
Contractor

FCBC
Queensferry Crossing

DRAGADOS | AMERICAN BRIDGE INTERNATIONAL
HOCHTIEF | MORRISON CONSTRUCTION

Project

# FORTH REPLACEMENT CROSSING

Document title

# AIR QUALITY MONITORING REPORT APRIL 2016

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**Contents**

## 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 April 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).

## 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 ($PM_{10}$) 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, 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 April |
|---|---|---|---|---|
| M1 | Whinny Hill | Frisbee | 21/03/12 | • Earthworks/Fill Placement<br>• Hope Street roadworks<br>• Bridge works at Ferrytoll<br>• Main carriageway roadworks<br>• Rock crushing |
| | | Automatic light scatter meter | 16/02/12 | |
| M7 | Butlaw Fisheries | Frisbee | 05/10/11 | • Pier S1 rebar, formwork & concrete works<br>• Pier S2 rebar, formwork & concrete works<br>• South Tower rebar, formwork, concreting works, deck segment lifts, deck table installation works |
| M8 | Barracks West | Frisbee | 31/08/11 | • Pier S1 rebar, formwork & concrete works<br>• Pier S2 rebar, formwork & concrete works<br>• South Tower rebar, formwork, concreting works, deck segment lifts, deck table installation works |
| M10 | Inchgarvie Lodge | Frisbee | 22/08/11 | • AVS Scaffolding, shuttering and reinforcement to deck<br>• Main carriageway earthworks<br>• Pier S1 rebar, formwork & concrete works<br>• Pier S2 formwork and concrete works<br>• South Tower rebar, formwork, concreting works, deck segment lifts, deck table installation works |
| | | Automatic light scatter meter | 17/10/11 | |
| M11 | Linn Mill | Frisbee | 22/08/11 | • AVS Scaffolding, shuttering and reinforcement to deck<br>• Main carriageway earthworks<br>• South Tower rebar, formwork, concreting works, deck segment lifts, deck table installation works |
| | | Automatic light scatter meter | 06/12/11 | |
| M12 | Clufflat | Frisbee | 29/08/11 | • AVS Scaffolding, shuttering and reinforcement to deck<br>• Main carriageway earthworks |
| M13 | Clufflat Brae | Frisbee | 21/09/11 | |
| | | Automatic light scatter meter | 24/10/11 | |

| | | | | |
|---|---|---|---|---|
| M14 | Springfield | Frisbee | 15/08/11 | • AVS Scaffolding, shuttering and reinforcement to deck<br>• Main carriageway earthworks |
| M15 | Echline | Frisbee | 16/08/11 | • AVS Scaffolding, shuttering and reinforcement to deck<br>• Main carriageway earthworks |
| | | Automatic light scatter meter | 10/11/11 | |
| M16 | Scotstoun | Frisbee | 07/09/11 | • Footpath works<br>• Utility works<br>• Main carriageway works<br>• B800 Rebar and Concrete works.<br>• Top soil spread next to B800<br>• North-bound bus link |
| | | Automatic light scatter meter | 14/02/12 | |
| M17 | Dundas Home Farm | Frisbee | 29/08/11 | • Utility works<br>• B800 Rebar and Concrete works<br>• Main carriageway works<br>• North-bound bus link |
| | | 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 April 2016 have been presented in a monthly chart; this can be found in Appendix A. Results show that the $PM_{10}$ levels were below threshold levels throughout April with the exception of Scotstoun on the 19th April. All monitors generally follow the same pattern throughout the month. However, the $PM_{10}$ results for Scotstoun show larger increases on the 9th and 19th April. On the 19th April, the Scotstoun light scatter meter registered 15 minute exceedances for $PM_{10}$. The FCBC Environmental Coordinator investigated the area and confirmed that conditions were not dusty and that sufficient mitigation was in place. All other monitors also showed an increase on this day. Although below the threshold, high results were also observed for Linn Mill on 11th, 12th and 22nd April and at Inchgarvie on 25th April.

