

Environment Protection Authority

Stirling North air quality report

June 2017

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ISBN 978-1-921495-82-3

July 2017

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Contents

Abbreviation	1
1 Background	3
2 Port Augusta air quality monitoring.....	4
3 EPA monitoring campaign	7
4 Conclusion and recommendations	10
Appendix Supplementary information – measurement methods	11

List of figures

Figure 1 Map showing locations of air quality monitors	4
Figure 2 Daily average PM ₁₀ concentrations from HVAS network (operated by Flinders Power).....	5
Figure 3 Picture showing current Flinders Power’s Stirling North monitoring location	6
Figure 4 Map showing locations of air quality monitors at Stirling North	7
Figure 5 EPA Stirling North daily TSP (µg/m ³).....	8
Figure 6 EPA Stirling North daily PM ₁₀ (µg/m ³).....	8
Figure 7 Comparison of TSP monitored by EPA and Flinders Power HVAS (24-hour averaged) at Stirling North.....	9
Figure 8 Comparison of PM ₁₀ monitored by EPA and Flinders Power HVAS (24-hour averaged) at Stirling North.....	9

Abbreviation

(The) Act	Environment Protection Act 1993
EPA	South Australian Environment Protection Authority
TSP	total suspended particulates
BAM	beta attenuation monitor
TEOM	tapered element oscillating microbalance

1 Background

One of the EPA's environmental goals is good quality air. To support this goal the EPA conducts ongoing ambient air quality monitoring and site-specific investigative monitoring at locations around the state. Monitoring is one of the tools used to improve understanding of air pollution patterns and trends and the impacts on South Australian communities.

The EPA monitors air quality in Port Augusta to identify potential impacts from the site of the former Port Augusta power stations. Following a major dust event in January 2017, the EPA increased its monitoring in Port Augusta, including installing an additional monitoring station at Stirling North to better understand why the existing monitoring station was recording elevated levels of dust which were not being measured across the rest of the town's monitoring network.

The EPA assessed dust sources at the Flinders Power Stirling North monitoring site and at nearby EPA licensed sites. An additional station was installed at the site of the Stirling North Primary School, where the environment immediately around the air quality monitoring station was not affected by localised dust sources. This report outlines the assessment of data obtained from this monitoring station.

Data in this report are assessed against ground level concentration criteria for PM₁₀ in Schedule 2 of the *Environment Protection (Air Quality) Policy 2016*. Further information about ambient air quality is available on the [EPA website](http://www.epa.sa.gov.au/data_and_publications/air_quality_monitoring)¹.

¹ http://www.epa.sa.gov.au/data_and_publications/air_quality_monitoring

2 Port Augusta air quality monitoring

During power generation, the EPA required Flinders Power to conduct dust and other pollutants monitoring to understand the impacts of its emission. High volume air samplers (HVAS) are still maintained on five sites at Stirling North, Lea Memorial Oval, Port Augusta Hospital, PA Tennis Association and Pigeon Club to monitor TSP (all sites) and PM₁₀ (four sites only). The existing Stirling North monitoring site was chosen to be used as a background site as it is away from the former power station site and there are no significant sources in the prevailing wind direction (ie south easterlies) toward the monitoring station (Figure 1).

More recently, Flinders Power has installed real-time monitors to carry out continuous monitoring of PM₁₀ at Lea Memorial Oval and Stirling North. This equipment constantly measures PM₁₀ and combines the continuous information to calculate the 24-hour average PM₁₀. More intensive monitoring provides information on variations in the dust throughout the day and picks up short-term 'spikes' in dust.

Total suspended particulates (TSP) is a class of particles which have equivalent aerodynamic diameters less than 50 micrometres (µm) and includes a mixture of large and fine particles. The larger particles that have equivalent aerodynamic diameters greater than 10 µm are generally trapped in our noses and throats, so they do not reach the lungs; however, they may cause nuisance and soiling of surfaces. PM₁₀ is a class of particles which can be inhaled, with equivalent aerodynamic diameters 10 µm and smaller.

PM₁₀ particles are able to enter the lungs and are known to have health effects. PM₁₀ particles may also be associated with visible dust, which is why PM₁₀ is often measured in conjunction with TSP.

