



Dust and Air Quality Innovation and Expertise

Unit 8 Nimrod
De Havilland Way
Witney
Oxford OX29 0YG
United Kingdom
Tel: (44) 1608 810110

Quarterly non-technical summary: Mountsorrel Quarry particulate matter, dust and weather monitoring

Date range: Quarter 3 2024 (31 May – 28 August 2024)

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Introduction

Every month, the results of dust and particulate matter monitoring at Mountsorrel Quarry are compiled and summarised in ‘compliance’ reports, which are then shared with Charnwood Borough Council (CBC), Leicestershire County Council (LCC) and the Environment Agency. The monitoring results are discussed in more detail during Technical Liaison meetings held with CBC and LCC on a quarterly basis.

Once the quarterly liaison meetings are held, we prepare a cover letter to provide a non-technical overview of the most recent three months of finalised reports. This letter covers the period from 31 May – 28 August 2024.

An explanation of how and why dust and air quality are measured at Mountsorrel Quarry is available [here](#).

Changes to reporting

Following consultation with CBC and LCC, the format and focus of the compliance reports have been revised. In addition to typically presenting PM₁₀ and PM_{2.5} data from both on-site monitors, an increased emphasis is being placed on the frequency of short-term PM₁₀ alerts sent to quarry management, the investigations triggered by the alerts and the changes to on-site processes to minimise dust.

The general air quality of the surrounding area is now assessed by comparing the particulate matter concentrations recorded by CBC at the southern end of Hawcliffe Road against the relevant Air Quality Objectives (AQOs). Data from a Defra Automatic Urban and Rural Network (AURN) monitoring station at Leicester University are also presented for reference.

Weather summary

Early June was generally mild and wet until mid-June, before warmer temperatures and little low rainfall levels in late June. Warmer temperatures continued into July, where there were several extended dry periods. Early August experienced generally warm temperatures and several dry days, however, there was a slight decrease in temperatures from mid-late August onwards.

During June and July, winds were predominantly blowing from the west-northwest and south, meaning that there may have been the potential for dust to propagate in a northerly or east-southeasterly direction. During August however, winds were coming predominantly from the south.

Deposited dust

During this period, deposited dust levels were below site-specific threshold levels at all locations, except for Stn 9 (located at the top end of Hawcliffe Road, near the site boundary). The site reported that there had been an issue in August with dust from the Processing and Quarry operations, which may have caused the dust levels to exceed the threshold. One-off internal monitoring programmes are regularly carried out to investigate specific dust issues such as this.

The frequency of threshold level exceedances over the previous three months is shown for each monitoring location in Figure 1 using pie charts.



Figure 1: Frequency of high dust levels, Quarter 3 2024

Particulate Matter

Due to a technical issue with the Osiris monitor at Hawcliffe Road, data from this location are not available for this period. The device has since been fully repaired.

On-site PM_{2.5}

PM_{2.5} concentrations at Quorn house were low, with a period average of 3.6 µg/m³ (Figure 2).

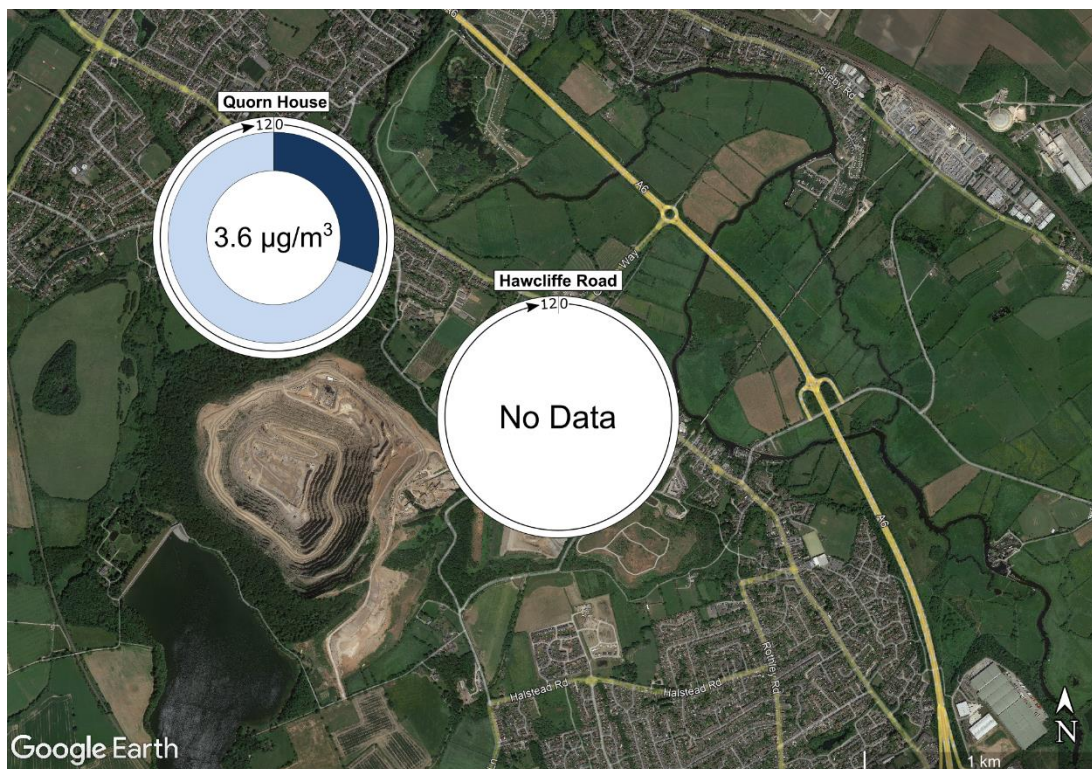


Figure 2: PM_{2.5} monitoring summary, Quarter 3 2024

Off-site PM_{2.5}

As shown in Figure 3, the period average PM_{2.5} concentrations recorded at the CBC monitoring station at the southern end of Hawcliffe Road was 6.1 µg/m³ or 51% of the AQO (12 µg/m³ as an annual average). The period average concentration at the Leicester University AURN monitoring station was much lower, at 5.2 µg/m³ or 44% of the AQO.

The broad similarity of period average PM_{2.5} concentrations recorded at the three locations show that the site was not a significant source of PM_{2.5} during this period.

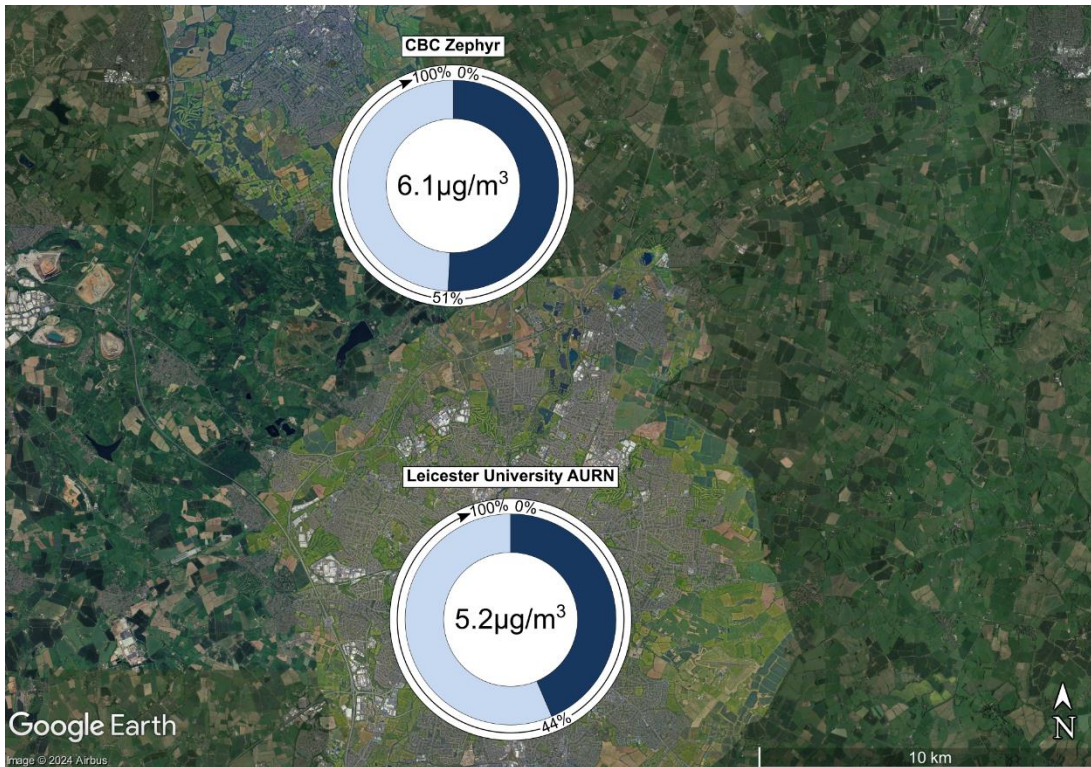


Figure 3: PM_{2.5} monitoring summary, CBC and AURN monitoring stations, Quarter 3 2024

On-site PM₁₀

PM₁₀ concentrations recorded at Quorn House had a period average of 4.9 µg/m³ for this period.

The short-term PM₁₀ trigger level (125 µg/m³ over a 15-minute period) was not exceeded at Quorn House, therefore no alerts were sent out during this quarter.



Figure 4: PM₁₀ monitoring summary, Quarter 3 2024

Off-site PM₁₀

As shown in Figure 5, PM₁₀ concentrations recorded at the CBC monitoring station at the southern end of Hawcliffe Road was 8.8 µg/m³ or 22% of the AQO (40 µg/m³). Concentrations at the Leicester University AURN monitoring station was very similar, at 9.4 µg/m³ or 23% of the AQO.

No days with an average PM₁₀ concentration above 50 µg/m³ were recorded during this quarter.

As with PM_{2.5}, the data show that Mountsorrel Quarry was not a significant source of PM₁₀ during this period.



Figure 5: PM₁₀ monitoring summary, CBC and AURN monitoring stations, Quarter 3 2024

Complaints

During the third quarter of 2024 the quarry received several complaints relating to dust or air quality.

**DustScanAQ
December 2024**



Dust, Particulate Matter and Weather Monitoring Report: June 2024

Mountsorrel Quarry

September, 2024

Tarmac



Document Control Sheet

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Report Prepared By

DustScanAQ
Unit 8 Nimrod
De Havilland Way
Witney
Oxon
OX29 0YG
United Kingdom
Tel: + 44 (0) 1608 810110
E-mail: info@dustscan.co.uk
Web: www.DustScan.co.uk

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1 Introduction

Mountsorrel Quarry has a comprehensive Dust Management and Monitoring Plan (DMMP). The DMMP was developed in 2011 and is subject to regular review and revision, in consultation between Tarmac and the local regulators (Leicestershire County Council (LCC) and Charnwood Borough Council (CBC)).

The DMMP is enacted through the quarry Site Improvement Plan (SIP). The SIP sets out a programme of actions to reduce the environmental impact of specific areas of the site operation, and is updated regularly by quarry management, with support from DustScanAQ through regular site visits and quarterly reviews with LCC and CBC.

Section 7.5 of the DMMP requires that a monthly summary and review of dust and particulate matter monitoring is prepared and circulated with LCC, CBC and the Environment Agency.

This report details the results of dust, particulate matter and weather monitoring around Mountsorrel Quarry during the period 31 May – 28 June 2024.

1.1 Report scope

The intention of this report is to summarise dust and particulate matter monitoring results for the given period and compare them against site-specific alert limits and thresholds. This report also details the results of any investigation carried out into elevated dust or particulate matter levels, as prompted by an exceedance of alert limits or thresholds.

1.2 Dust definitions

'Dust' is generally regarded as particulate matter up to 75 µm (micron) diameter and can be considered in two categories. Fine dust, essentially particles up to 10 µm, is commonly referred to as PM₁₀ and is measured to agreed standards and forms part of the national Air Quality Objectives (AQO). The AQO for PM₁₀ is currently 50 µg/m³ for the 24-hour mean, not to be exceeded 35 times per year and 40 µg/m³ for the annual mean. Particles up to 2.5 µm in diameter are referred to as PM_{2.5}. The interim AQO for PM_{2.5} is 12 µg/m³ for the annual mean (to be achieved by 2028), whilst the legal AQO for PM_{2.5} is 10 µg/m³ for the annual mean (to be achieved by 2040) as per The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023¹.

It may be noted that the above Regulations relate to average particle concentrations in Local Authority districts thus do not apply to any specific industrial or other operation, such as Mountsorrel Quarry, and are included for reference.

Coarser dust (essentially particles greater than 10 µm) is generally regarded as 'nuisance dust' and can be associated with annoyance, although there are no official standards (such as AQO) for dust annoyance.

¹ Statutory Instrument. (2023), 'The Environmental Targets (Fine Particulate Matter) (England) Regulations', No. 96. King's Printer of Acts of Parliament

2 Sampler locations

As shown in Figure 2.1 and Table 2.1, dust, particulate matter and weather conditions are measured at a number of locations around site and the surrounding area:

- Directional and depositional dust: currently monitored at 13 locations;
- Particulate matter: currently monitored at two locations;
- Weather conditions: currently monitored at one location.

The majority of the dust samplers around Mountsorrel Quarry comprise the ‘Frisbee-type’ deposition gauge combined with an adhesive ‘sticky pad’ directional gauge. These samplers are used to monitoring ‘nuisance’ dust and samples from these instruments are collected on a monthly basis.

For particulate matter, Turnkey Osiris samplers are located at Stn 9 (Hawcliffe Road) and at Stn 13 (Quorn House). These recognised and certificated ‘indicative’ real-time devices are connected to their own wind vane and anemometer and provide near-instantaneous directional PM₁₀, PM_{2.5} and PM₁ data directly to the quarry management team.

A weather station is located at the site offices off Wood Lane and collects a range of weather parameters over fifteen minute intervals. Data from the weather station are available to the quarry management by means of a dedicated modem connection to the internet.