**3.1.2.** The $PM_{10}$ 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, although the light scatter meter results indicate some higher peaks of $PM_{10}$ throughout April. The higher levels of $PM_{10}$ observed at Scotstoun, Linn Mill and Inchgarvie (3.1.1 above) are largely consistent with the TEOM results for the same period, although the exceedance on 19th April at Scotstoun is higher. The pattern observed throughout April was largely driven by regional changes in air quality.

### 3.2. Total Suspended Particles

**3.2.1.** The TSP results for April 2016 have been presented in a monthly chart; this can be found in Appendix B. The TSP levels at monitoring locations during April 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 $PM_{10}$ levels). As with $PM_{10}$ 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 April 2016 have been presented in a chart and can be found in Appendix C. Two collections were made in April; these occurred on the 13th and 27th April 2016.

**3.3.2.** The site action level for the dust deposition rate has been set at 250 $mg/m^2/day$. 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$^2$/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 April there was one exceedance of the review level at Scotstoun for the fortnight concluding 13th April. The light scatter meter at Scotstoun indicated mostly low levels of $PM_{10}$ and TSP during this fortnight. During March FCBC placed an additional temporary Frisbee at Scotstoun (noted as Scotstoun Arups in Appendix C). This temporary frisbee is located closer to the FCBC works than the permanent frisbee. The results from the temporary frisbee for the fortnight ending 13th April indicates a significantly lower result than for the Scotstoun permanent frisbee. This suggests that the higher results obtained recently at the permanent monitoring location are not entirely due to FCBC activities. As noted in previous reports, other construction work (not project related) is ongoing in the Scotstoun area. However, FCBC will continue to monitor Forth Replacement Crossing construction closely as works progress and provide mitigation as necessary.

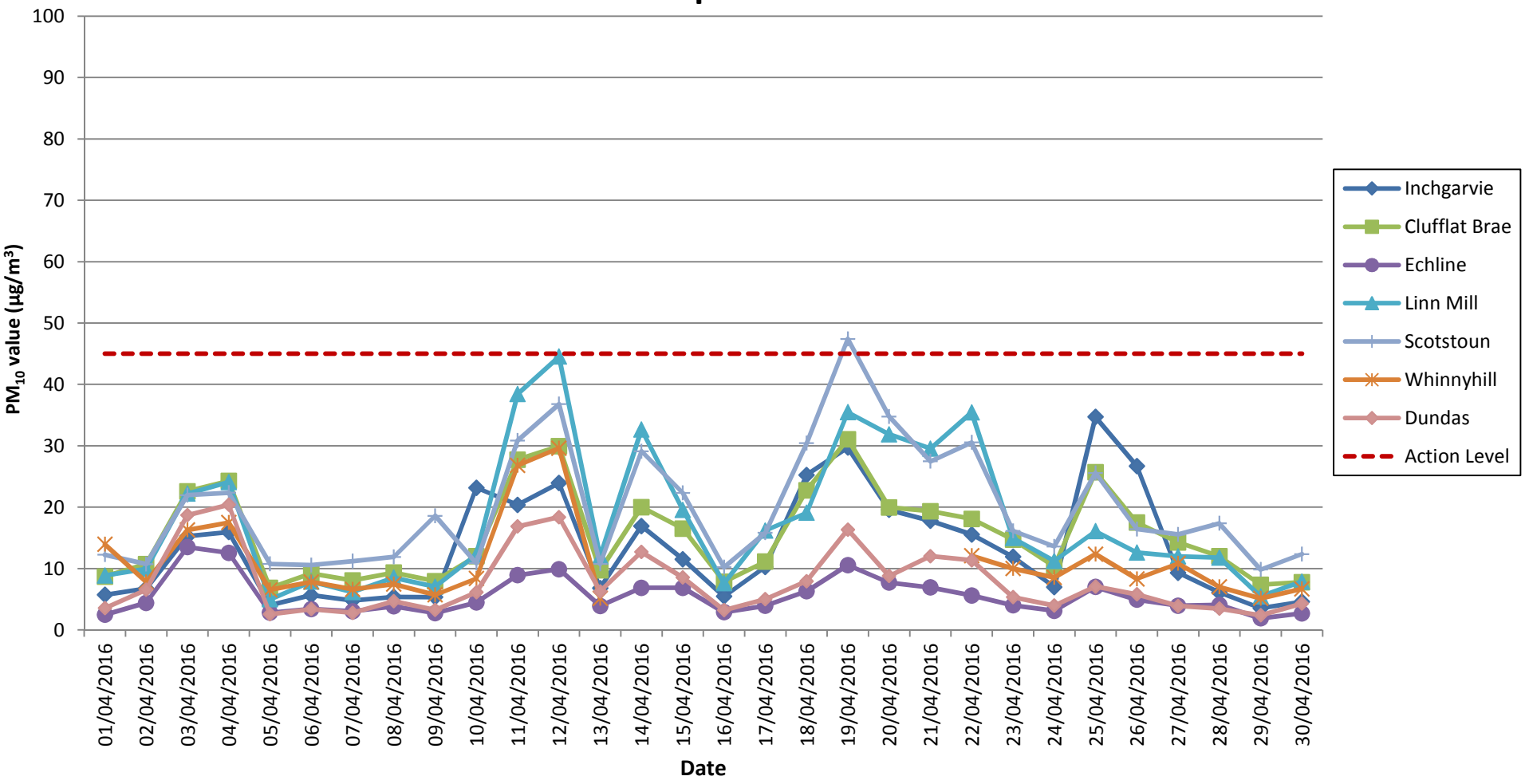
### 3.4. Daily Dust Log and Environmental Inspections

