style-type: none"> 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 July 2015 have been presented in a monthly chart; this can be found in Appendix A. Results show that the PM₁₀ levels were mostly below threshold levels throughout the month with the exception of four periods (1st, 8th, 10th and 24th July). Linn Mill, Scotstoun and Whinnyhill registered above the action level on the 1st July and Clufflat registered above the action level 8th, 10th and 24th July. The other light scatter meters in the vicinity (Inchgarvie and Linn Mill) do not show a similar increase on these days. Clufflat and Inchgarvie also

showed an increase on the 29th July (although still below the action level on this date). These dates all correspond with dry weather conditions with the exception of the 8th when it was damp.

- 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 July 2012. The comparison between the light scatter and TEOM results demonstrates that both sets of results generally follow the same pattern, indicating that the pattern observed throughout July was largely driven by regional changes in air quality, with the exception of increases observed for Clufflat during the month. In particular, the increases on the 8th, 10th and 24th July did not correspond to high TEOM results. The elevated levels of PM₁₀ may be due partly to construction activities, particularly the main carriageway earthworks or dust arising from bare ground areas during dry conditions. Bowser activity will be increased in the area accordingly.
- 3.1.3.** During July, site operations continued around the B800 north of the bridge over the A90. These works currently extend up to the fence line where the Scotstoun PM₁₀ monitor is located. These works include landscaping, surfacing and earthworks in the vicinity of the monitor. This means that the monitor is essentially on-site and that operations are now closer to some receptors. However the Scotstoun PM₁₀ results thorough out the month of July are all under the threshold with the exception of the 1st. FCBC will continue to monitor this area closely over the next few months as works in this area progress.

3.2. Total Suspended Particles

3.2.1. The TSP results for July 2015 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during July were found to be generally low and all within the threshold level. All locations across the site were mostly found to follow a similar pattern (similar to that observed for PM₁₀ levels) but with higher levels noted at a few locations. As mentioned in 3.1.3. The Scotstoun monitor is currently located immediately adjacent to work activities which are being monitored closely at present. As with PM₁₀ it is considered that, in general, the TSP levels across site were influenced by regional changes in TSP levels, with the exception of the increases corresponding to the higher PM₁₀ levels noted in 3.1.2.

3.3. Frisbee Dust Deposition Results

3.3.1. The Frisbee dust deposition results for July 2015 have been presented in a chart and can be found in Appendix C. This includes an additional Frisbee (Echline Corner) currently located south of the A904 in proximity to the Echline monitor. This temporary Frisbee is used to provide additional information and its results are presented alongside the 13 permanent monitors. Frisbee dust deposition results were collected fortnightly, and the results averaged over this fortnight period to give a daily dust deposition rate. Three collections were made to cover the results for July; these occurred on the 1st, 15th and 29th July 2015.

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 July there was 1 exceedance of the review level at Barracks West during the fortnight ending 15th July and 1 exceedance of the action level at Scotstoun during the fortnight ending 29th July . With regards the exceedance at Scotstoun, the Scotstoun light scatter meter registered levels well below the action level for both the TSP and PM10 during the period. These factors would indicate that the exceedance at this location was not related to FCBC Works.

3.4. Daily Dust Log and Environmental Inspections

- 3.4.1.** A summary of the daily dust log for July can be found in Appendix D. There is no information for wind/wind direction from the 3rd-18th July due to an IT server problem, which has been rectified. No instances of dust relating to FCBC works were noted on site.
- 3.4.2.** During this period full environmental inspections were also undertaken across the site and covered areas where works were being carried out.