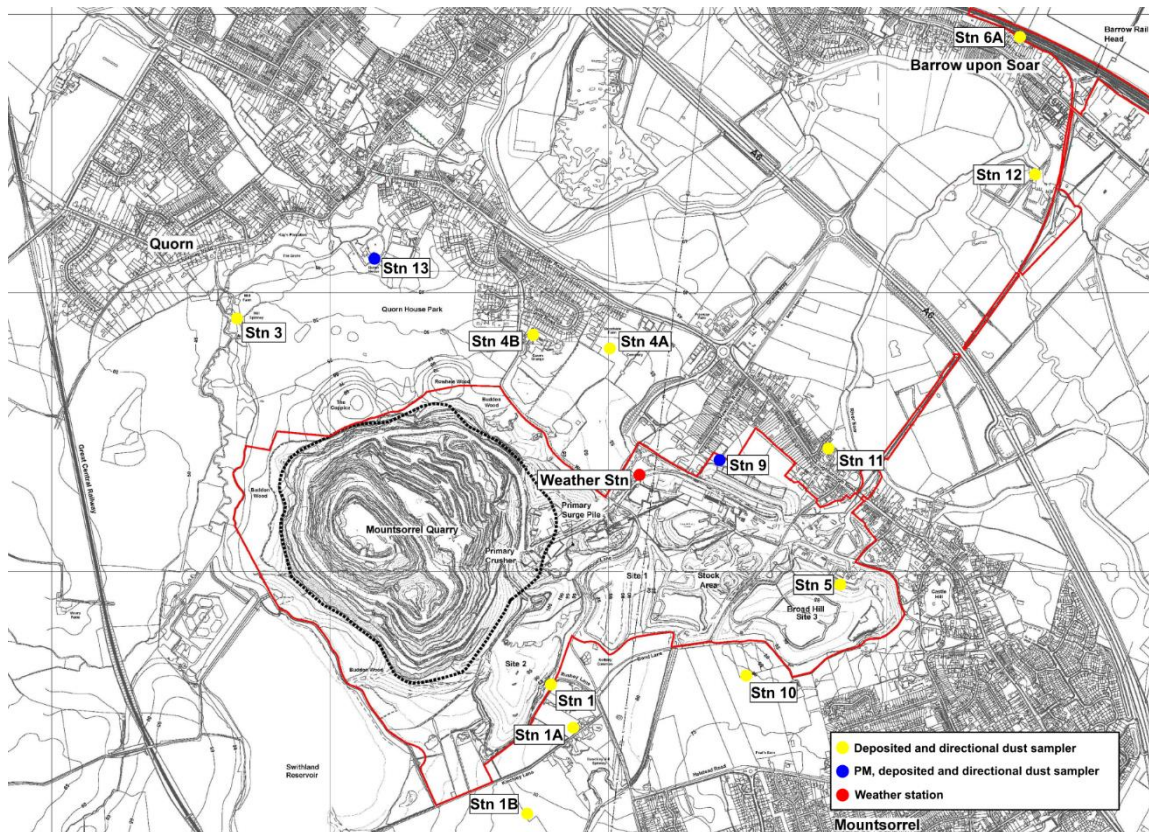


Figure 2.1: Particulate matter, dust and weather monitoring locations, Mountsorrel Quarry

Table 2.1: Weather, particulate matter and dust monitoring locations, Mountsorrel Quarry

Sampler reference	Easting	Northing	Locality monitored
Stn 1	456781	314577	Swithland Lane; Rushey Lane; Kinchley Lane
Stn 1A	456891	314436	Swithland Lane; Rushey Lane; Kinchley Lane
Stn 1B	456715	314109	Swithland Lane; Rushey Lane; Kinchley Lane
Stn 3	455681	315847	Mill Farm; Quorn House
Stn 4A	457000	315805	Woodside Farm; Leicester Road
Stn 4B	456733	315778	Quorn Grange, Unitt Road, Northage Close, Quorn Park
Stn 5	457789	314941	Bond Lane; Crown Lane
Stn 6A	458660	316786	Sileby Road; Huston Close; Sileby Road (commercial)
Stn 9 (inc. PM)	457374	315398	Hawcliffe Road
Stn 10	457487	314626	Glebe Close; Halstead Road (south); Halstead Road (north)
Stn 11	457791	315458	Loughborough Road; River Soar (marina / caravan park)
Stn 12	458575	315459	Meadow Farm Marina and Caravan Park
Stn 13 (incl. PM)	456158	316090	Northage Close, Meeting Street
Weather Station	457126	315376	Wood Lane Site Offices

Charnwood Borough Council (CBC) is responsible for the monitoring of air quality within the borough and prepares Air Quality Annual Status Reports (ASRs) for submission to Defra. It operates a Zephyr air quality monitor which is located within the Leicestershire County Council (LCC) depot at the southern end of Hawcliffe Road, in close proximity to the Osiris device at Stn 9. This device measures a number of pollutants including PM₁₀ and PM_{2.5}, allowing CBC to compare concentrations against the relevant AQOs for these pollutants.

For additional context, the latest PM₁₀ and PM_{2.5} monitoring data from CBC are summarised in Appendix A and Appendix B.

2.1 Alert thresholds and response procedures

To help the site reduce its impact on the surrounding area, a number of alert thresholds have been calculated, as outlined in Table 2.2.

Table 2.2: Alert thresholds

Pollutant	Threshold	Averaging period	Applies to
PM ₁₀	125 µg/m ³	15 minutes	Stn 9 (Hawcliffe Road), Stn 13 (Quorn House)
Deposited dust	125 mg/m ² /day	1 month	All deposited dust monitoring locations

For particulate matter (PM₁₀) an alert threshold of 125 µg/m³ for the 15-minute average has been in use for several years.

Many years of monitoring and research have shown that the quarry is not a significant source of fine particulate matter (PM_{2.5}) hence no alert threshold for this size fraction is required.

PM₁₀ and PM_{2.5} concentrations recorded by CBC at the southern end of Hawcliffe Road and by Defra through the Automatic Urban and Rural Network (AURN) at Leicester University are presented in Appendix A and Appendix B respectively. Data from both locations have been compared against relevant Air Quality Objectives (AQOs) for PM₁₀ and PM_{2.5}.

For deposited dust, the DMMP sets out a site-wide deposited dust threshold of 125 mg/m²/day 'undissolved solids' as a trigger limit for investigation to identify the potential dust source/s, taking account of the directional data.

3 Results

3.1 Weather monitoring

Weather conditions can have a significant effect on the potential for dust propagation from a minerals site. Of particular importance are wind speed, wind direction, and precipitation. Dust can be carried from a source towards receptors (such as nearby homes and other businesses) according to the strength and direction of wind. Precipitation is recognised to suppress dust and 0.2 mm antecedent rainfall is considered sufficient to suppress windblown dust for a number of hours.

The key weather data which might affect dust propagation (wind speed, wind direction, total daily precipitation and average daily temperature) for this reporting period are summarised in Figure 3.1 and Figure 3.2.

The monitoring period was characterised by generally mild temperatures until mid-June, before warmer temperatures in late June. The maximum daily average temperature was 21.8 °C recorded on 25 June and the minimum daily temperature was 10.9°C recorded on 11 June.

The monitoring period was generally dry with precipitation recorded on just 41% of total days. A ten-day dry period occurred in late June during the warmer period; this combination of warm temperatures and lack of precipitation may have increased the risk of dust propagation beyond the site boundary.

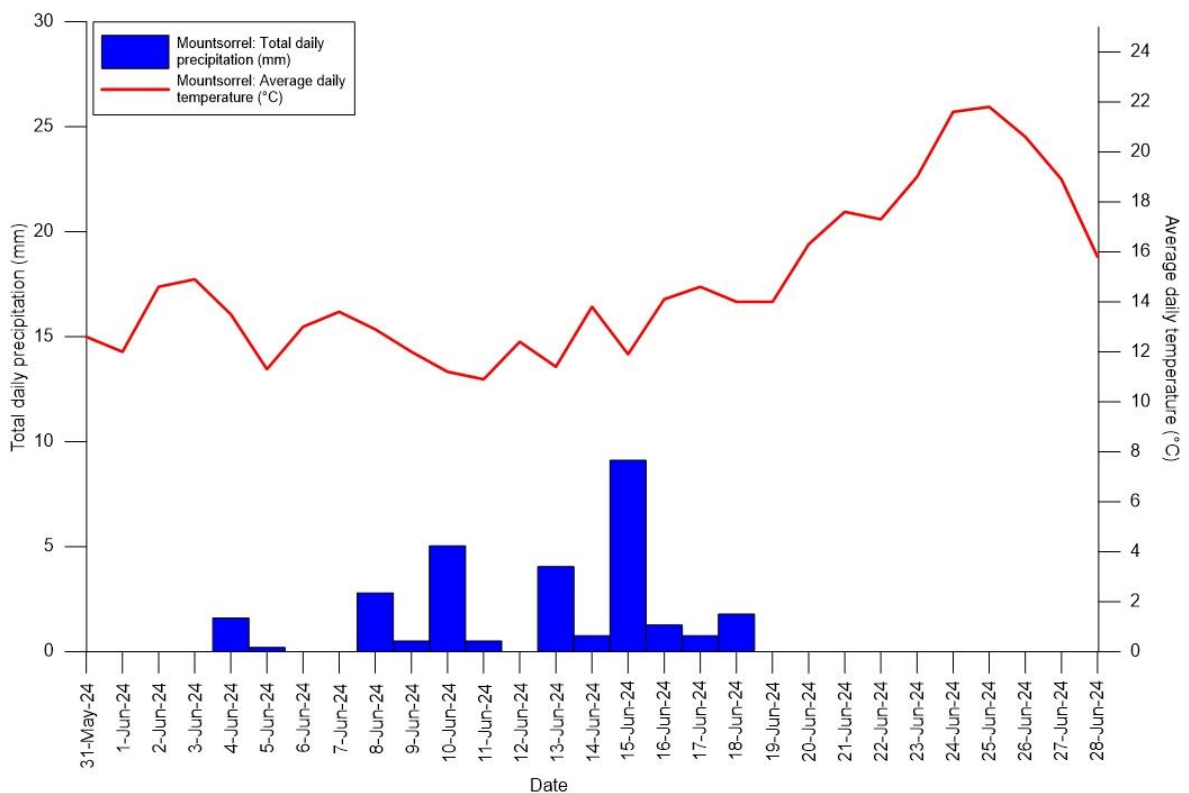


Figure 3.1: Total daily precipitation and average daily temperature, Mountsorrel Quarry, 31 May – 28 June 2024

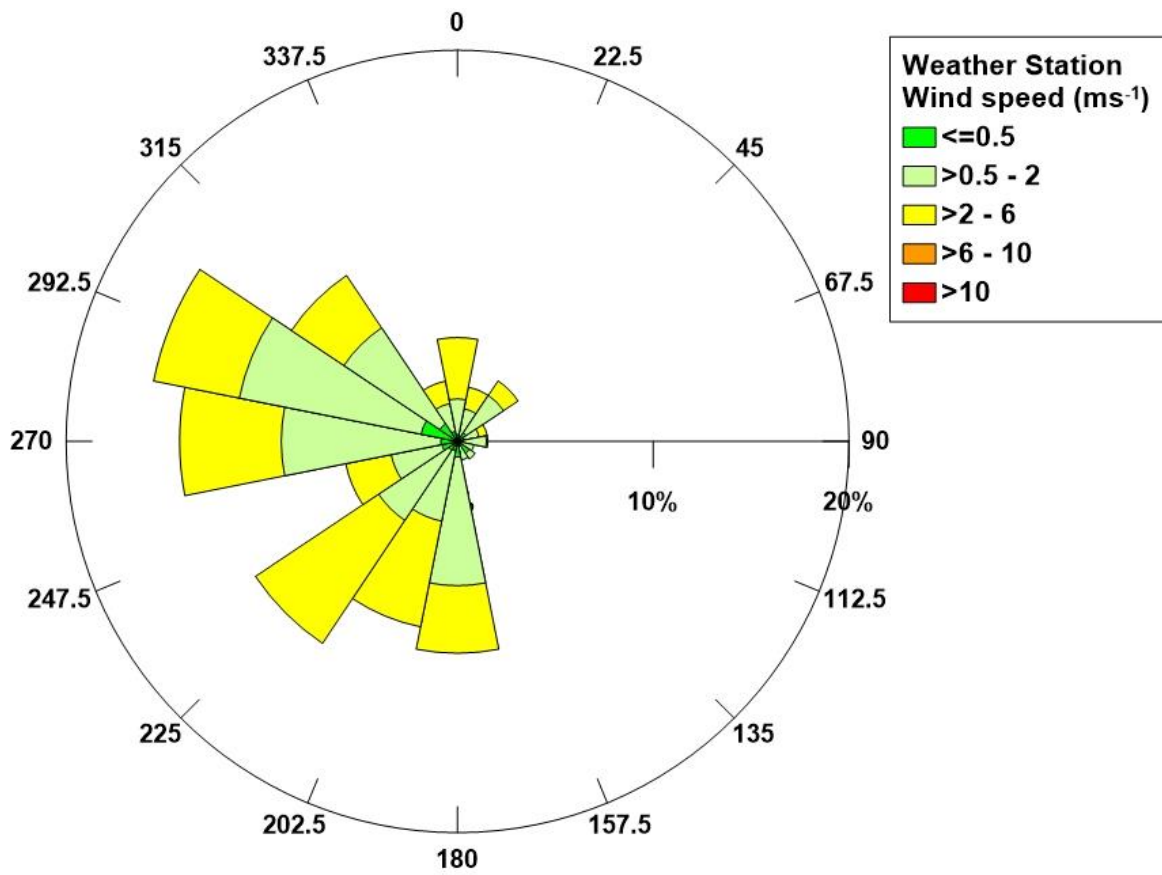


Figure 3.2: Wind rose, Mountsorrel Quarry, Mountsorrel, 31 May – 28 June 2024

As seen in Figure 3.2, winds for this monitoring period were predominantly calm to moderate in speed (>0.5 – 6 m/s) and from the west-northwest and west. Winds were also recorded from the southwest and south. Consequently, there may have been slight potential for dust propagation generally towards the east-southeast, east, north and northwest throughout the monitoring period.

3.2 Particulate matter

3.2.1 PM₁₀

The available 15-minute data from the period of review are presented for both monitoring locations in Figure 3.3 and Figure 3.4. The red line denotes the site trigger level (125 µg/m³ over the 15-minute average), whilst the dashed black line denotes the average concentration recorded over this period.

Additional PM₁₀ monitoring data (collected by CBC and the Defra AURN monitoring network) are provided in Appendix A.