**3.4.1.** A summary of the daily dust log for April 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.

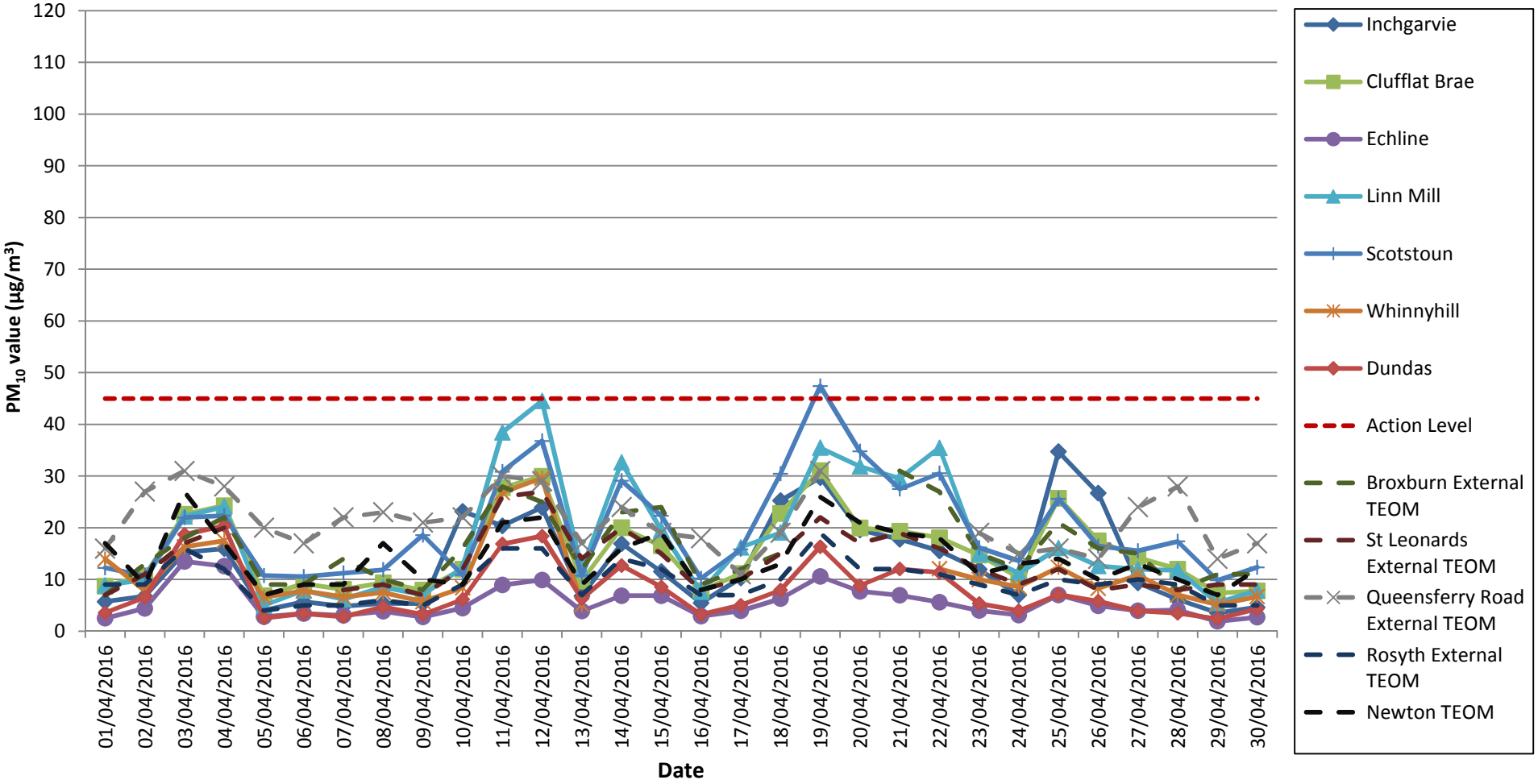
# APPENDIX A: LIGHT SCATTER METER RESULTS

# Air Quality Monitoring
# Particulate Matter (PM10) Results for all Monitoring Locations
# April 2016




Note: There is no data at the Whinnyhill monitor between 14/04/2016-21/04/2016 due to a electrical problem at the monitor. This was back online on the 22/04/2016