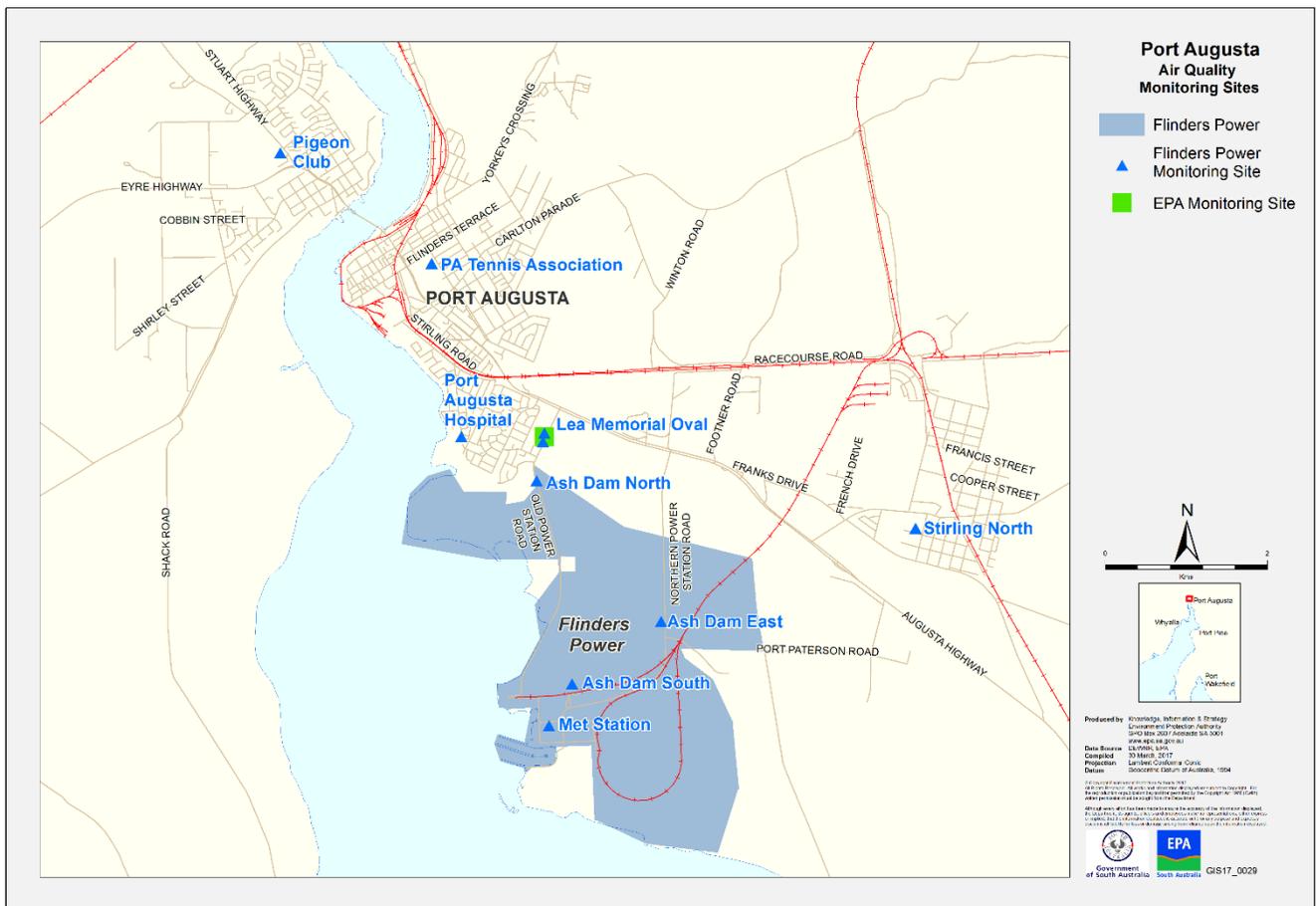


Figure 1 Map showing locations of air quality monitors

Figure 2 provides air quality data (PM₁₀) monitored by Flinders Power's HVAS network across Port Augusta including the January 2017 dust event. Lea Memorial Oval and PA Tennis Association monitors were not working between December 2016 and 12 January 2017 due to equipment faults.