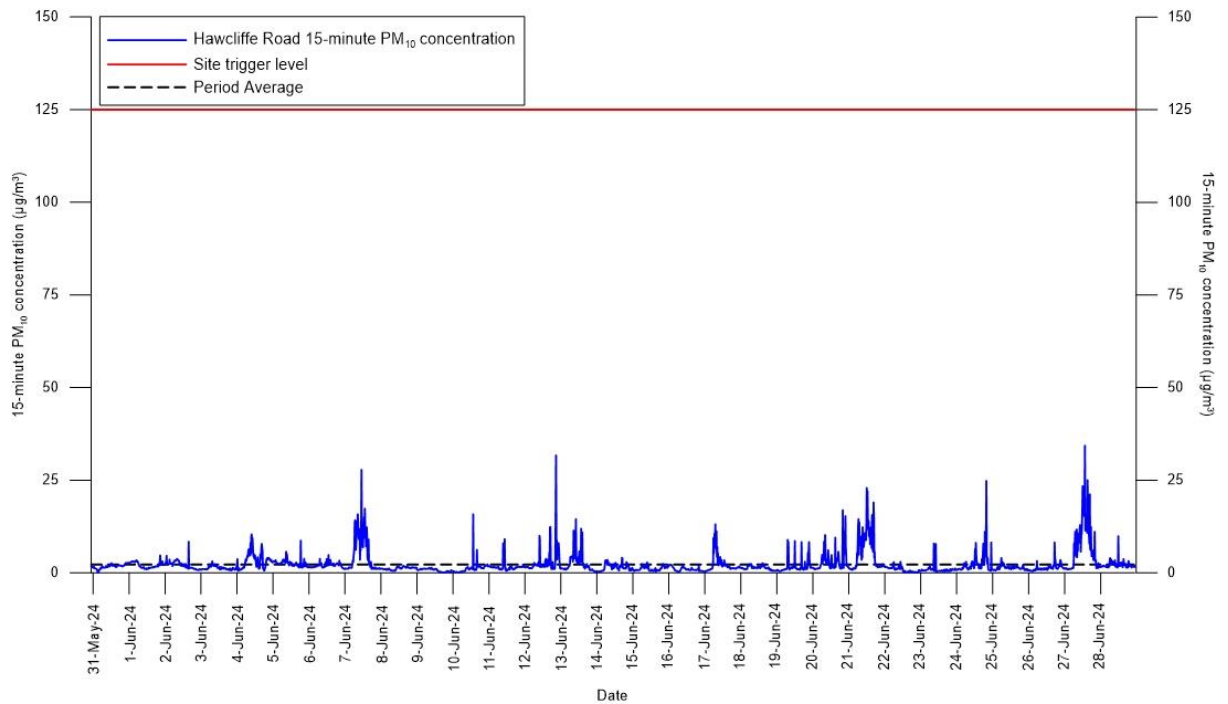


Figure 3.3: 15-minute mean PM₁₀ concentration, Hawcliffe Road, 31 May – 28 June 2024

Figure 3.3 indicates that there were no exceedances of the site trigger level at Hawcliffe Road during this period, whilst the overall average concentration for this period was 2.2 µg/m³. Some short-term spikes were recorded, however concentrations did not approach the site trigger level.

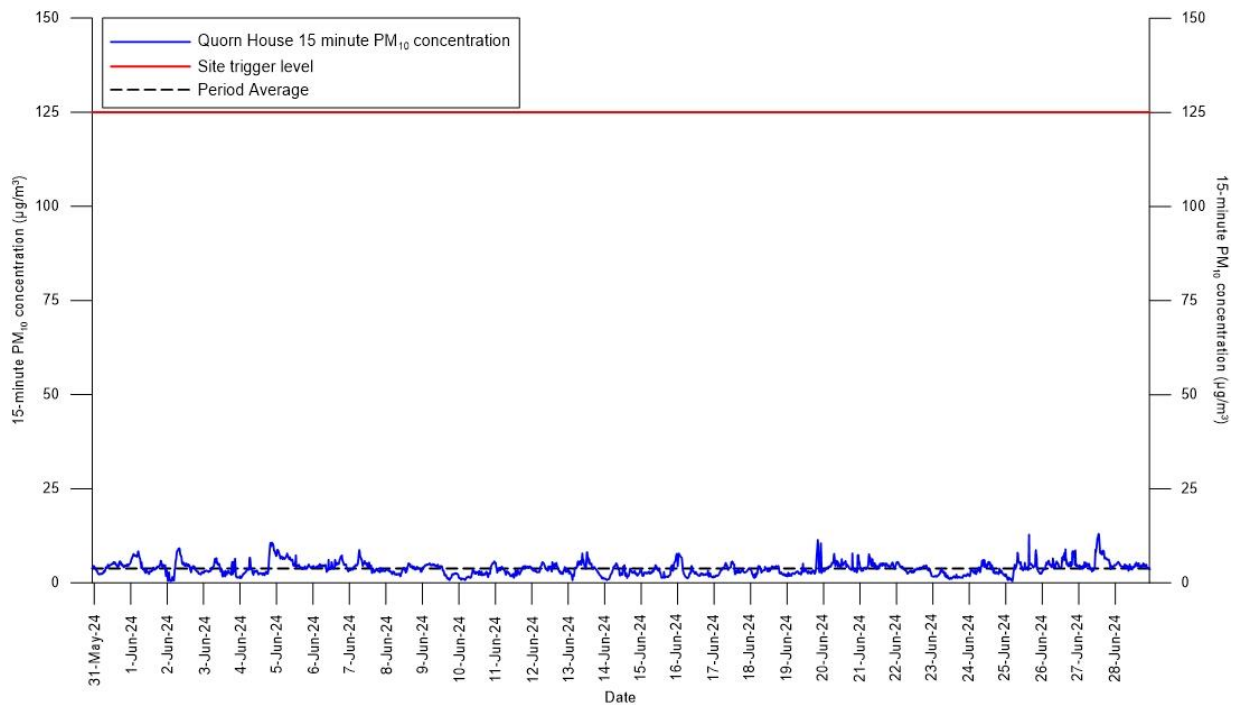


Figure 3.4: 15-minute mean PM₁₀ concentration, Quorn House, 31 May – 28 June 2024

At Quorn House there were no exceedances of the PM₁₀ site trigger level, and the overall average concentration for this period was 3.8 µg/m³. The general similarity between PM₁₀

concentrations recorded at both locations suggests that the site was not a significant source of PM₁₀ at these locations during this period. This is further demonstrated by the off-site PM₁₀ monitoring results presented in Appendix A.

3.2.2 PM_{2.5}

The results of PM_{2.5} monitoring at Hawcliffe Road and Quorn House are presented in Figure 3.5 and Figure 3.6. The dashed black line denotes the average concentration recorded over this period.

Additional PM_{2.5} monitoring data (collected by CBC and the Defra AURN monitoring network) are provided in Appendix B.

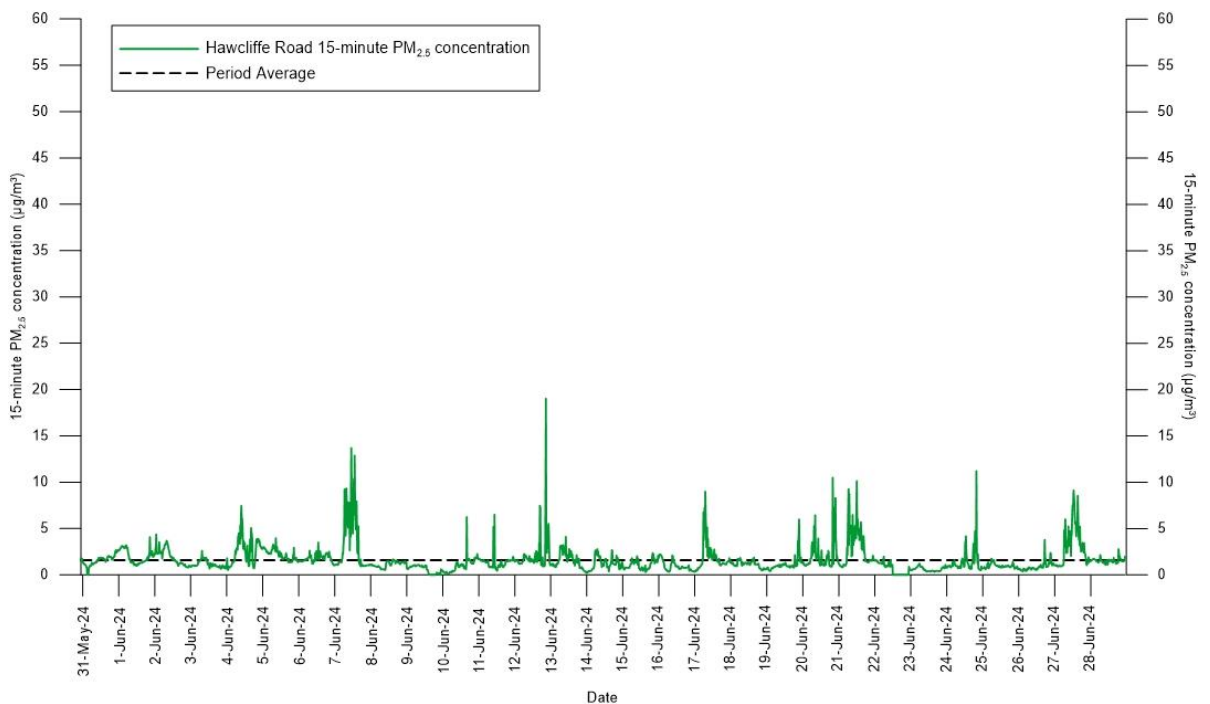


Figure 3.5: 15-minute mean PM_{2.5} concentration, Hawcliffe Road, 31 May – 28 June 2024

At Hawcliffe Road, the overall average concentration for this period was 1.6 µg/m³ whilst at Quorn House, the overall average was 2.9 µg/m³. As with the PM₁₀ concentrations, it is most likely that a regional rather than local PM_{2.5} signal was recorded during this period. This is supported by the CBC and AURN data presented in Appendix B. For this period, 71 % of PM₁₀ recorded at Hawcliffe Road was formed of PM_{2.5}, whilst it made up 76% of PM₁₀ at Quorn House. This strongly indicates that a regional rather than a local particulate matter signal was recorded during this period.

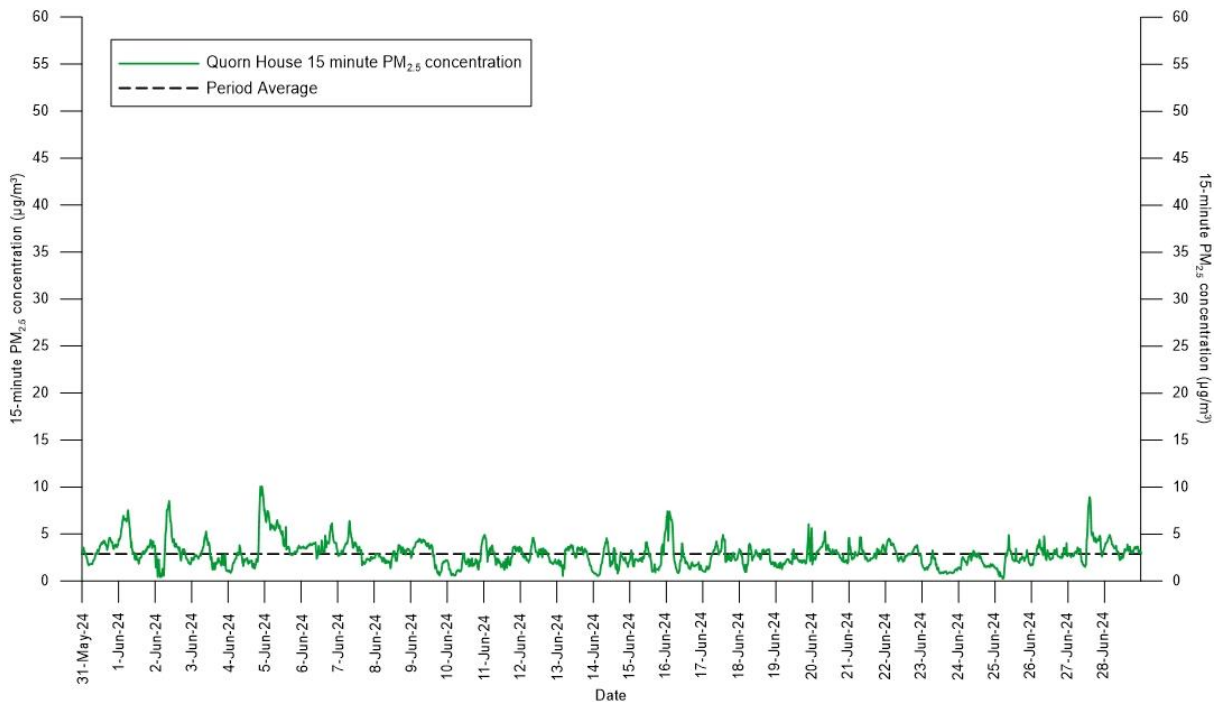


Figure 3.6: 15-minute mean PM_{2.5} concentration, Quorn House, 31 May – 28 June 2024

3.3 Visible dust

3.3.1 Deposited dust monitoring summary

The deposited dust data for 31 May – 28 June 2024 are summarised in

Table 3.1. As outlined earlier, point-specific thresholds have been calculated for investigation to identify the potential dust source/s, taking account of the directional data.

Table 3.1 shows that, for the available data, deposited dust levels during 31 May – 28 June 2024 were all within the site-specific threshold for all stations, excluding Stn 9 which recorded elevated levels of dust. No data was available for Stn 13 (Quorn House) for this period as the monitoring location was inaccessible.

The directional dust results for Stn 9 (indicating a source from the southwest and west) would suggest the potential for both on-site and off-site dust sources during this period, such as the toast rack or PSV yard, or neighbouring sites along Granite Way respectively.

Table 3.1: Summary of deposited dust (undissolved solids), 31 May – 28 June 2024

Undissolved solids (mg/m ² /day)				
This month report start date:		31-May-24		
This month report end date:		28-Jun-24		
Receptor location	Nearest / appropriate dust monitoring point	Reported value	Trigger: ≥ 125 ^a	Magnitude ^b
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1	97	No	Slightly Elevated
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1A	33	No	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	44	No	Very Low
Mill Farm; Quorn House	Stn 3	23	No	Very Low
Woodside Farm, Leicester Road	Stn 4A	30	No	Very Low
Quorn Grange, Unitt Road, Northage Close, Quorn Park	Stn 4B	35	No	Very Low
Bond Lane; Crown Lane	Stn 5	28	No	Very Low
Sileby Road; Huston Close; Sileby Road (commercial)	Stn 6A	28	No	Very Low
Hawcliffe Road	Stn 9	130	Yes	Elevated
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	36	No	Very Low
Loughborough Road; River Soar (marina / caravan park)	Stn 11	49	No	Very Low
Meadow Farm Marina and Caravan Park	Stn 12	43	No	Very Low
Quorn House Park	Stn 13	no data	No data	N/A

^a Trigger mass deposition and Effective Area Coverage rates as in Section 7.3, ZLFMS-AG008 Dust Management and Monitoring Plan (Updated), 2015

^b Magnitude of mass deposition rate assessed against typical rate for semi-rural areas (30 - 80 mg/m²/day)

Regarding dust deposition over time, the rates across the sampling area have varied considerably. Trends in dust deposition rates (as undissolved solids) for the previous 12 months, together with the site-wide dust threshold are illustrated in Figure 3.7.

In general, as would be expected, dust deposition rates are typically lower in winter months than in summer months. This trend is clearly seen for most monitoring points in Figure 3.7, with some exceptions. Dust deposition rates have been consistently below the ‘trigger limit’ at all sampling locations except Stn 1B and 9, although the exceedances at Stn 1B are known to be related to nearby agricultural activities, rather than on-site processes.