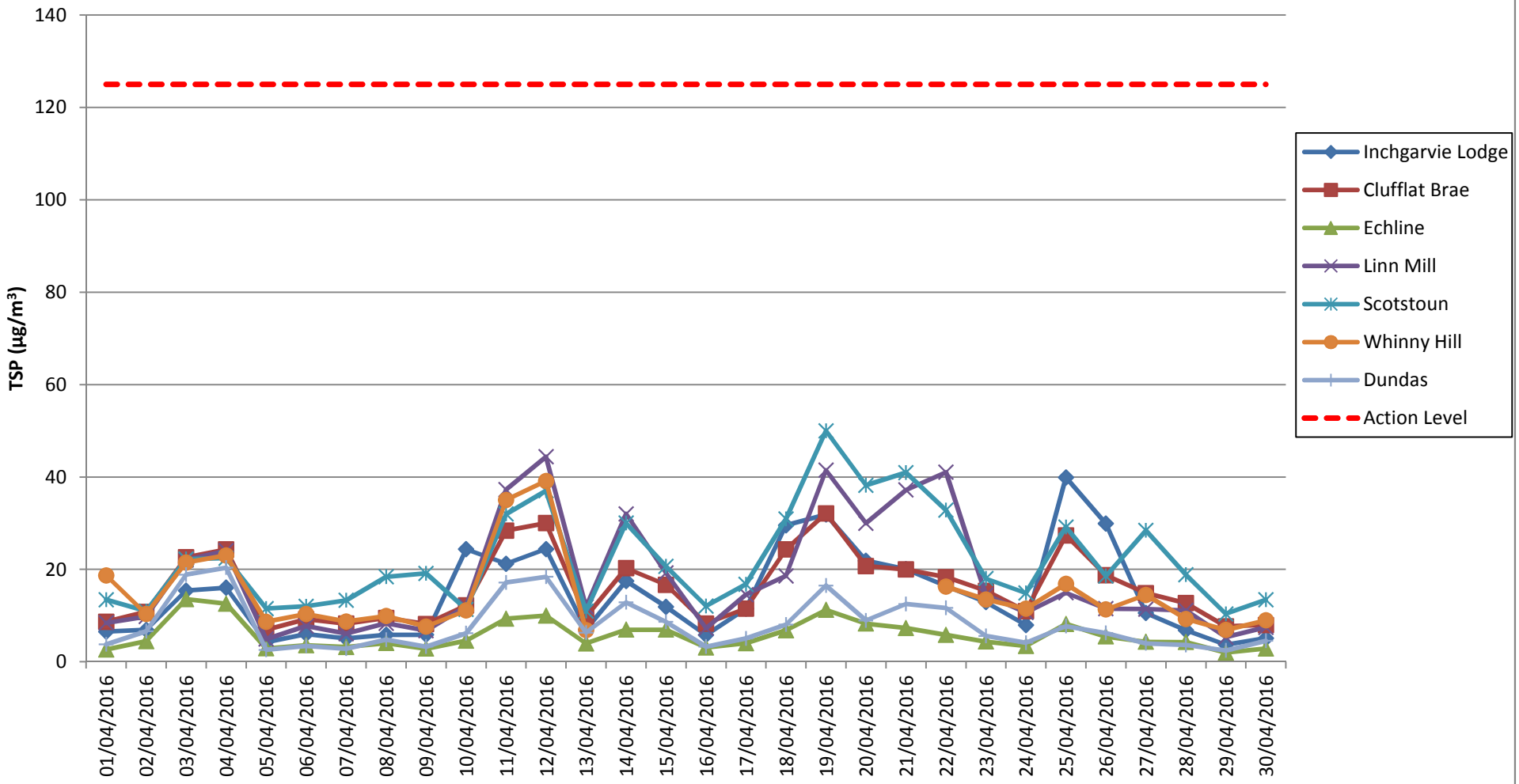
# Air Quality Monitoring: Particulate Matter (PM10) Results for all Monitoring Locations, inlcuding TEOM data
## April 2016




Note: There is no data at the Whinnyhill monitor between 14/04/2016-21/04/2016 due to a electrical problem at the monitor. This was back online on the 22/04/2016