Forth Crossing Bridge Constructors

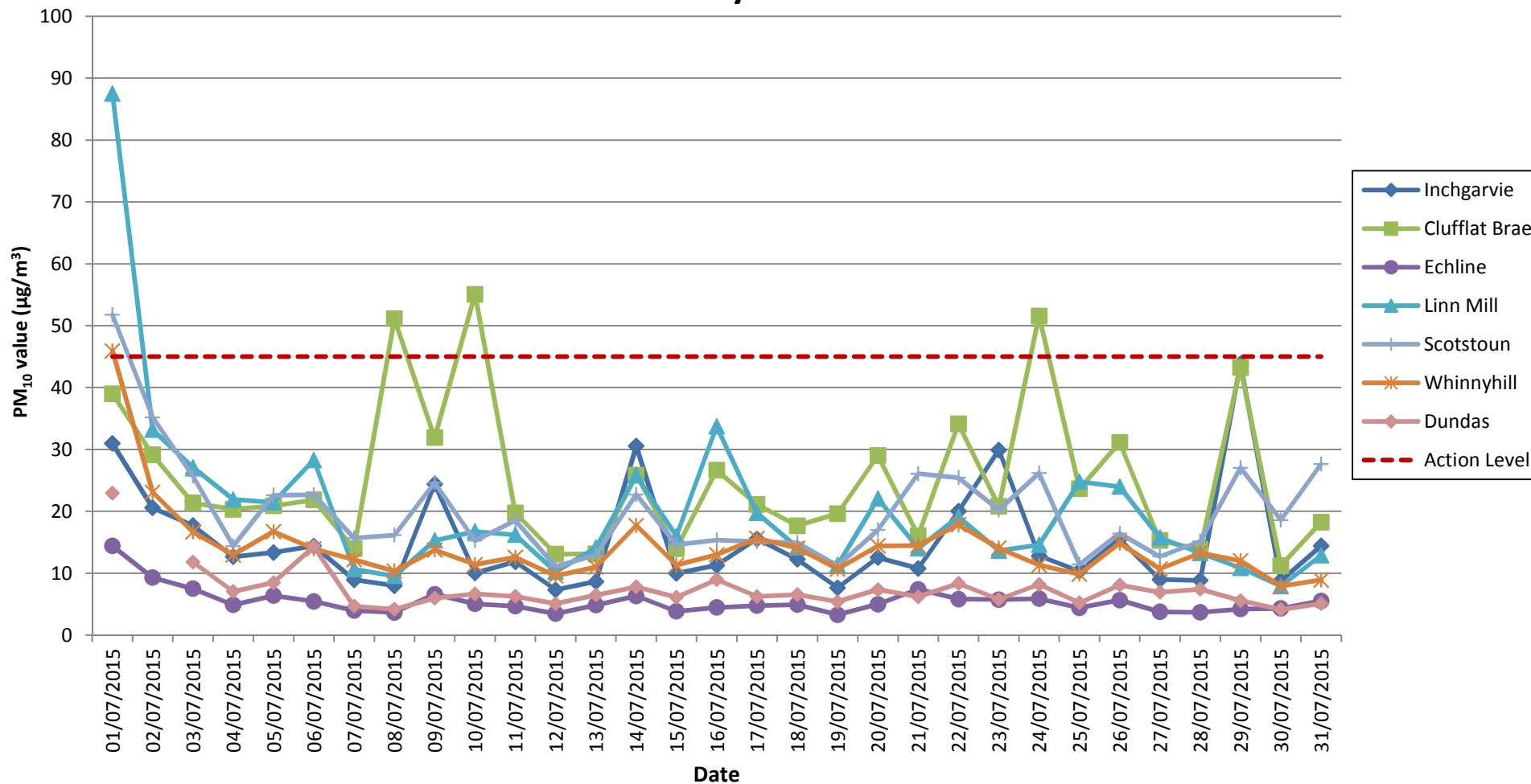
HOCHTIEF Solutions
American Bridge International
DRAGADOS
Morrison Construction