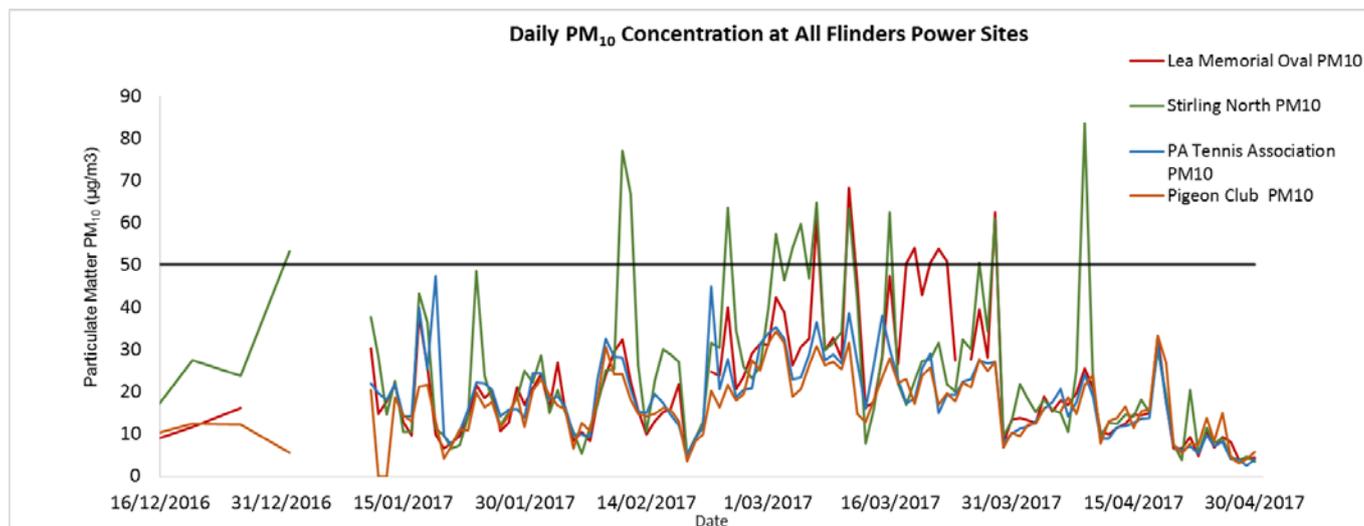


Figure 2 Daily average PM₁₀ concentrations from HVAS network (operated by Flinders Power)

Data presented in Figure 2 indicates that PM₁₀ levels at Stirling North were generally higher compared to other locations across the Flinders Power monitoring network in Port Augusta city. Three events (dated 11, 12 and 24) in February when PM₁₀ levels were above the 50-µg/m³ criterion were registered at Stirling North with moderate to strong southeasterly wind directions. This wind direction did not indicate the power station site as a source. These events were raised as a concern during the local council meeting on 27 Feb 2017 which prompted EPA to undertake site surveillance activity and further analysis of the monitoring data.

Based on data from other HVAS PM₁₀ monitors operated by Flinders Power (at Lea Memorial Oval, PA Tennis Association and Pigeon Club) PM₁₀ levels at these 3 locations were well below 50 µg/m³. The three monitors are located on the same downwind direction (ie towards northwest) from the ash dam; it is likely that a different source(s) would have contributed to Stirling North’s elevated PM₁₀ levels which is located at a different downwind direction (ie towards northeast).

For all 3 days (11, 12 and 24 February) HVAS filters were covered with red dust for Stirling North typically representative of local dust in the area (Table 1).

Table 1 PM₁₀ concentrations at different locations, unit is in µg/m³

Date	Lea Memorial Oval	Stirling North (levels above the criteria)	PA Tennis Association	Pigeon Club
11 Feb	32.3	77	28	24.2
12 Feb	22.3	66.7	20.6	18
24 Feb	39.9	63.6	27.6	21.5

Based on the data, it became clearer that elevated levels of PM₁₀ at Stirling North were potentially due to natural/local dust from source(s) near the monitoring station.

This triggered further investigation by the EPA to understand any potential local dust sources in the Stirling North area. EPA staff made site visits and assess potential dust sources in the immediate area of the HVAS, as well as possible dust sources in the wider area including EPA licensees other than Flinders Power operations. Based on this surveillance activity it was noted that the area around the Flinders Power’s HVAS was unsealed and dirt tracks were being used by local vehicles (Figure 3).

In conducting this surveillance, the EPA observed activity occurring around this site including:

- A playground next to the monitoring site.

