



Contractor



Forth Crossing Bridge Constructors

HOCHTIEF Solutions
American Bridge International
DRAGADOS
Morrison Construction

Project **FORTH REPLACEMENT CROSSING**

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AIR QUALITY MONITORING REPORT
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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 July 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 (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 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.



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 July
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	Works at S7 and S8 Works at Society Road Marine works
M8	Barracks West	Frisbee	31/08/11	Marine works Works at Society Road
M9	Barracks East	Frisbee	31/08/11	Marine works Works at Society Road
M10	Inchgarvie Lodge	Frisbee	22/08/11	Utility works Earthworks Works at S7 and S8 Drainage works
		Automatic light scatter meter	17/10/11	
M11	Linn Mill	Frisbee	22/08/11	Utility works Earthworks Drainage works Excavation
		Automatic light scatter meter	06/12/11	
M12	Clufflat	Frisbee	29/08/11	Utility works Earthworks Excavation Drainage works
M13	Clufflat Brae	Frisbee	21/09/11	
		Automatic light scatter meter	24/10/11	
M14	Springfield	Frisbee	15/08/11	Utility works Earthworks Drainage works Excavation
M15	Echline	Frisbee	16/08/11	Utility works Earthworks Drainage works Excavation
		Automatic light scatter meter	10/11/11	
M16	Scotstoun	Frisbee	07/09/11	Soil stripping 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 July 2012 have been presented in a monthly chart; this can be found in Appendix A. Results show that generally PM₁₀ levels were low and largely followed the same pattern across the site. There was a single exceedance of the PM₁₀ threshold during July; this occurred at Clufflat Brae on 27 July, where a level of 56.45µg/m³ was recorded. Construction works (service diversions) were on-going in this area on this day, however, ground conditions were damp and, although strong winds were noted, these conditions acted to restrict the spread of construction dust. Real time triggers were received by the Environmental Team during this day. Discussions with the works manager confirmed that the construction activities (service diversions only) in the area were not giving rise to visible excessive dust. As light rain was noted to be falling at the time (this was recorded at the weather station at Clufflat Brae) it was considered that no further action was necessary.

3.1.2. The 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. 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 July was largely due to regional changes in air quality, rather than due to construction works. However, the TEOM data did not show any significant peak on the 27th July, which would indicate that the increase at Clufflat Brae on this date was not weather related or due to any transboundary affects.

- 3.1.3.** Due to a loss of the power supply at Echline, the data from this meter is missing throughout July. FCBC are currently working to restore the power supply to this device. It is anticipated that the device will be operational mid-August.

3.2. Total Suspended Particles

- 3.2.1.** The TSP results for July 2012 have been presented in a monthly chart; this can be found in Appendix B. TSP levels at all monitoring locations throughout July 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. One slight elevation in the results did occur at Clufflat Brae on the 27th July, corresponding with the date on which high PM₁₀ results were recorded; results were, however, significantly below the action threshold.
- 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 was recalibrated by the supplier at the beginning of July. However, measurements of TSP throughout July continued to be unrealistically low. It should be noted that, following consultation with the supplier, this was a device error that affected the measurement of TSP only. Data is also missing for Echline due to the loss of power, as noted in paragraph 3.1.3.

3.3. Frisbee Dust Deposition Results

3.3.1. The Frisbee dust deposition results for July 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 July; 11 and 25 July 2012. Due to unforeseen circumstances, the collection due on the 25 July was delayed until the 26 July. This resulted in the results being averaged over a period of 15 days for the second period of this month. It should also be noted that due to a delayed collection at the end of June, the results for the period ending on the 11 July were averaged over a period of 13 days. The next collection date is due on the 08 August.

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. Throughout July the dust deposition rates for Groups 1, 3 and 4 were within the threshold levels. For Group 2, results for all locations were within the threshold dust deposition levels for the period ending on 26 July. However, there were exceedances of the site review level at Clufflat Brae and Echline for the period ending on the 11 July. The results for Group 5 show that results at Whinny Hill were within the threshold level for the period ending on 25 July, though there was an exceedance of the review level for the period ending on 11 July. There were no exceedances of the site action level throughout July.

3.3.5. Due to the exceedances of the site review level on three occasions during July, at three 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 dust, however, indicated that the construction works were unlikely to have resulted in the exceedances. North and 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. During the period leading up to the 11 July, wet weather was also frequently recorded.

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. For both the South and North work areas no instances of dust due to construction works were noted. During dry periods the bowser was on site, dampening down materials where 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 July, focussing on areas in which



works were being undertaken. Due to the wet weather conditions during July, dust levels throughout were generally not found to be an issue. However, the inspections noted that, where required, the bowser was present on site in both the North and South works areas.



APPENDIX A: LIGHT SCATTER METER RESULTS



APPENDIX B: TOTAL SUSPENDED PARTICLES



APPENDIX C: FRISBEE GAUGE RESULTS



APPENDIX D: DAILY DUST LOG



APPENDIX E: SUMMARY OF ENVIRONMENTAL INSPECTIONS