In general, as shown in Figure 3.7, higher rates of dust deposition have been recorded near industrial settings (*i.e.* Stn 9) than in more residential areas (*e.g.* Stn 1, Kinchley Lane).

Figure 3.7 show that dust deposition rates were largely well within the site-specific trigger level during the previous 12 months although rates have occasionally been exceeded at Stn 9 and Stn 1B.

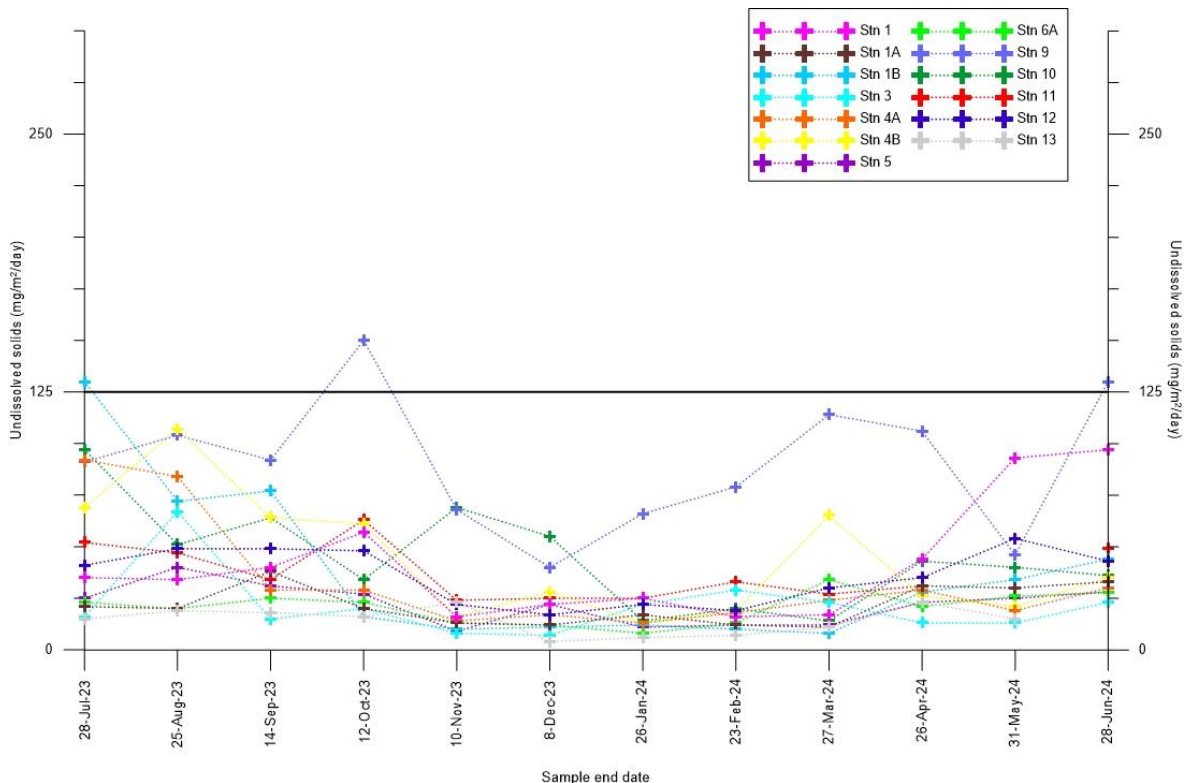


Figure 3.7: Dust deposition rates per sampling location over time (past 12 months)

3.3.2 Directional dust monitoring summary

The directional dust data for 31 May – 28 June 2024 are summarised in Table 3.2, and are presented graphically in Figure 3.8. As with deposited dust, the DMMP sets out a site-wide directional dust threshold. For directional dust soiling, 0.5 % effective area coverage (EAC) per day is a trigger limit for investigation to identify the likely dust source/s, again taking account of the direction.

Table 3.2 and Figure 3.8 show that during 31 May – 28 June 2024, all stations recorded Very Low dust levels from all directions, with the exception of Low dust levels from the southwest and west at Stn 9 and from the southwest at Stn 10.

Table 3.2: Summary of directional dust soiling, 31 May – 28 June 2024

		Directional dust soiling (%EAC/day) by direction (°)								
This month report start date:		31-May-24								
This month report end date:		28-Jun-24								
Receptor location	Nearest / appropriate dust monitoring point	Direction (°)								
		0	45	90	135	180	225	270	315	
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1	Reported value	0.1	0.1	0	0	0	0.1	0.1	0
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1A	Reported value	0.1	0	0	0	0	0.1	0.1	0
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	Reported value	0	0	0	0.1	0.1	0.1	0	0
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Mill Farm; Quorn House	Stn 3	Reported value	0.1	0	0	0	0	0	0	0
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Woodside Farm, Leicester Road	Stn 4A	Reported value	0	0	0	0	0	0	0.1	0
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Quorn Grange, Unitt Road, Northage Close, Quorn Park	Stn 4B	Reported value	0	0	0.1	0	0.1	0	0	0
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Bond Lane; Crown Lane	Stn 5	Reported value	0.1	0	0	0	0	0.1	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Sileby Road; Huston Close; Sileby Road (commercial)	Stn 6A	Reported value	0	0.1	0.1	0	0.1	0.1	0.1	0
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Hawcliffe Road	Stn 9	Reported value	0.1	0.1	0.1	0.1	0	0.3	0.3	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Low	Very Low
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	Reported value	0.1	0	0	0.1	0.1	0.2	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Very Low	Very Low
Loughborough Road; River Soar (marina / caravan park)	Stn 11	Reported value	0.1	0	0	0	0.1	0.1	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Meadow Farm Marina and Caravan Park	Stn 12	Reported value	0.1	0.1	0	0.1	0.1	0.1	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Quorn House Park	Stn 13	Reported value	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Trigger: ≥ 0.5 ^a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Magnitude ^b	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

^a Trigger mass deposition and Effective Area Coverage rates as in Section 7.3, ZLFMS-AG008 Dust Management and Monitoring Plan (Updated), 2015

^b Magnitude of directional dust soiling derived from Beaman and Kingsbury, 1981

^c Direction/s not determined for daily EAC below 0.1%/day (very low soiling)

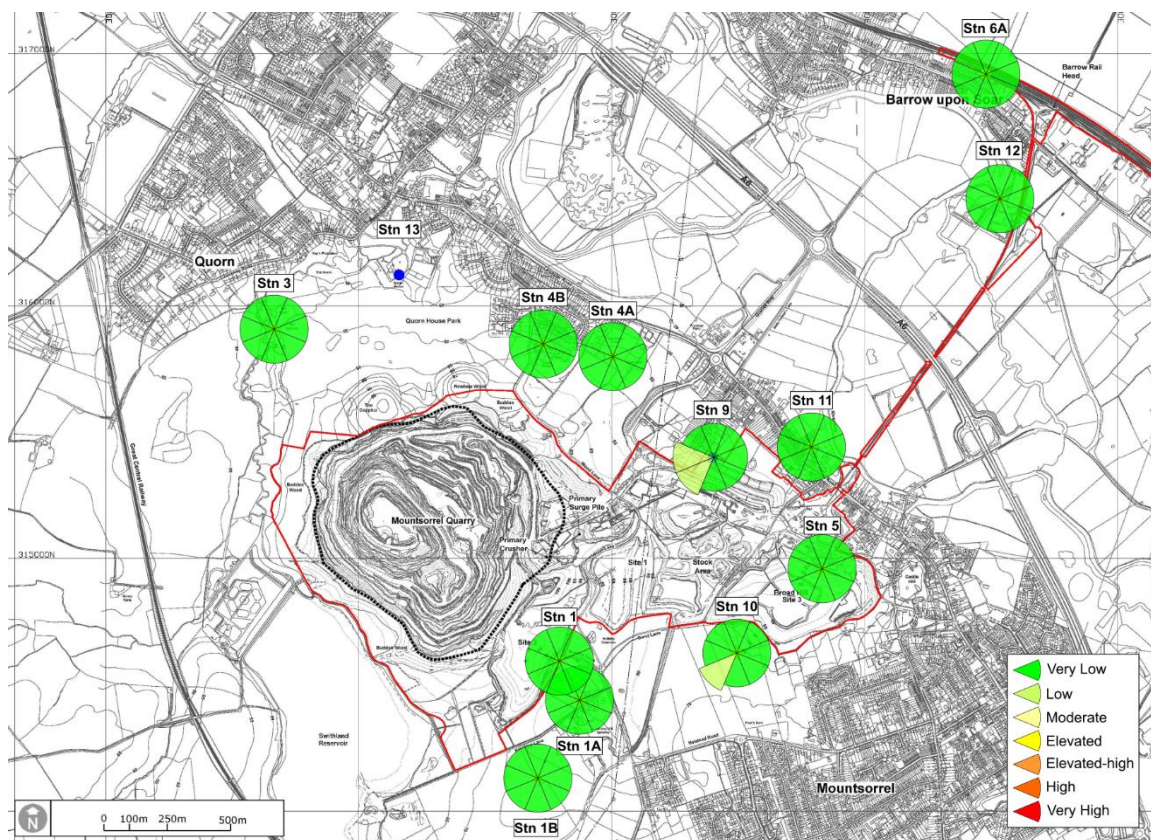


Figure 3.8: Directional dust soiling rose diagrams, 31 May – 28 June 2024

Table 3.3 shows that average directional soiling rates have been at very low levels at most monitoring locations, for most directions, over the past year. At Stn 9, the annual average soiling rate to date was 0.2 % EAC/day from the southwest and west resulting in ‘Low’ magnitudes being recorded. The cause or causes of these consistently, but marginally elevated dust soiling rates at this monitoring point are under review, as they may be related to site activities such as operations at the PSV yard, Granite Way and/or the toast rack.

Table 3.3: Running average directional dust soiling (past 12 months)

Receptor location	Nearest / appropriate dust monitoring point		Direction (°)							
			0	45	90	135	180	225	270	315
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1	Average value	0.1	0	0	0	0	0.1	0.1	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1A	Average value	0	0	0	0	0	0	0.1	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	Average value	0	0	0	0	0.1	0.1	0	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Mill Farm; Quorn House	Stn 3	Average value	0	0	0	0	0	0	0	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Woodside Farm, Leicester Road	Stn 4A	Average value	0	0	0	0	0	0.1	0.1	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Quorn Grange, Unitt Road, Northage Close, Quorn Park	Stn 4B	Average value	0	0	0.1	0	0.1	0	0	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Bond Lane; Crown Lane	Stn 5	Average value	0.1	0	0	0	0.1	0.1	0.1	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Sileby Road; Huston Close; Sileby Road (commercial)	Stn 6A	Average value	0	0.1	0.1	0	0	0.1	0.1	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Hawcliffe Road	Stn 9	Average value	0.1	0.1	0.1	0.1	0	0.2	0.2	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Low	Very Low
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	Average value	0.1	0	0	0	0.1	0.1	0.1	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Loughborough Road; River Soar (marina / caravan park)	Stn 11	Average value	0	0	0	0	0.1	0.1	0.1	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Meadow Farm Marina and Caravan Park	Stn 12	Average value	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Quorn House Park	Stn 13	Average value	0	0	0	0	0	0	0	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low

^a Trigger mass deposition and Effective Area Coverage rates as in Section 7.3, ZLFMS-AG008 Dust Management and Monitoring Plan (Updated), 2015

^b Magnitude of directional dust soiling derived from Beaman and Kingsbury, 1981

^c Direction/s not determined for daily EAC below 0.1%/day (very low soiling)

4 Complaints

During 31 May – 28 June 2024 several dust complaints were received by the quarry. These are being investigated in accordance with the procedure outlined in the DMMP.

Appendix A: Off-site PM₁₀ monitoring (CBC and AURN)

The daily average PM₁₀ concentrations recorded by the CBC Zephyr are presented below in Figure A.1, alongside similar data from the Defra Automatic Urban and Rural Network (AURN) station in Leicester University².

For the 12 months leading up to 28 June 2024, there were 362 daily PM₁₀ readings taken by the CBC Zephyr, and 363 daily readings taken by the Leicester AURN, representing a ~99% data collection rate at each respective location.

From the available data the annual average daily PM₁₀ concentration for the 12 months to date at CBC Zephyr was 9.63 µg/m³, which is approximately 24.1 % of the annual average PM₁₀ concentration objective (40 µg/m³). At the Leicester AURN the annual average daily PM₁₀ concentration for the 12 months to date was 10.3 µg/m³ which is approximately 25.8 % of the annual average PM₁₀ concentration objective.

For the 12 months up to 28 June 2024 there were no recorded instances where the daily average PM₁₀ concentrations exceeded 50 µg/m³ at either location. In summary, for the 12 months up to 28 June 2024 neither the annual nor daily AQO were exceeded.

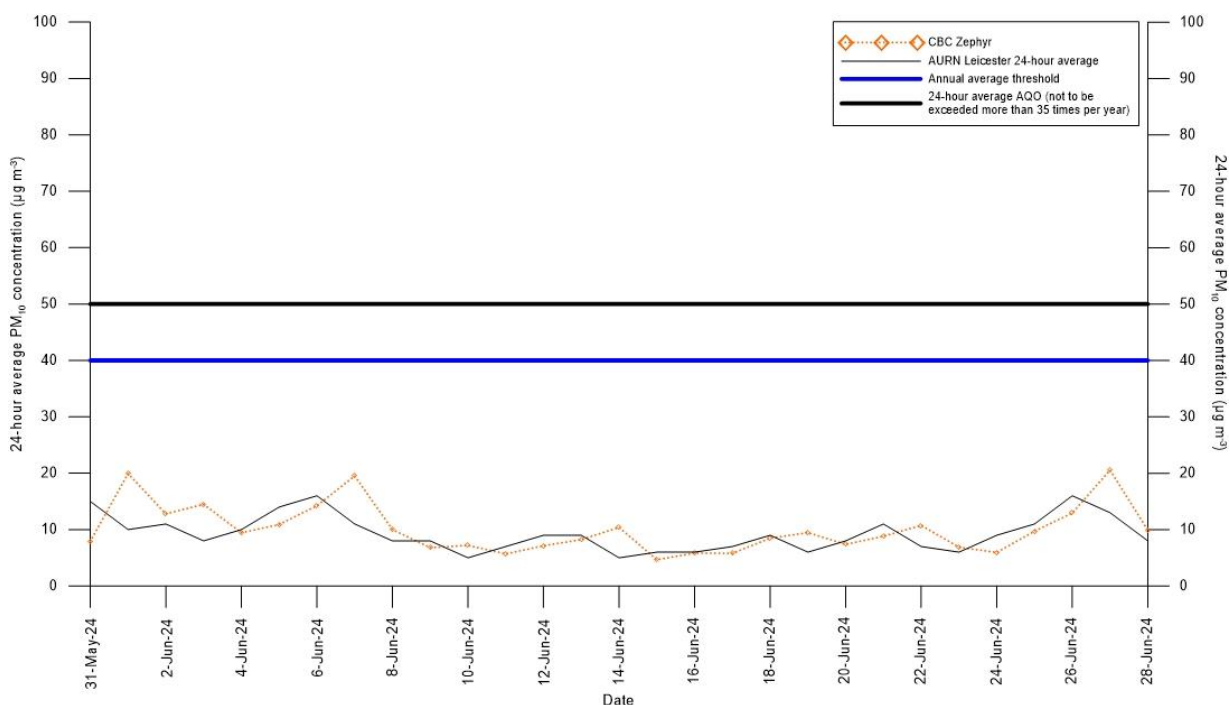


Figure A.1: Daily average PM₁₀ concentration, CBC Zephyr and Leicester AURN, 31 May – 28 June 2024

² <http://uk-air.defra.gov.uk/networks/network-info?view=aur>

Appendix B: Off-site PM_{2.5} monitoring (CBC and AURN)

The daily average PM_{2.5} concentrations recorded by the CBC Zephyr are presented below in Figure B.1, alongside similar data from the Defra Automatic Urban and Rural Network (AURN) station in Leicester University.