APPENDIX A: LIGHT SCATTER METER RESULTS

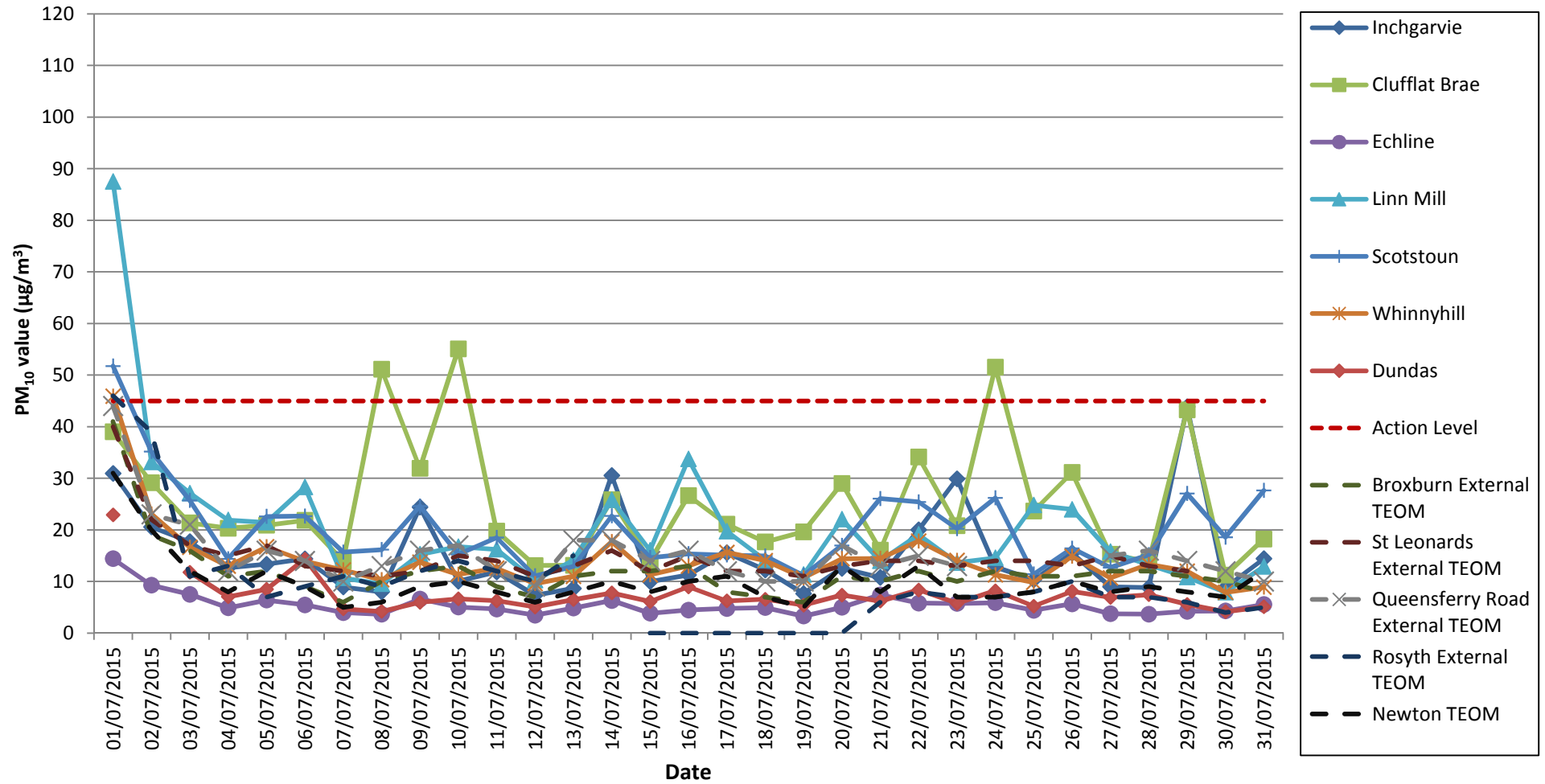
Air Quality Monitoring

Particulate Matter (PM10) Results for all Monitoring Locations

July 2014



Air Quality Monitoring: Particulate Matter (PM10) Results for all Monitoring Locations, including TEOM data JULY 2015