# APPENDIX B: TOTAL SUSPENDED PARTICLES

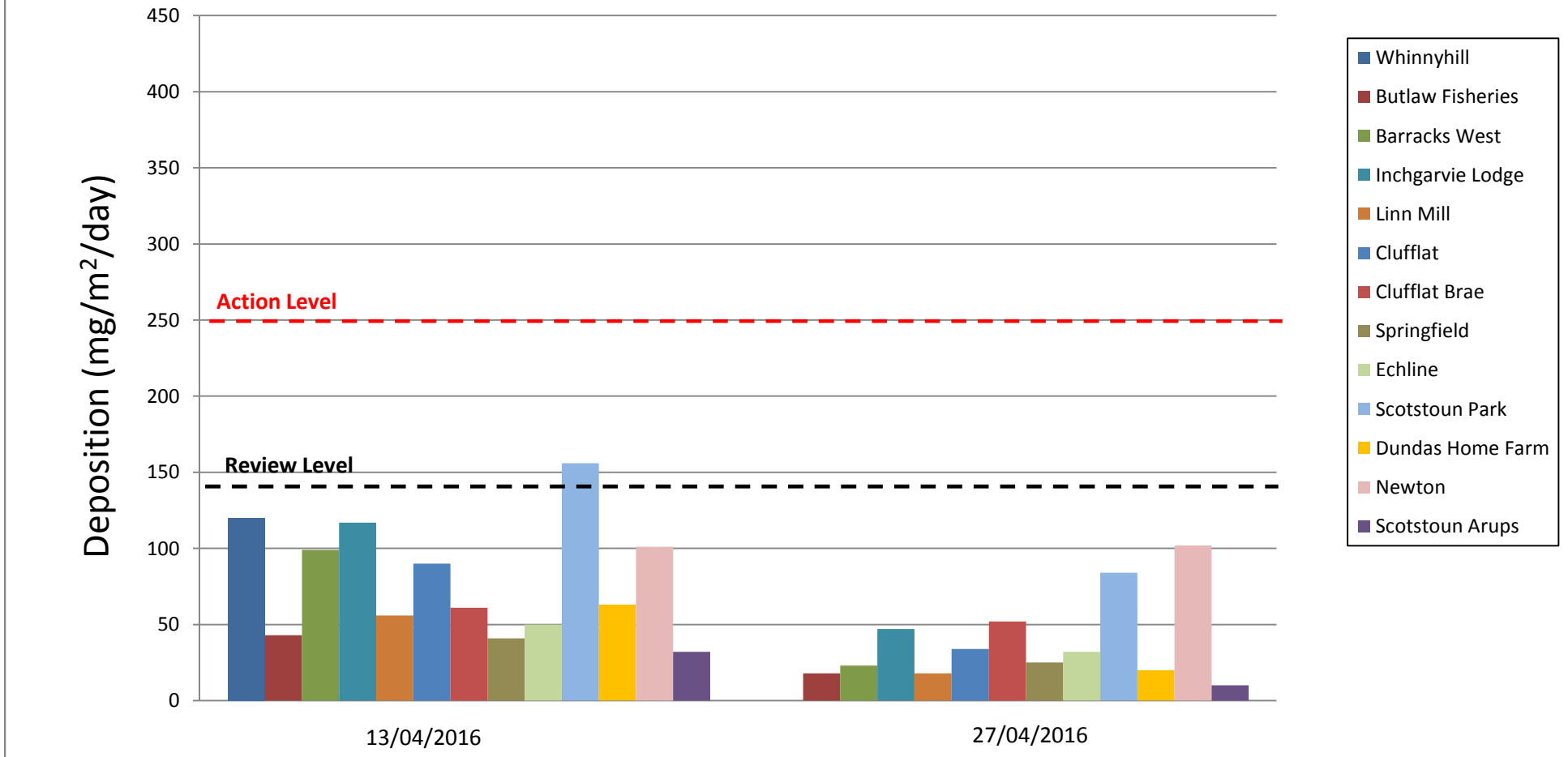
# Total Suspended Particles (TSP) Results
# April 2016




Note: There is no data at the Whinnyhill monitor between 14/04/2016-21/04/2016 due to a electrical problem at the monitor. This was back online on the 22/04/2016