- Regular use of the driveway and parking for Stirling North Progress Association building. The Association meets on the last Tuesday of each month.
- Regular use of a private driveway and parking for Stirling North Progress Association Sunday Night Family meals.
- Regular use of the driveway for Stirling North Country Fire Service (CFS) for meetings and drills every Wednesday evening.

EPA staff witnessed this activity and visible dust emissions impacting the monitor. Based on the review of monitoring data and surveillance observations it became evident that there was a need for a comparison of monitoring data from another location unaffected by the above local sources, in order to ascertain what contribution, if any, power station closure activity was having in Stirling North.



Figure 3 Picture showing current Flinders Power's Stirling North monitoring location

3 EPA monitoring campaign

The EPA established a monitoring site at Stirling North Primary School to measure TSP and PM₁₀, and to compare results with Flinders Power’s monitoring data collected at Stirling North. The EPA monitoring station location was chosen to avoid the potential of dust from local dirt tracks or vehicle movement. As shown in Figure 4, the monitoring location was still in the same downwind direction of potential major dust sources such as former power station site and ash dam. The monitoring commenced on 21 March 2017 and completed on 24 April 2017.

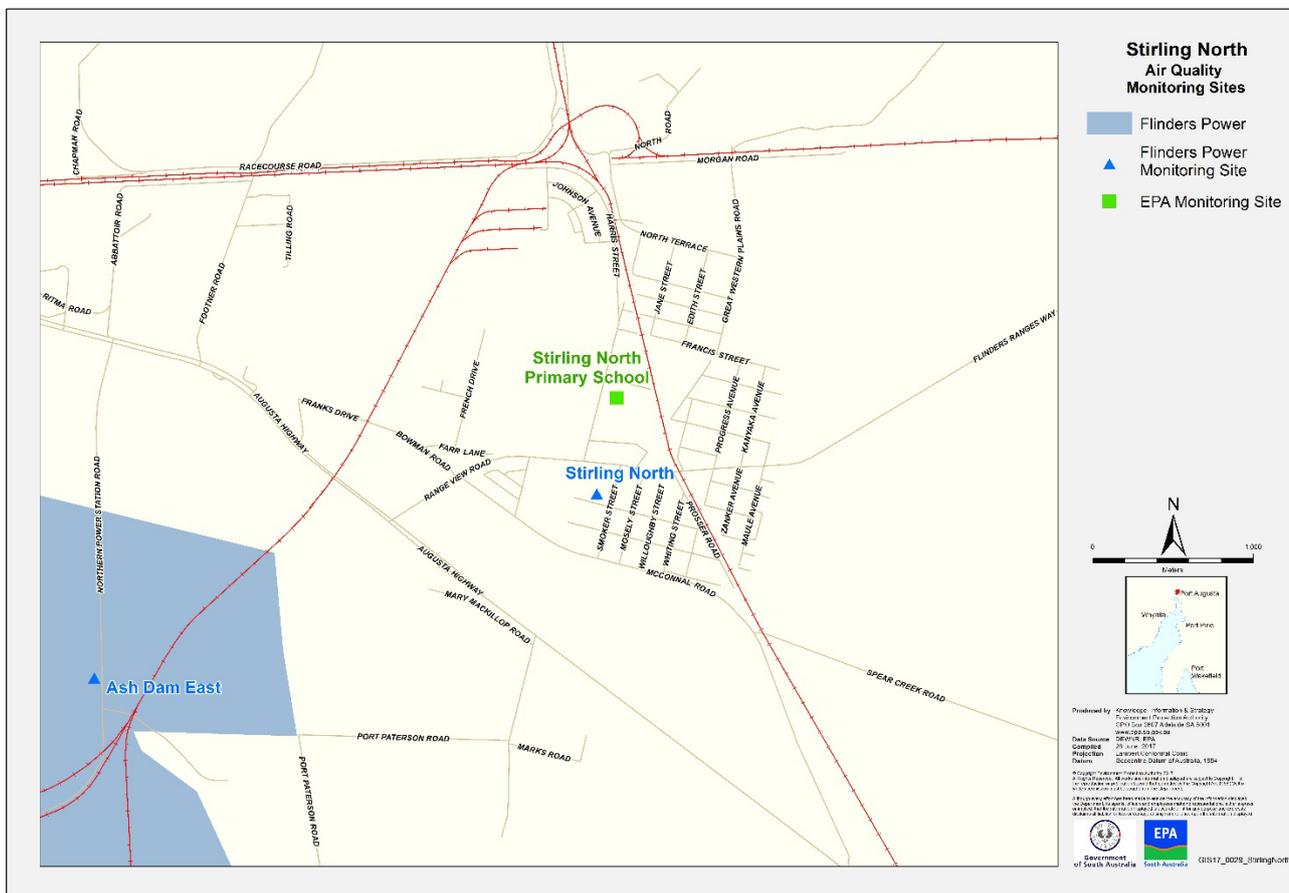


Figure 4 Map showing locations of air quality monitors at Stirling North

Monitoring data

Total suspended particles (TSP)

TSP can provide an indication of the levels of visible nuisance dust in an area. There are no ground level concentration criterion for TSP particles. TSP levels at EPA’s Stirling North location were quite moderate during the monitored period. The data gaps for six days in March were due to logistic issues (Figure 5).

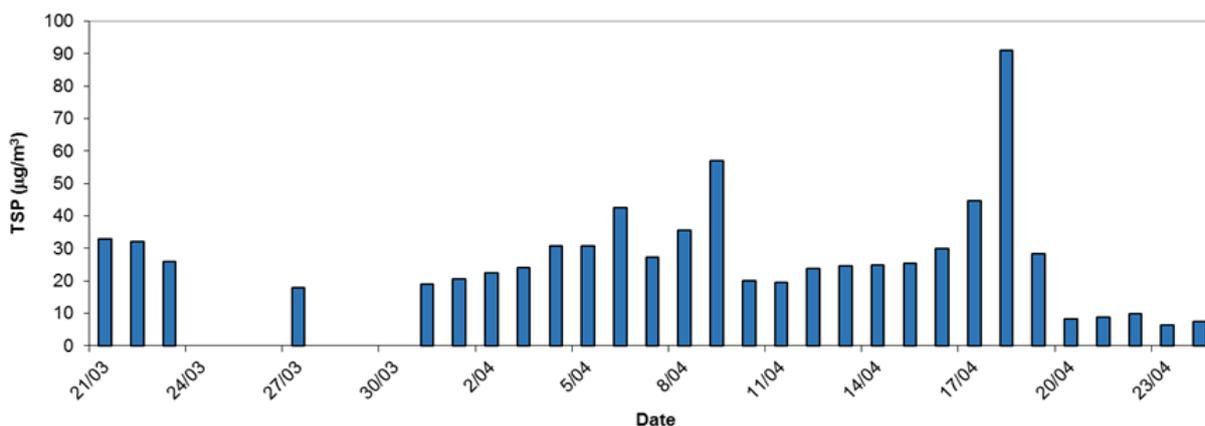


Figure 5 EPA Stirling North daily TSP (µg/m³)

Particles (PM₁₀)

There were no exceedences of the 24-hour ground level concentration criterion for PM₁₀ (50 µg/m³), taken from Schedule 2 of the Environment Protection (Air Quality) Policy 2016, at EPA’s Stirling North Primary School location during the monitored period (Figure 6).

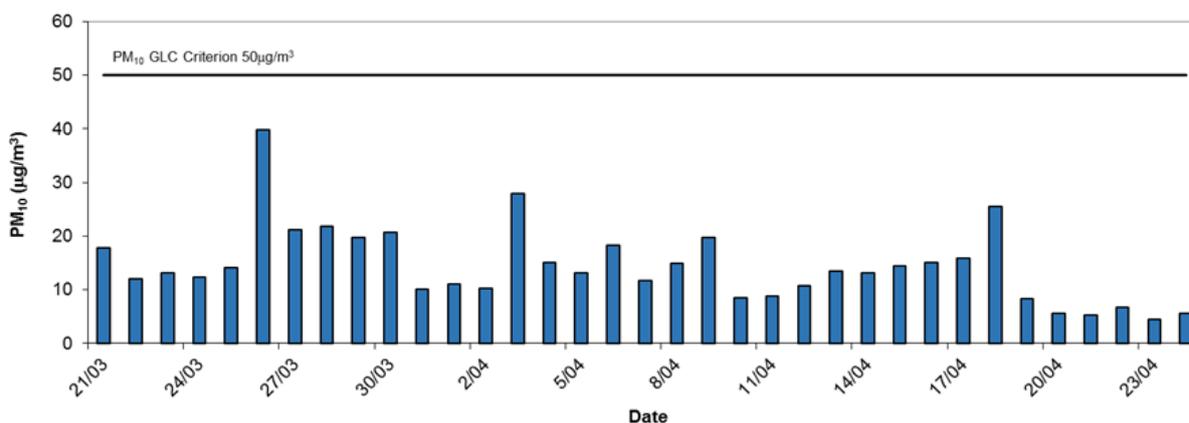


Figure 6 EPA Stirling North daily PM₁₀ (µg/m³)