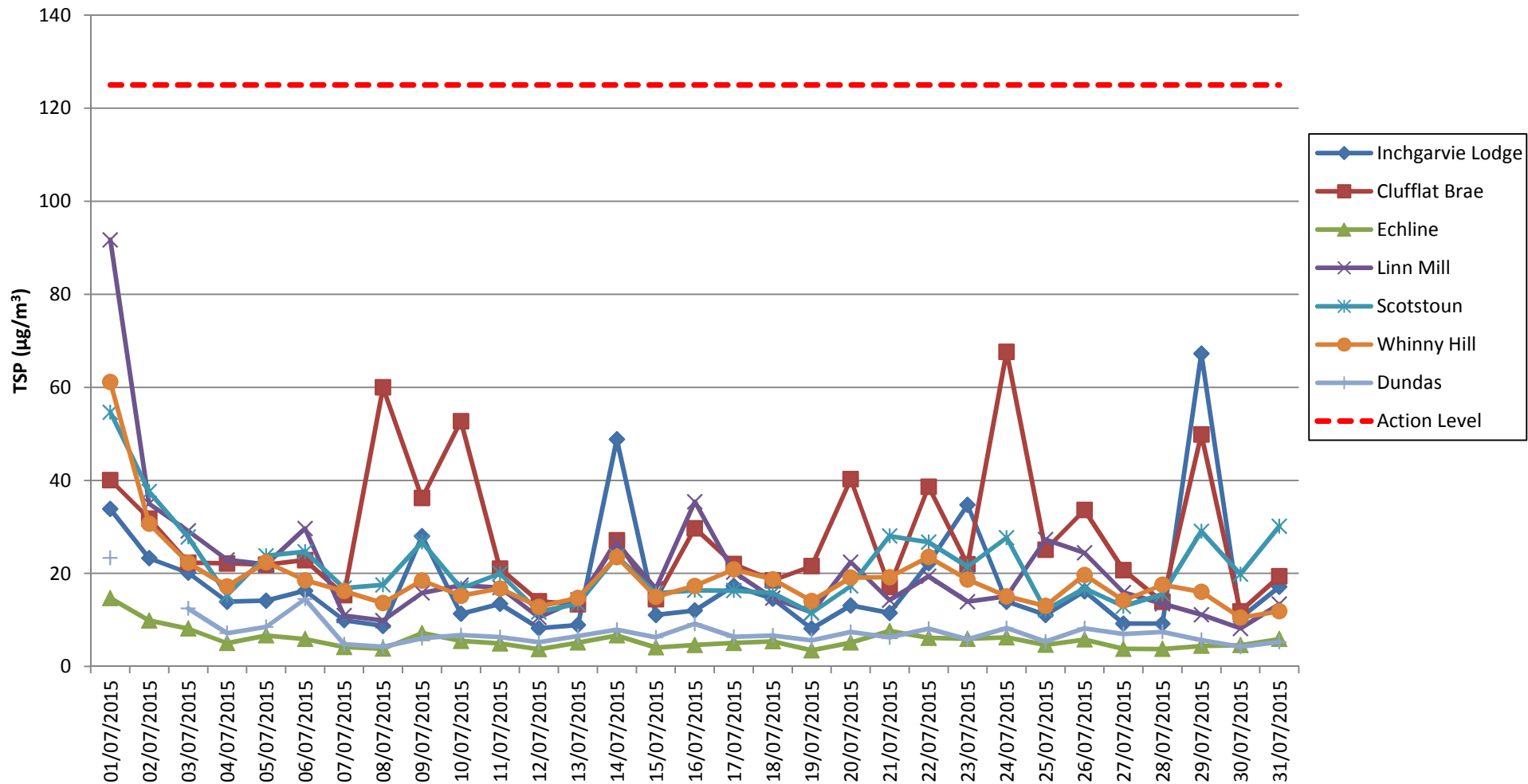


Forth Crossing Bridge Constructors

HOCHTIEF Solutions
American Bridge International
DRAGADOS
Morrison Construction

APPENDIX B: TOTAL SUSPENDED PARTICLES

Total Suspended Particles (TSP) Results July 2014



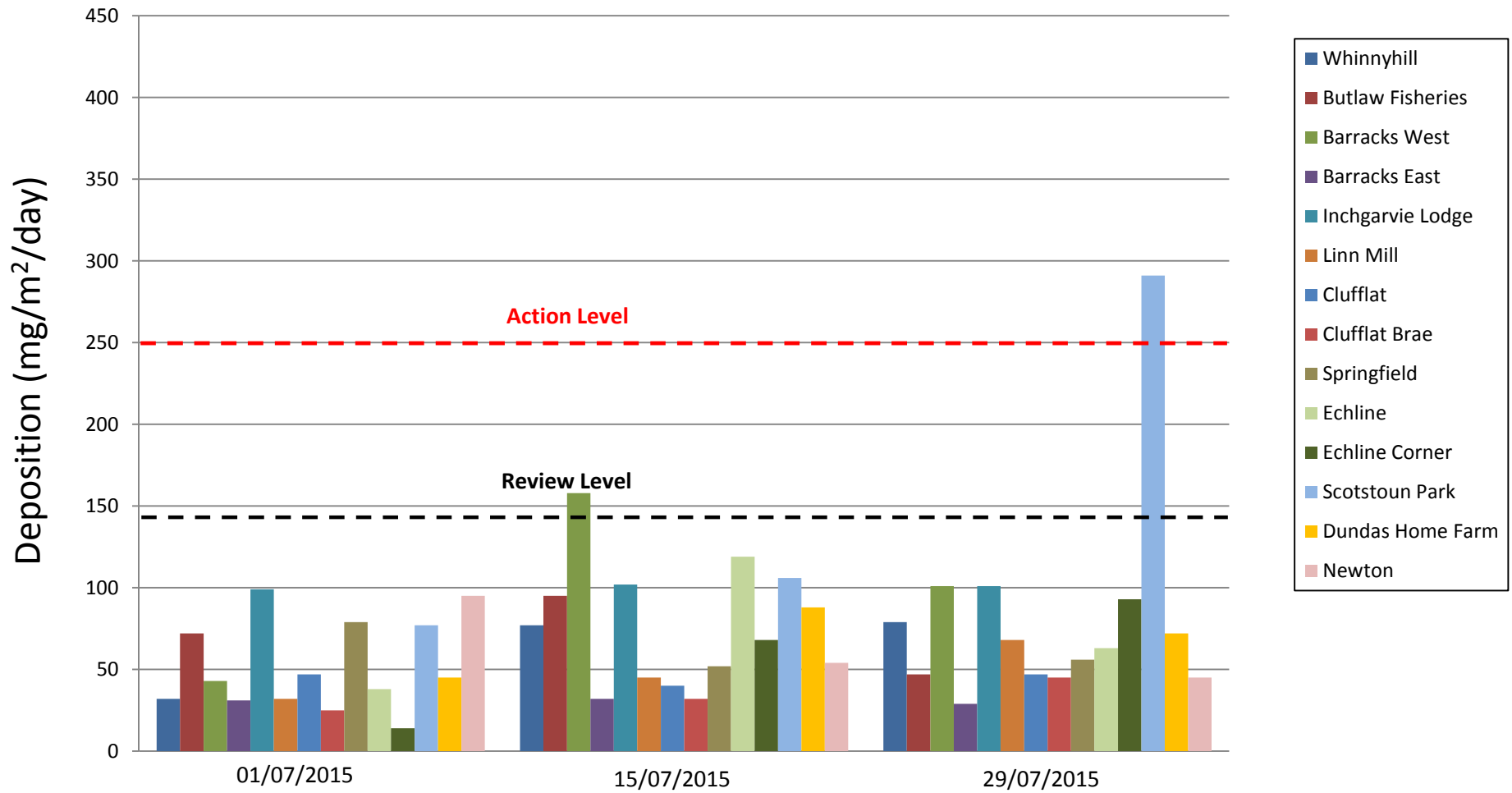


Forth Crossing Bridge Constructors

HOCHTIEF Solutions
American Bridge International
DRAGADOS
Morrison Construction

APPENDIX C: FRISBEE GAUGE RESULTS

Frisbee Dust Deposition Results: July 2015





Forth Crossing Bridge Constructors

HOCHTIEF Solutions
American Bridge International
DRAGADOS
Morrison Construction

APPENDIX D: DAILY DUST LOG

Daily Dust Log - North - July 2015

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/07/2015	N	LIGHT	NE	DRY	N			
02/07/2015	N	LIGHT	NE	DRY	N			
03/07/2015	N			DRY	N			
04/07/2015	N			WET	N			
05/07/2015	N			DAMP	N			
06/07/2015	N			WET	N			