## APPENDIX C: FRISBEE GAUGE RESULTS

# Frisbee Dust Deposition Results: April 2016



## APPENDIX D: DAILY DUST LOG

# Daily Dust Log - North - April 2016

| DATE | LOCATION | WIND | WIND DIRECTION | GROUND SURFACE | VISIBLE DUST | DUST DUE TO WORKS (if applicable) | CAUSES OF DUST (if applicable) | COMMENTS AND ACTIONS |
|---|---|---|---|---|---|---|---|---|
| 01/04/2016 | N | LIGHT | S | WET | | | | |
| 02/04/2016 | N | | | | | | | |
| 03/04/2016 | N | | | | | | | |
| 04/04/2016 | N | LIGHT | SE | DAMP | | | | |
| 05/04/2016 | N | LIGHT | S | DAMP | | | | |
| 06/04/2016 | N | LIGHT | SW | WET | | | | |
| 07/04/2016 | N | LIGHT | S | WET | | | | |
| 08/04/2016 | N | LIGHT | S | DRY | | | | |
| 09/04/2016 | N | | | | | | | |
| 10/04/2016 | N | | | | | | | |
| 11/04/2016 | N | LIGHT | E | DRY | | | | |
| 12/04/2016 | N | LIGHT | E | WET | | | | |
| 13/04/2016 | N | LIGHT | SE | WET | | | | |
| 14/04/2016 | N | LIGHT | E | DRY | | | | |
| 15/04/2016 | N | LIGHT | S | WET | | | | |
| 16/04/2016 | N | | | | | | | |
| 17/04/2016 | N | | | | | | | |
| 18/04/2016 | N | LIGHT | S | DRY | | | | Dust from rock crusher at works near Ferrytoll gyratory . Contacted site teams to put appropriate mitigation in place |
| 19/04/2016 | N | LIGHT | S | DRY | | | | |
| 20/04/2016 | N | LIGHT | SE | DRY | | | | |
| 21/04/2016 | N | LIGHT | SE | DRY | | | | |
| 22/04/2016 | N | LIGHT | SE | DRY | | | | |
| 23/04/2016 | N | | | | | | | |
| 24/04/2016 | N | | | | | | | |
| 25/04/2016 | N | LIGHT | SW | DRY | | | | |
| 26/04/2016 | N | LIGHT | SW | WET | | | | |
| 27/04/2016 | N | LIGHT | E | DAMP | | | | |
| 28/04/2016 | N | LIGHT | SE | WET | | | | |
| 29/04/2016 | N | LIGHT | SW | DAMP | | | | |
| 30/04/2016 | N | | | | | | | |

# Daily Dust Log -South - April 2016

| DATE | LOCATION | WIND | WIND DIRECTION | GROUND SURFACE | VISIBLE DUST | DUST DUE TO WORKS (if applicable) | CAUSES OF DUST (if applicable) | COMMENTS AND ACTIONS |
|---|---|---|---|---|---|---|---|---|
| 01/04/2016 | S | LIGHT | E | WET | | | | |
| 02/04/2016 | S | | | | | | | |
| 03/04/2016 | S | | | | | | | |
| 04/04/2016 | S | LIGHT | W | WET | | | | |
| 05/04/2016 | S | LIGHT | S | DAMP | | | | |
| 06/04/2016 | S | LIGHT | SE | WET | | | | |
| 07/04/2016 | S | LIGHT | S | WET | | | | |
| 08/04/2016 | S | LIGHT | SE | DRY | | | | |
| 09/04/2016 | S | | | | | | | |
| 10/04/2016 | S | | | | | | | |
| 11/04/2016 | S | LIGHT | S | DRY | | | | |
| 12/04/2016 | S | LIGHT | W | WET | | | | |
| 13/04/2016 | S | LIGHT | SW | WET | | | | |
| 14/04/2016 | S | LIGHT | SW | DRY | | | | |
| 15/04/2016 | S | LIGHT | S | WET | | | | |
| 16/04/2016 | S | | | | | | | |
| 17/04/2016 | S | | | | | | | |
| 18/04/2016 | S | LIGHT | SE | DRY | | | | |
| 19/04/2016 | S | LIGHT | S | DRY | | | | PM10 - 15 minute exceedances throughout day at Scotstoun. Environmental coordinator attended site. No dust observed and dust suppression was ongoing (bowser). |
| 20/04/2016 | S | LIGHT | S | DRY | | | | |
| 21/04/2016 | S | LIGHT | SW | DRY | | | | |
| 22/04/2016 | S | LIGHT | W | DRY | | | | |
| 23/04/2016 | S | | | | | | | |
| 24/04/2016 | S | | | | | | | |
| 25/04/2016 | S | LIGHT | S | DRY | | | | |
| 26/04/2016 | S | LIGHT | S | WET | | | | |
| 27/04/2016 | S | LIGHT | S | DAMP | | | | |
| 28/04/2016 | S | LIGHT | SE | WET | | | | |
| 29/04/2016 | S | LIGHT | S | DAMP | | | | |
| 30/04/2016 | S | | | | | | | |