Data comparison: EPA and Flinders Power

The following graphs (Figures 7 and 8) show a comparison of TSP and PM₁₀ measured by the EPA at Stirling North Primary School and Flinders Power’s existing location at Stirling North. Generally it was observed that TSP and PM₁₀ levels monitored at Flinders Power were higher than those monitored at Stirling North Primary School. This supports the observation made by EPA staff about local activities influencing readings obtained by the Flinders Power’s monitor including recorded PM₁₀ exceedences.

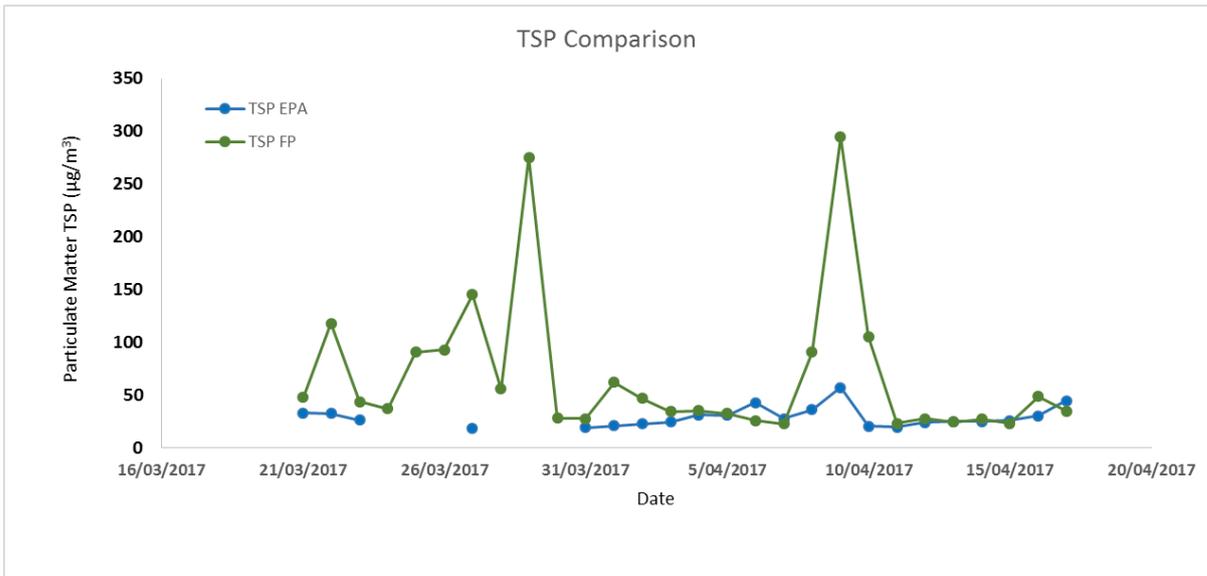


Figure 7 Comparison of TSP monitored by EPA and Flinders Power HVAS (24-hour averaged) at Stirling North