07/07/2015	N			DAMP	N			
08/07/2015	N			DAMP	N			
09/07/2015	N			DRY	N			
10/07/2015	N			DRY	N			
11/07/2015	N			DRY	N			
12/07/2015	N			DRY	N			
13/07/2015	N			WET	N			
14/07/2015	N			DRY	N			
15/07/2015	N			DAMP	N			
16/07/2015	N			DRY	N			
17/07/2015	N			WET	N			
18/07/2015	N			DAMP	N			
19/07/2015	N	LIGHT	NE	WET	N			
20/07/2015	N	LIGHT	NE	DRY	N			
21/07/2015	N	MEDIUM	SW	DAMP	N			
22/07/2015	N	MEDIUM	SW	WET	N			
23/07/2015	N	MEDIUM	SW	WET	N			
24/07/2015	N	LIGHT	SW	DRY	N			
25/07/2015	N	LIGHT	NE	DAMP	N			
26/07/2015	N	LIGHT	NE	DRY	N			
27/07/2015	N	LIGHT	NE	DRY	N			
28/07/2015	N	LIGHT	NE	WET	N			
29/07/2015	N	LIGHT	SW	DRY	N			
30/07/2015	N	LIGHT	SW	DRY	N			
31/07/2015	N	LIGHT	S	DRY	N			

Daily Dust Log - South - July 2015

DATE	LOCATION	WIND	WIND DIRECTION	GROUND SURFACE	VISIBLE DUST	DUST DUE TO WORKS (if applicable)	CAUSES OF DUST (if applicable)	COMMENTS AND ACTIONS