For the 12 months leading up to 28 June 2024, there were 362 daily PM_{2.5} readings taken by the CBC Zephyr, and 363 readings taken by the Leicester AURN, representing a ~99 % data collection rate respectively. From the available data the annual average daily PM_{2.5} concentration for the 12 months at the CBC Zephyr was 5.88 µg/m³, which is approximately 49 % of the interim annual average PM_{2.5} concentration objective (12 µg/m³) applicable from 31 January 2023. At the Leicester AURN the annual average daily concentration was 6.31 µg/m³, which is approximately 53 % of the interim annual average PM_{2.5} concentration objective.

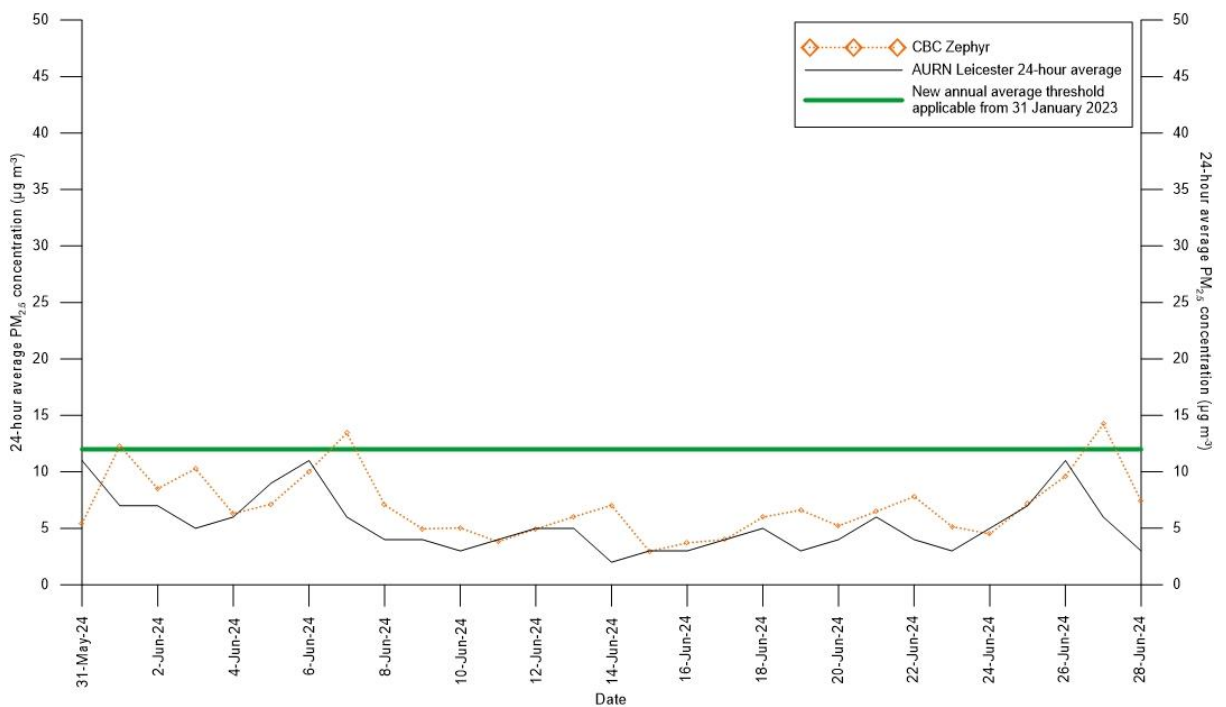


Figure B.1: Daily average PM_{2.5} concentrations, CBC Zephyr and Leicester AURN, 31 May – 28 June 2024



Dust, Particulate Matter and Weather Monitoring Report: July 2024

Mountsorrel Quarry

October, 2024

Tarmac



Document Control Sheet

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Report Prepared By

DustScanAQ
Unit 8 Nimrod
De Havilland Way
Witney
Oxon
OX29 0YG
United Kingdom
Tel: + 44 (0) 1608 810110
E-mail: info@dustscan.co.uk
Web: www.DustScan.co.uk

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1 Introduction

Mountsorrel Quarry has a comprehensive Dust Management and Monitoring Plan (DMMP). The DMMP was developed in 2011 and is subject to regular review and revision, in consultation between Tarmac and the local regulators (Leicestershire County Council (LCC) and Charnwood Borough Council (CBC)).

The DMMP is enacted through the quarry Site Improvement Plan (SIP). The SIP sets out a programme of actions to reduce the environmental impact of specific areas of the site operation, and is updated regularly by quarry management, with support from DustScanAQ through regular site visits and quarterly reviews with LCC and CBC.

Section 7.5 of the DMMP requires that a monthly summary and review of dust and particulate matter monitoring is prepared and circulated with LCC, CBC and the Environment Agency.

This report details the results of dust, particulate matter and weather monitoring around Mountsorrel Quarry during the period 28 June – 31 July 2024.

1.1 Report scope

The intention of this report is to summarise dust and particulate matter monitoring results for the given period and compare them against site-specific alert limits and thresholds. This report also details the results of any investigation carried out into elevated dust or particulate matter levels, as prompted by an exceedance of alert limits or thresholds.

1.2 Dust definitions

'Dust' is generally regarded as particulate matter up to 75 µm (micron) diameter and can be considered in two categories. Fine dust, essentially particles up to 10 µm, is commonly referred to as PM₁₀ and is measured to agreed standards and forms part of the national Air Quality Objectives (AQO). The AQO for PM₁₀ is currently 50 µg/m³ for the 24-hour mean, not to be exceeded 35 times per year and 40 µg/m³ for the annual mean. Particles up to 2.5 µm in diameter are referred to as PM_{2.5}. The interim AQO for PM_{2.5} is 12 µg/m³ for the annual mean (to be achieved by 2028), whilst the legal AQO for PM_{2.5} is 10 µg/m³ for the annual mean (to be achieved by 2040) as per The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023¹.

It may be noted that the above Regulations relate to average particle concentrations in Local Authority districts thus do not apply to any specific industrial or other operation, such as Mountsorrel Quarry, and are included for reference.

Coarser dust (essentially particles greater than 10 µm) is generally regarded as 'nuisance dust' and can be associated with annoyance, although there are no official standards (such as AQO) for dust annoyance.

¹ Statutory Instrument. (2023), 'The Environmental Targets (Fine Particulate Matter) (England) Regulations', No. 96. King's Printer of Acts of Parliament

2 Sampler locations

As shown in Figure 2.1 and Table 2.1, dust, particulate matter and weather conditions are measured at a number of locations around site and the surrounding area:

- Directional and depositional dust: currently monitored at 13 locations;
- Particulate matter: currently monitored at two locations;
- Weather conditions: currently monitored at one location.

The majority of the dust samplers around Mountsorrel Quarry comprise the ‘Frisbee-type’ deposition gauge combined with an adhesive ‘sticky pad’ directional gauge. These samplers are used to monitoring ‘nuisance’ dust and samples from these instruments are collected on a monthly basis.

For particulate matter, Turnkey Osiris samplers are located at Stn 9 (Hawcliffe Road) and at Stn 13 (Quorn House). These recognised and certificated ‘indicative’ real-time devices are connected to their own wind vane and anemometer and provide near-instantaneous directional PM₁₀, PM_{2.5} and PM₁ data directly to the quarry management team.

A weather station is located at the site offices off Wood Lane and collects a range of weather parameters over fifteen minute intervals. Data from the weather station are available to the quarry management by means of a dedicated modem connection to the internet.

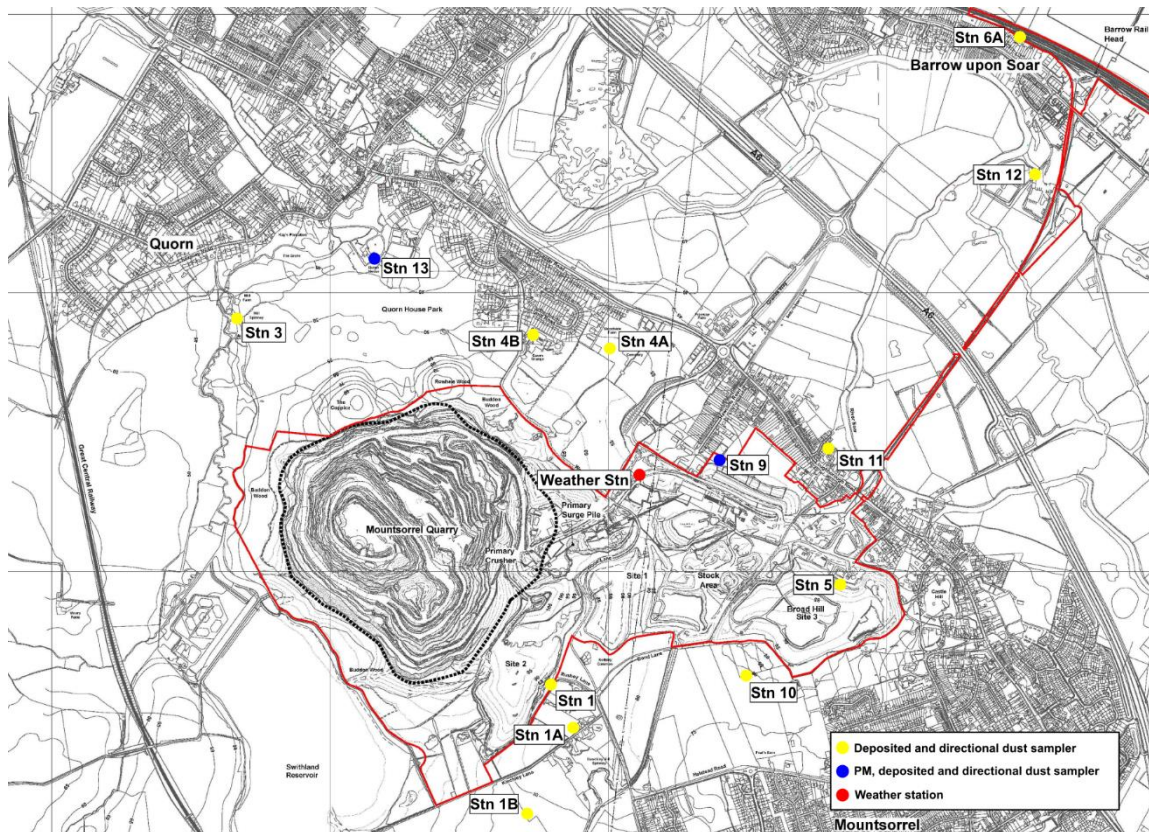


Figure 2.1: Particulate matter, dust and weather monitoring locations, Mountsorrel Quarry

Table 2.1: Weather, particulate matter and dust monitoring locations, Mountsorrel Quarry

Sampler reference	Easting	Northing	Locality monitored
Stn 1	456781	314577	Swithland Lane; Rushey Lane; Kinchley Lane
Stn 1A	456891	314436	Swithland Lane; Rushey Lane; Kinchley Lane
Stn 1B	456715	314109	Swithland Lane; Rushey Lane; Kinchley Lane
Stn 3	455681	315847	Mill Farm; Quorn House
Stn 4A	457000	315805	Woodside Farm; Leicester Road
Stn 4B	456733	315778	Quorn Grange, Unitt Road, Northage Close, Quorn Park
Stn 5	457789	314941	Bond Lane; Crown Lane
Stn 6A	458660	316786	Sileby Road; Huston Close; Sileby Road (commercial)
Stn 9 (inc. PM)	457374	315398	Hawcliffe Road
Stn 10	457487	314626	Glebe Close; Halstead Road (south); Halstead Road (north)
Stn 11	457791	315458	Loughborough Road; River Soar (marina / caravan park)
Stn 12	458575	315459	Meadow Farm Marina and Caravan Park
Stn 13 (incl. PM)	456158	316090	Northage Close, Meeting Street
Weather Station	457126	315376	Wood Lane Site Offices

Charnwood Borough Council (CBC) is responsible for the monitoring of air quality within the borough and prepares Air Quality Annual Status Reports (ASRs) for submission to Defra. It operates a Zephyr air quality monitor which is located within the Leicestershire County Council (LCC) depot at the southern end of Hawcliffe Road, in close proximity to the Osiris device at Stn 9. This device measures a number of pollutants including PM₁₀ and PM_{2.5}, allowing CBC to compare concentrations against the relevant AQOs for these pollutants.

For additional context, the latest PM₁₀ and PM_{2.5} monitoring data from CBC are summarised in Appendix A and Appendix B.

2.1 Alert thresholds and response procedures

To help the site reduce its impact on the surrounding area, a number of alert thresholds have been calculated, as outlined in Table 2.2.

Table 2.2: Alert thresholds

Pollutant	Threshold	Averaging period	Applies to
PM ₁₀	125 µg/m ³	15 minutes	Stn 9 (Hawcliffe Road), Stn 13 (Quorn House)
Deposited dust	125 mg/m ² /day	1 month	All deposited dust monitoring locations

For particulate matter (PM₁₀) an alert threshold of 125 µg/m³ for the 15-minute average has been in use for several years.

Many years of monitoring and research have shown that the quarry is not a significant source of fine particulate matter (PM_{2.5}) hence no alert threshold for this size fraction is required.

PM₁₀ and PM_{2.5} concentrations recorded by CBC at the southern end of Hawcliffe Road and by Defra through the Automatic Urban and Rural Network (AURN) at Leicester University are presented in Appendix A and Appendix B respectively. Data from both locations have been compared against relevant Air Quality Objectives (AQOs) for PM₁₀ and PM_{2.5}.