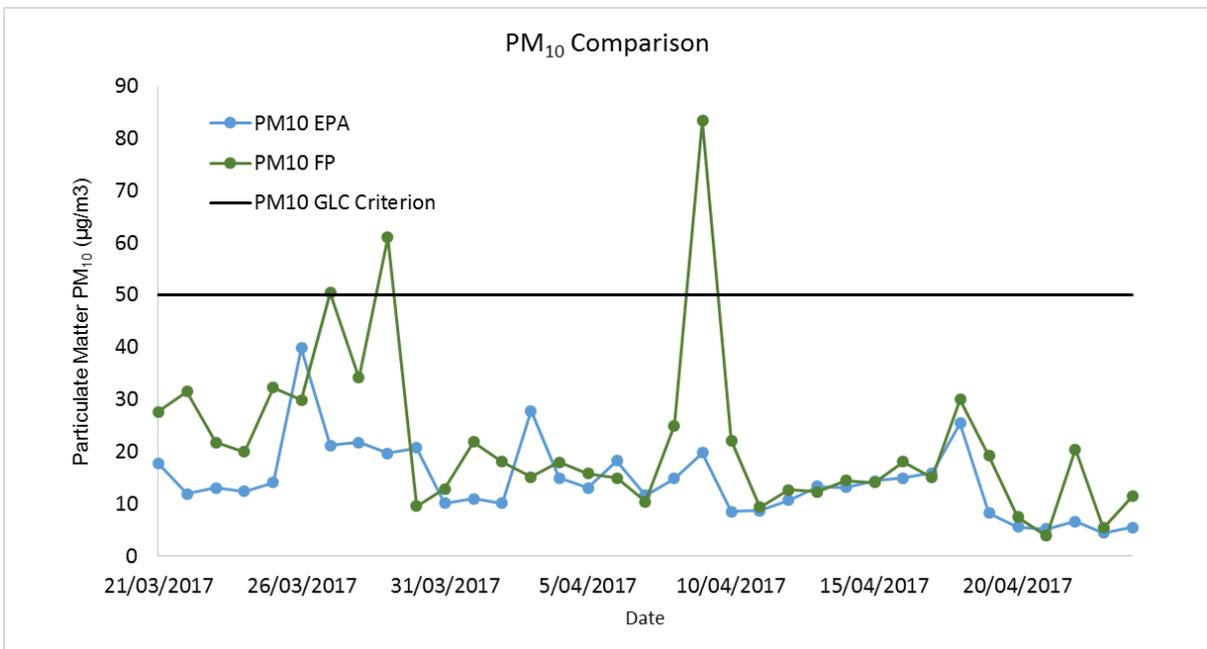


Figure 8 Comparison of PM₁₀ monitored by EPA and Flinders Power HVAS (24-hour averaged) at Stirling North

4 Conclusion and recommendations

Based on the EPA surveillance and data analysis undertaken and outlined in this report it appears that the Flinders Power Stirling North monitoring station was being affected by local dust sources adjacent to the existing monitoring site. This indicates that the current location of the Stirling North monitoring station is not 'representative' of local air quality experienced by the Stirling North community.

Therefore it is recommended that:

- The EPA will require Flinders Power to relocation its current monitoring station to either Stirling North Primary School or to an area which is not exposed to unsealed tracks or localised dust levels, within the same direction from the power station site.
- The EPA to communicate with Port Augusta City Council about options to reduce local dust impacts in the vicinity of the Progress Association, Country Fire Service and playground area. This may include encouraging alternate traffic flow and parking behaviour, or sealing off the area.

Appendix Supplementary information – measurement methods

Measurement methods

High volume air sampler (HVAS)

A high volume air sampler is used to collect TSP and/or PM₁₀ samples. The high volume air sampler draws a large known volume of air through a pre-weighed filter for 24 hours. The sampler filter traps the TSP particles as air passes through the instrument. After sampling, the exposed filter is re-weighed and the difference in filter weight is the collected particulate matter mass. Dividing the mass by the volume of air sampled gives the concentration of particles (dust). For PM₁₀ monitoring, the air sample passes through a size-selective inlet.

Beta attenuation monitor

A standard beta attenuation monitor or BAM automatically measures and records airborne particles. This monitor works by collecting particles on a filter tape and measuring the reduction in beta rays absorbed by the particles. From this, the concentration of airborne particles is calculated. E-BAM samplers operate continuously and do not need filter changes as frequently as high volume air samplers do. This means the analysers can provide additional information, such as the time of day that peak particle concentrations occur. Used in conjunction with meteorological data, it can help identify sources of particle emissions.

Tapered element oscillating microbalance (TEOM)

This is a special instrument that continuously 'weighs' particles drawn into it, providing measurements of particle concentrations at set intervals throughout the day. The instrument maintains a constant temperature and flow rate, and electronically processes the readings. Dividing the mass rate by the flow rate provides a continuous output of the particle mass concentration. TEOM samplers operate continuously and do not need filter changes as frequently as high-volume air samplers do. This means the analysers can provide additional information, such as the time of day that peak particle concentrations occur. Used in conjunction with meteorological data, it helps identify sources of particle emissions.