01/07/2015	S	LIGHT	NE	DRY	N			
02/07/2015	S	LIGHT	NE	DRY	N			
03/07/2015	S			DRY	N			
04/07/2015	S			WET	N			
05/07/2015	S			DAMP	N			
06/07/2015	S			WET	N			
07/07/2015	S			DAMP	N			
08/07/2015	S			DAMP	N			
09/07/2015	S			DRY	N			
10/07/2015	S			DRY	N			
11/07/2015	S			DRY	N			
12/07/2015	S			DRY	N			
13/07/2015	S			WET	N			
14/07/2015	S			DRY	N			
15/07/2015	S			DAMP	N			
16/07/2015	S			DRY	N			
17/07/2015	S			WET	N			
18/07/2015	S			DAMP	N			
19/07/2015	S	LIGHT	NE	WET	N			
20/07/2015	S	LIGHT	NE	DRY	N			
21/07/2015	S	MEDIUM	SW	DAMP	N			
22/07/2015	S	MEDIUM	SW	WET	N			
23/07/2015	S	MEDIUM	SW	WET	N			
24/07/2015	S	LIGHT	SW	DRY	N			
25/07/2015	S	LIGHT	NE	DAMP	N			
26/07/2015	S	LIGHT	NE	DRY	N			
27/07/2015	S	LIGHT	NE	DRY	N			
28/07/2015	S	LIGHT	NE	WET	N			
29/07/2015	S	LIGHT	SW	DRY	N			
30/07/2015	S	LIGHT	SW	DRY	N			
31/07/2015	S	LIGHT	S	DRY	N			