For deposited dust, the DMMP sets out a site-wide deposited dust threshold of 125 mg/m²/day ‘undissolved solids’ as a trigger limit for investigation to identify the potential dust source/s, taking account of the directional data.

3 Results

3.1 Weather monitoring

Weather conditions can have a significant effect on the potential for dust propagation from a minerals site. Of particular importance are wind speed, wind direction, and precipitation. Dust can be carried from a source towards receptors (such as nearby homes and other businesses) according to the strength and direction of wind. Precipitation is recognised to suppress dust and 0.2 mm antecedent rainfall is considered sufficient to suppress windblown dust for a number of hours.

The key weather data which might affect dust propagation (wind speed, wind direction, total daily precipitation and average daily temperature) for this reporting period are summarised in Figure 3.1 and Figure 3.2.

The monitoring period was characterised by generally mild temperatures until mid-July, before warmer temperatures in late July. The maximum daily average temperature was 22.7 °C recorded on 19 July and the minimum daily average temperature was 12.9 °C recorded on 06 July.

The monitoring period was generally dry with precipitation recorded on just 35% of total days; however there were two days with significant rainfall in mid-July. During the warmer period in late July, a 15-day dry period occurred where only 0.25 mm precipitation was recorded; this combination of warm temperatures and lack of precipitation may have increased the risk of dust propagation beyond the site boundary.

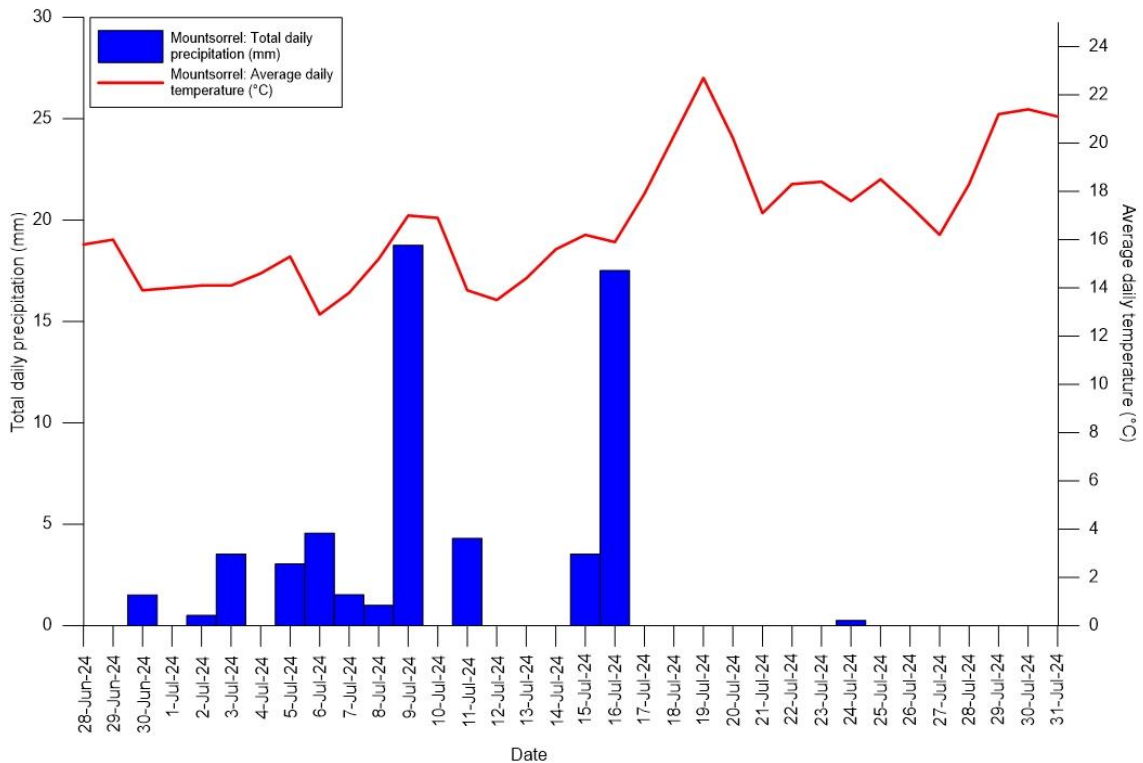


Figure 3.1: Total daily precipitation and average daily temperature, Mountsorrel Quarry, 28 June – 31 July 2024

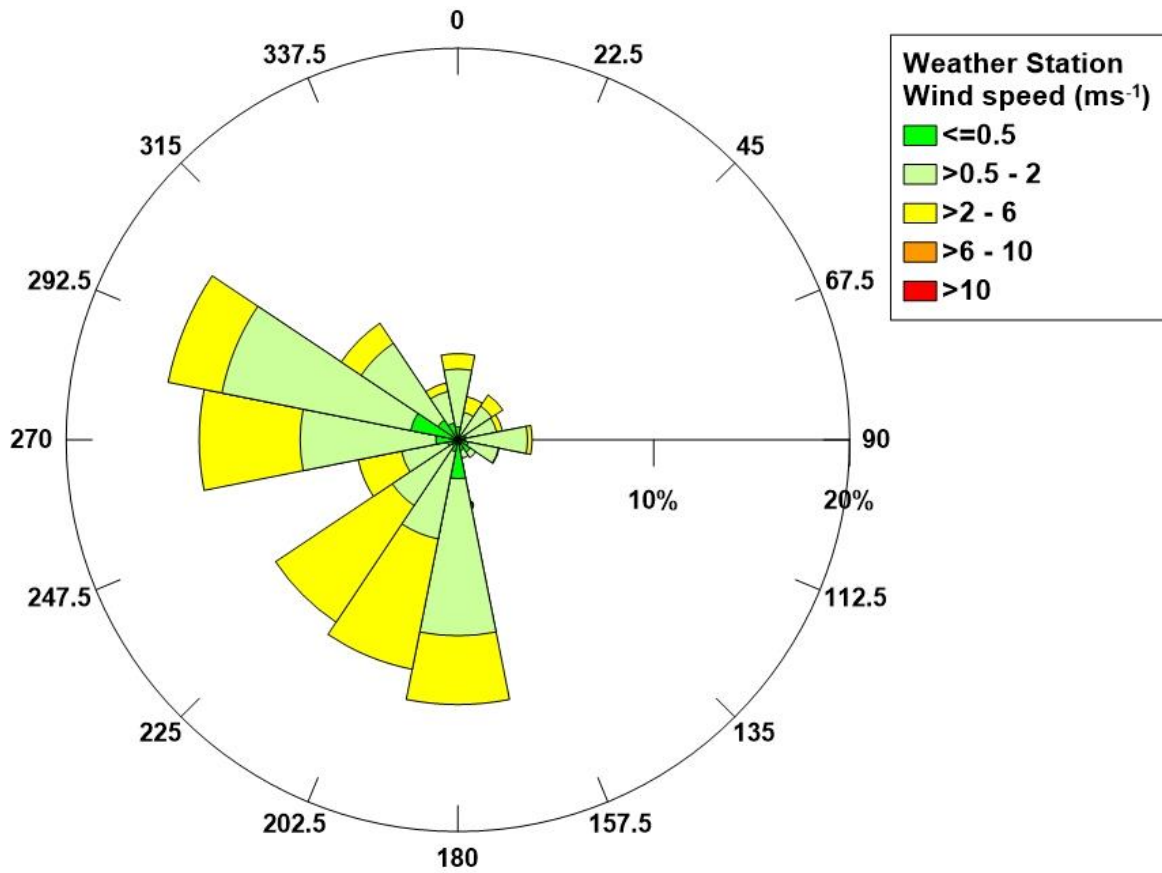


Figure 3.2: Wind rose, Mountsorrel Quarry, Mountsorrel, 28 June – 31 July 2024

As seen in Figure 3.2, winds for this monitoring period were predominantly calm to moderate in speed (>0.5 – 6 m/s) and from the west-northwest and west. Winds were also recorded from the southwest and south. Consequently, there may have been slight potential for dust propagation generally towards the east-southeast, east, north and northwest, especially during dry conditions in the latter part of the monitoring period.

3.2 Particulate matter

Due to a technical issue with the Osiris monitor at Hawcliffe Road, data from this location are not available for this period.

3.2.1 PM₁₀

The available 15-minute data from the period of review are presented for Quorn House in Figure 3.3. The dashed black line denotes the average concentration recorded over this period.

Additional PM₁₀ monitoring data (collected by CBC and the Defra AURN monitoring network) are provided in Appendix A.

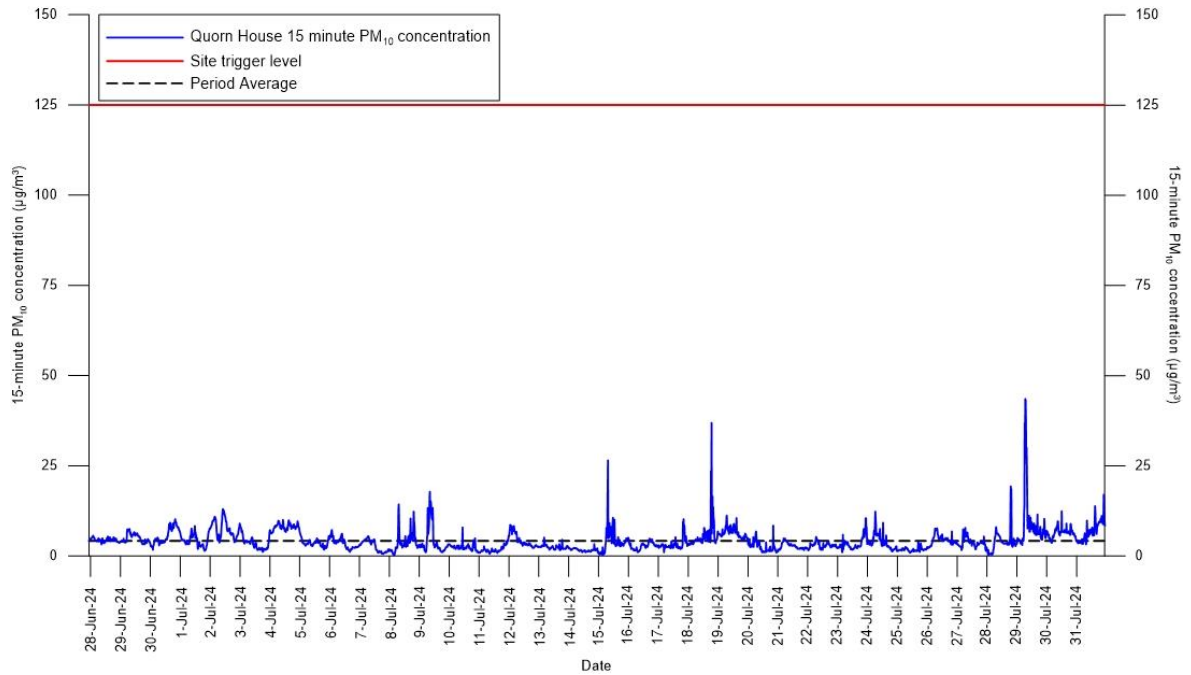


Figure 3.3: 15-minute mean PM₁₀ concentration, Quorn House, 28 June – 31 July 2024

At Quorn House there were no exceedances of the PM₁₀ site trigger level, and the overall average concentration for this period was 4.2 µg/m³. The general similarity between PM₁₀ concentrations recorded at Quorn House, the CBC monitor and the AURN monitor suggests that the site was not a significant source of PM₁₀ at this location during this period.

3.2.2 PM_{2.5}

The results of PM_{2.5} monitoring at Quorn House are presented in Figure 3.4. The dashed black line denotes the average concentration recorded over this period.

Additional PM_{2.5} monitoring data (collected by CBC and the Defra AURN monitoring network) are provided in Appendix B.

The overall average concentration for this period was 2.8 µg/m³ at Quorn House. As with the PM₁₀ concentrations, it is most likely that a regional rather than local PM_{2.5} signal was recorded during this period. This is supported by the CBC and AURN data presented in Appendix B. For this period, 66 % of PM₁₀ recorded at Quorn House was formed of PM_{2.5}. This strongly indicates that a regional rather than a local particulate matter signal was recorded during this period.

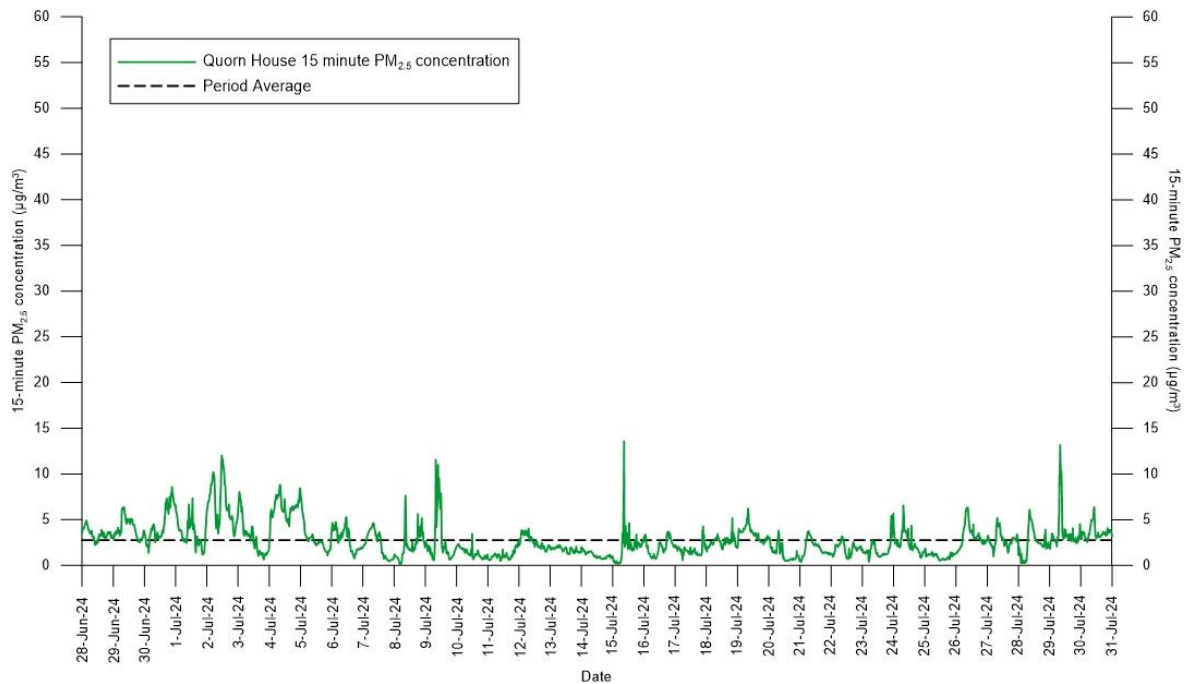


Figure 3.4: 15-minute mean PM_{2.5} concentration, Quorn House, 28 June – 31 July 2024

3.3 Visible dust

3.3.1 Deposited dust monitoring summary

The deposited dust data for 28 June – 31 July 2024 are summarised in Table 3.1. As outlined earlier, point-specific thresholds have been calculated for investigation to identify the potential dust source/s, taking account of the directional data. Table 3.1 shows that, for the available data, deposited dust levels during 28 June – 31 July 2024 were all within the site-specific threshold for all stations, although dust levels were approaching the trigger level at Stn 9.

The directional dust results for Stn 9 (indicating a source from the southwest and west) would suggest the potential for both on-site and off-site dust sources during this period, such as the toast rack or PSV yard, or neighbouring sites along Granite Way respectively.

Table 3.1: Summary of deposited dust (undissolved solids), 28 June – 31 July 2024

Undissolved solids (mg/m ² /day)				
This month report start date:		28-Jun-24		
This month report end date:		31-Jul-24		
Receptor location	Nearest / appropriate dust monitoring point	Reported value	Trigger: ≥ 125 ^a	Magnitude ^b
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1	37	No	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1A	40	No	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	30	No	Very Low
Mill Farm; Quorn House	Stn 3	39	No	Very Low
Woodside Farm, Leicester Road	Stn 4A	31	No	Very Low
Quorn Grange, Unitt Road, Northage Close, Quorn Park	Stn 4B	29	No	Very Low
Bond Lane; Crown Lane	Stn 5	23	No	Very Low
Sileby Road; Huston Close; Sileby Road (commercial)	Stn 6A	53	No	Low
Hawcliffe Road	Stn 9	121	No	Elevated
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	84	No	Slightly Elevated
Loughborough Road; River Soar (marina / caravan park)	Stn 11	40	No	Very Low
Meadow Farm Marina and Caravan Park	Stn 12	49	No	Very Low
Quorn House Park	Stn 13	24	No	Very Low

^a Trigger mass deposition and Effective Area Coverage rates as in Section 7.3, ZLFMS-AG008 Dust Management and Monitoring Plan (Updated), 2015

^b Magnitude of mass deposition rate assessed against typical rate for semi-rural areas (30 - 80 mg/m²/day)

Regarding dust deposition over time, the rates across the sampling area have varied considerably. Trends in dust deposition rates (as undissolved solids) for the previous 12 months, together with the site-wide dust threshold are illustrated in Figure 3.5.

In general, as would be expected, dust deposition rates are typically lower in winter months than in summer months. This trend is clearly seen for most monitoring points in Figure 3.5, with some exceptions. Dust deposition rates have been consistently below the 'trigger limit' at all sampling locations except Stn 9.

In general, as shown in Figure 3.5, higher rates of dust deposition have been recorded near industrial settings (*i.e.* Stn 9) than in more residential areas (*e.g.* Stn 1, Kinchley Lane).

Figure 3.5 show that dust deposition rates were largely well within the site-specific trigger level during the previous 12 months although rates have occasionally been exceeded at Stn 9.

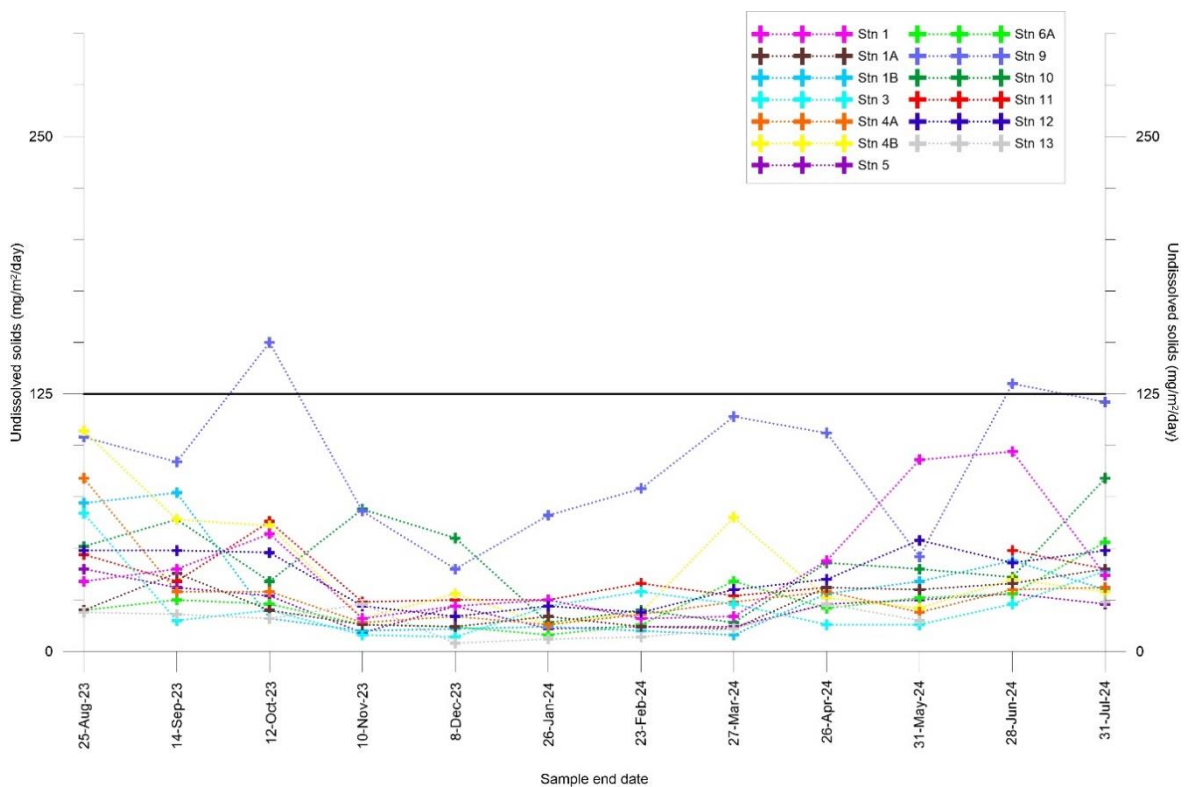


Figure 3.5: Dust deposition rates per sampling location over time (past 12 months)

3.3.2 Directional dust monitoring summary

The directional dust data for 28 June – 31 July 2024 are summarised in Table 3.2, and are presented graphically in Figure 3.6. As with deposited dust, the DMMP sets out a site-wide directional dust threshold. For directional dust soiling, 0.5 % effective area coverage (EAC) per day is a trigger limit for investigation to identify the likely dust source/s, again taking account of the direction.

Table 3.2 and Figure 3.6 show that during 28 June – 31 July 2024, all stations recorded Very Low dust levels from all directions, with the exception of Low dust levels from the southwest and west at Stn 6A and Stn 9.

Table 3.2: Summary of directional dust soiling, 28 June – 31 July 2024

		Directional dust soiling (%EAC/day) by direction (°)								
This month report start date:		28-Jun-24								
This month report end date:		31-Jul-24								
Receptor location	Nearest / appropriate dust monitoring point	Direction (°)								
		0	45	90	135	180	225	270	315	
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1	Reported value	0	0	0	0	0	0.1	0.1	0
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1A	Reported value	0	0	0	0	0	0.1	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	Reported value	0	0	0	0.1	0.1	0.1	0	0
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Mill Farm; Quorn House	Stn 3	Reported value	0	0	0	0	0	0	0	0
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Woodside Farm, Leicester Road	Stn 4A	Reported value	0	0	0	0	0	0.1	0	0
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Quorn Grange, Unitt Road, Northage Close, Quorn Park	Stn 4B	Reported value	0	0	0	0.1	0	0	0	0
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Bond Lane; Crown Lane	Stn 5	Reported value	0	0	0	0.1	0.1	0	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Sileby Road; Huston Close; Sileby Road (commercial)	Stn 6A	Reported value	0	0.1	0.1	0.1	0.1	0.2	0.2	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Low	Very Low
Hawcliffe Road	Stn 9	Reported value	0	0.1	0.1	0.1	0.1	0.3	0.3	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Low	Very Low
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	Reported value	0.1	0	0	0	0.1	0	0	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Loughborough Road; River Soar (marina / caravan park)	Stn 11	Reported value	0.1	0.1	0	0	0.1	0.1	0	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Meadow Farm Marina and Caravan Park	Stn 12	Reported value	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Quorn House Park	Stn 13	Reported value	0	0	0	0	0	0	0	0
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low

^a Trigger mass deposition and Effective Area Coverage rates as in Section 7.3, ZLFMS-AG008 Dust Management and Monitoring Plan (Updated), 2015

^b Magnitude of directional dust soiling derived from Beaman and Kingsbury, 1981

^c Direction/s not determined for daily EAC below 0.1%/day (very low soiling)

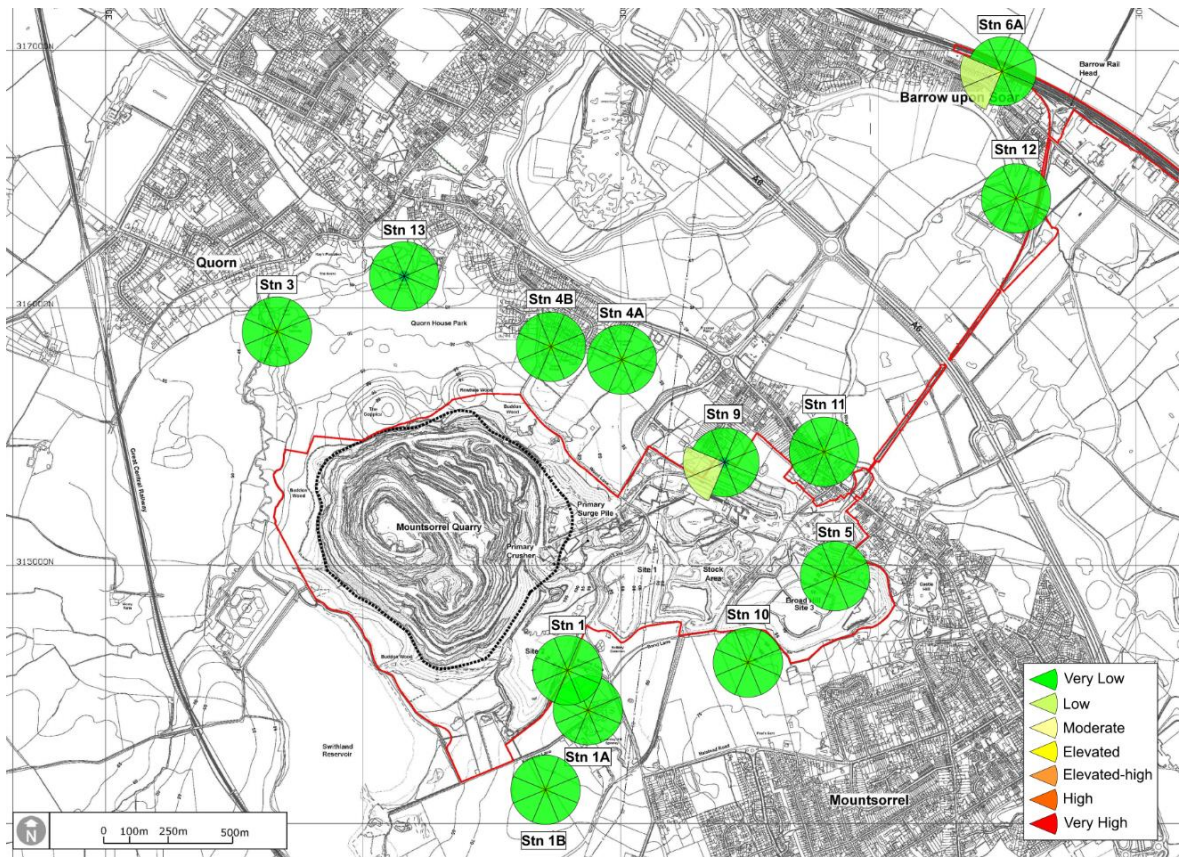


Figure 3.6: Directional dust soiling rose diagrams, 28 June – 31 July 2024

Table 3.3 shows that average directional soiling rates have been at very low levels at most monitoring locations, for most directions, over the past year. At Stn 9, the annual average soiling rate to date was 0.2 % EAC/day from the southwest and west resulting in ‘Low’ magnitudes being recorded. The cause or causes of these consistently, but marginally elevated dust soiling rates at this monitoring point are under review, as they may be related to site activities such as operations at the PSV yard, Granite Way and/or the toast rack.

Table 3.3: Running average directional dust soiling (past 12 months)

Receptor location	Nearest / appropriate dust monitoring point		Direction (°)							
			0	45	90	135	180	225	270	315
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1	Average value	0.1	0	0	0	0	0.1	0.1	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1A	Average value	0	0	0	0	0	0	0.1	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	Average value	0	0	0	0	0.1	0.1	0	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Mill Farm; Quorn House	Stn 3	Average value	0	0	0	0	0	0	0	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Woodside Farm, Leicester Road	Stn 4A	Average value	0	0	0	0	0	0.1	0.1	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Quorn Grange, Unitt Road, Northage Close, Quorn Park	Stn 4B	Average value	0	0	0.1	0	0.1	0	0	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Bond Lane; Crown Lane	Stn 5	Average value	0	0	0	0	0.1	0.1	0.1	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Sileby Road; Huston Close; Sileby Road (commercial)	Stn 6A	Average value	0	0.1	0.1	0	0	0.1	0.1	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Hawcliffe Road	Stn 9	Average value	0	0.1	0.1	0.1	0	0.2	0.2	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Low	Very Low
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	Average value	0.1	0	0	0	0.1	0.1	0	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Loughborough Road; River Soar (marina / caravan park)	Stn 11	Average value	0	0	0	0	0.1	0.1	0	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Meadow Farm Marina and Caravan Park	Stn 12	Average value	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Quorn House Park	Stn 13	Average value	0	0	0	0	0	0	0	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low

^a Trigger mass deposition and Effective Area Coverage rates as in Section 7.3, ZLFMS-AG008 Dust Management and Monitoring Plan (Updated), 2015
^b Magnitude of directional dust soiling derived from Beaman and Kingsbury, 1981
^c Direction/s not determined for daily EAC below 0.1%/day (very low soiling)

4 Complaints

During 28 June – 31 July 2024 two dust complaints were received by the quarry. These are being investigated in accordance with the procedure outlined in the DMMP.

Appendix A: Off-site PM₁₀ monitoring (CBC and AURN)

The daily average PM₁₀ concentrations recorded by the CBC Zephyr are presented below in Figure A.1, alongside similar data from the Defra Automatic Urban and Rural Network (AURN) station in Leicester University².

For the 12 months leading up to 31 July 2024, there were 362 daily PM₁₀ readings taken by the CBC Zephyr, and 363 daily readings taken by the Leicester AURN, representing a ~99% data collection rate at each respective location.

From the available data the annual average daily PM₁₀ concentration for the 12 months to date at CBC Zephyr was 9.78 µg/m³, which is approximately 24.5 % of the annual average PM₁₀ concentration objective (40 µg/m³). At the Leicester AURN the annual average daily PM₁₀ concentration for the 12 months to date was 10.3 µg/m³ which is approximately 25.8 % of the annual average PM₁₀ concentration objective.

For the 12 months up to 31 July 2024 there were no recorded instances where the daily average PM₁₀ concentrations exceeded 50 µg/m³ at either location. In summary, for the 12 months up to 31 July 2024 neither the annual nor daily AQO were exceeded.

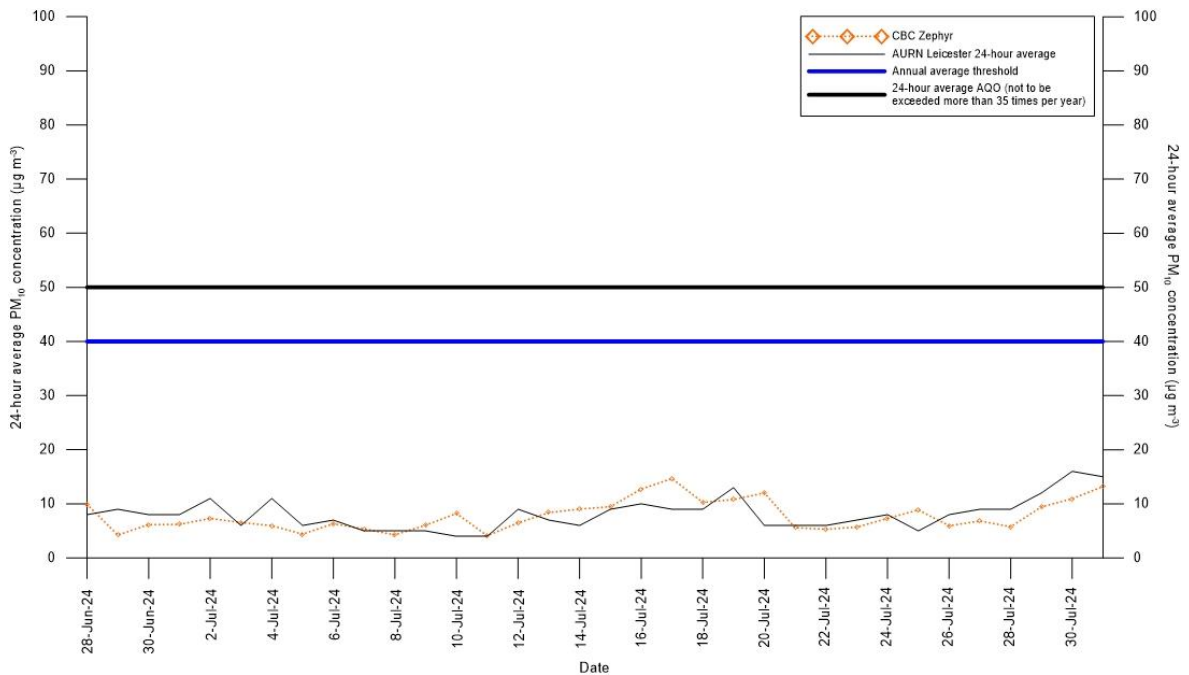


Figure A.1: Daily average PM₁₀ concentration, CBC Zephyr and Leicester AURN, 28 June – 31 July 2024

² <http://uk-air.defra.gov.uk/networks/network-info?view=aur>

Appendix B: Off-site PM_{2.5} monitoring (CBC and AURN)

The daily average PM_{2.5} concentrations recorded by the CBC Zephyr are presented below in Figure B.1, alongside similar data from the Defra Automatic Urban and Rural Network (AURN) station in Leicester University.

For the 12 months leading up to 31 July 2024, there were 362 daily PM_{2.5} readings taken by the CBC Zephyr, and 363 readings taken by the Leicester AURN, representing a ~99 % data collection rate respectively. From the available data the annual average daily PM_{2.5} concentration for the 12 months at the CBC Zephyr was 6.03 µg/m³, which is approximately 50 % of the interim annual average PM_{2.5} concentration objective (12 µg/m³) applicable from 31 January 2023. At the Leicester AURN the annual average daily concentration was 6.35 µg/m³, which is approximately 53 % of the interim annual average PM_{2.5} concentration objective.

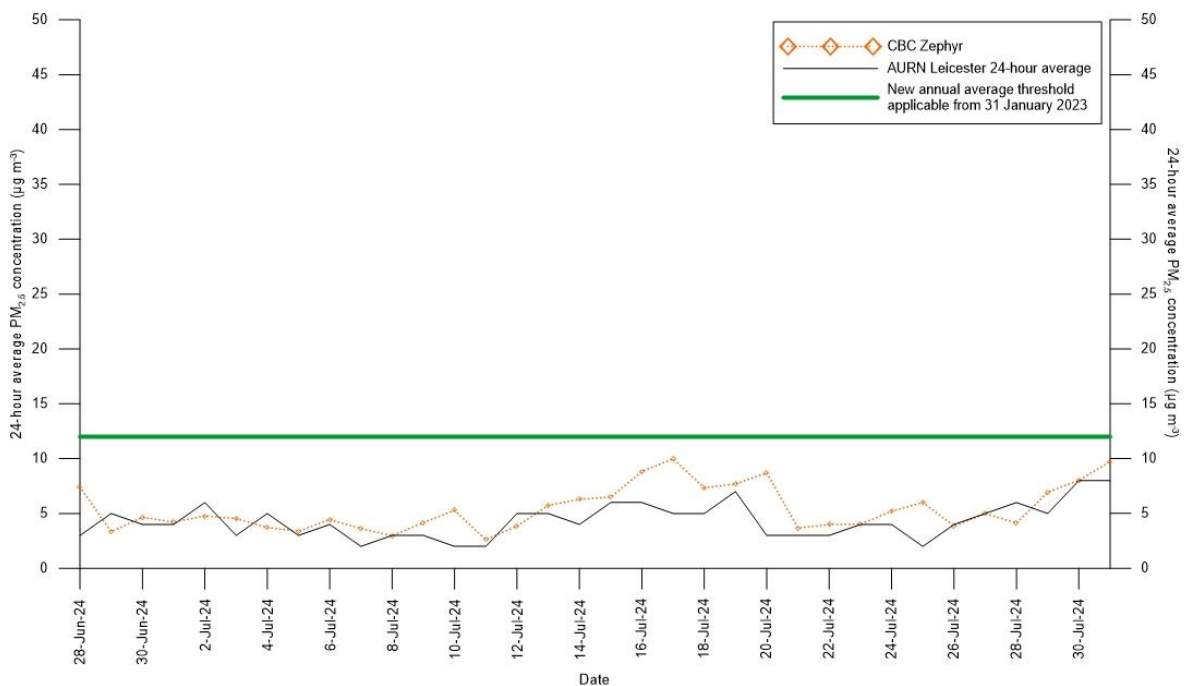


Figure B.1: Daily average PM_{2.5} concentrations, CBC Zephyr and Leicester AURN, 28 June – 31 July 2024



Dust, Particulate Matter and Weather Monitoring Report: August 2024

Mountsorrel Quarry

October, 2024

Tarmac



Document Control Sheet

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Disclaimer

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This report may include data obtained from trusted third-party consultants/laboratories that have been supplied to us in good faith. Whilst we do everything we can to ensure the quality of all the data we use, we cannot be held responsible for the accuracy or integrity of third-party data.

Report Prepared By

DustScanAQ
Unit 8 Nimrod
De Havilland Way
Witney
Oxon
OX29 0YG
United Kingdom
Tel: + 44 (0) 1608 810110
E-mail: info@dustscan.co.uk
Web: www.DustScan.co.uk

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1 Introduction

Mountsorrel Quarry has a comprehensive Dust Management and Monitoring Plan (DMMP). The DMMP was developed in 2011 and is subject to regular review and revision, in consultation between Tarmac and the local regulators (Leicestershire County Council (LCC) and Charnwood Borough Council (CBC)).

The DMMP is enacted through the quarry Site Improvement Plan (SIP). The SIP sets out a programme of actions to reduce the environmental impact of specific areas of the site operation, and is updated regularly by quarry management, with support from DustScanAQ through regular site visits and quarterly reviews with LCC and CBC.

Section 7.5 of the DMMP requires that a monthly summary and review of dust and particulate matter monitoring is prepared and circulated with LCC, CBC and the Environment Agency.

This report details the results of dust, particulate matter and weather monitoring around Mountsorrel Quarry during the period 31 July – 28 August 2024.

1.1 Report scope

The intention of this report is to summarise dust and particulate matter monitoring results for the given period and compare them against site-specific alert limits and thresholds. This report also details the results of any investigation carried out into elevated dust or particulate matter levels, as prompted by an exceedance of alert limits or thresholds.

1.2 Dust definitions

'Dust' is generally regarded as particulate matter up to 75 µm (micron) diameter and can be considered in two categories. Fine dust, essentially particles up to 10 µm, is commonly referred to as PM₁₀ and is measured to agreed standards and forms part of the national Air Quality Objectives (AQO). The AQO for PM₁₀ is currently 50 µg/m³ for the 24-hour mean, not to be exceeded 35 times per year and 40 µg/m³ for the annual mean. Particles up to 2.5 µm in diameter are referred to as PM_{2.5}. The interim AQO for PM_{2.5} is 12 µg/m³ for the annual mean (to be achieved by 2028), whilst the legal AQO for PM_{2.5} is 10 µg/m³ for the annual mean (to be achieved by 2040) as per The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023¹.

It may be noted that the above Regulations relate to average particle concentrations in Local Authority districts thus do not apply to any specific industrial or other operation, such as Mountsorrel Quarry, and are included for reference.

Coarser dust (essentially particles greater than 10 µm) is generally regarded as 'nuisance dust' and can be associated with annoyance, although there are no official standards (such as AQO) for dust annoyance.

¹ Statutory Instrument. (2023), 'The Environmental Targets (Fine Particulate Matter) (England) Regulations', No. 96. King's Printer of Acts of Parliament

2 Sampler locations

As shown in Figure 2.1 and Table 2.1, dust, particulate matter and weather conditions are measured at a number of locations around site and the surrounding area:

- Directional and depositional dust: currently monitored at 13 locations;
- Particulate matter: currently monitored at two locations;
- Weather conditions: currently monitored at one location.

The majority of the dust samplers around Mountsorrel Quarry comprise the ‘Frisbee-type’ deposition gauge combined with an adhesive ‘sticky pad’ directional gauge. These samplers are used to monitoring ‘nuisance’ dust and samples from these instruments are collected on a monthly basis.

For particulate matter, Turnkey Osiris samplers are located at Stn 9 (Hawcliffe Road) and at Stn 13 (Quorn House). These recognised and certificated ‘indicative’ real-time devices are connected to their own wind vane and anemometer and provide near-instantaneous directional PM₁₀, PM_{2.5} and PM₁ data directly to the quarry management team.

A weather station is located at the site offices off Wood Lane and collects a range of weather parameters over fifteen minute intervals. Data from the weather station are available to the quarry management by means of a dedicated modem connection to the internet.

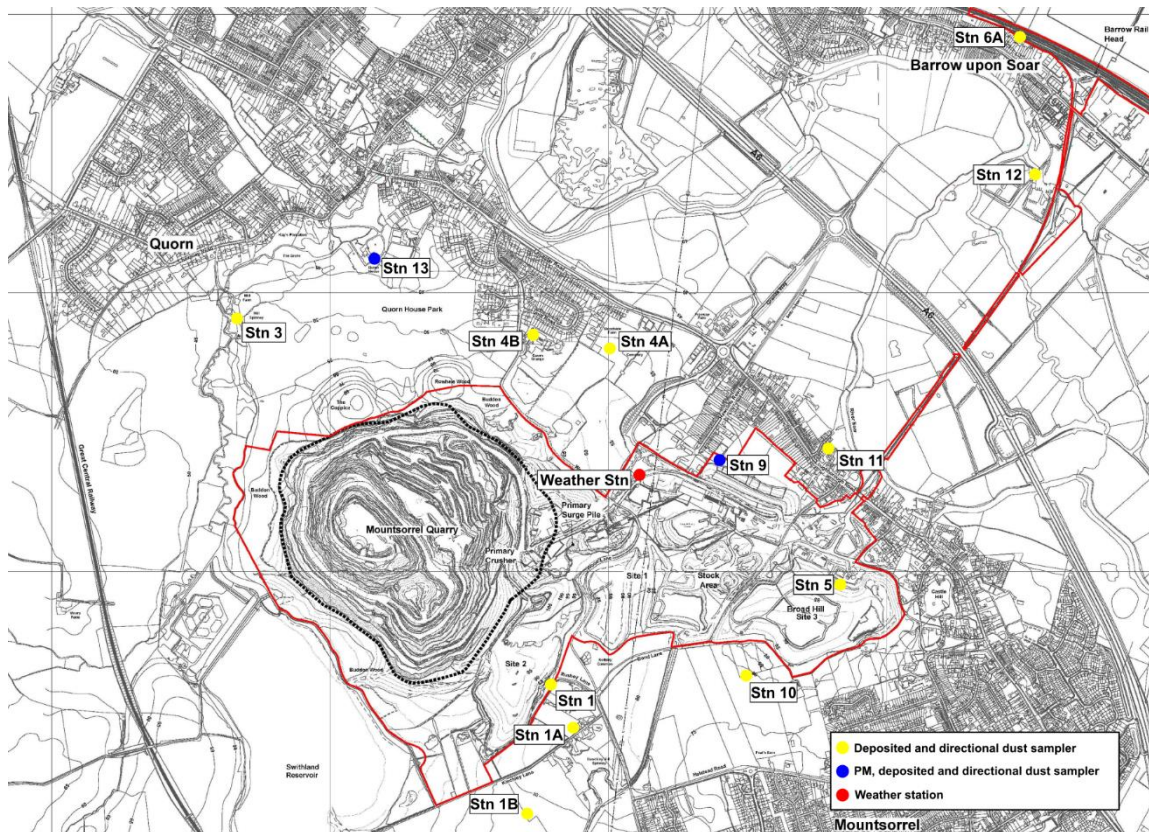


Figure 2.1: Particulate matter, dust and weather monitoring locations, Mountsorrel Quarry

Table 2.1: Weather, particulate matter and dust monitoring locations, Mountsorrel Quarry

Sampler reference	Easting	Northing	Locality monitored
Stn 1	456781	314577	Swithland Lane; Rushey Lane; Kinchley Lane
Stn 1A	456891	314436	Swithland Lane; Rushey Lane; Kinchley Lane
Stn 1B	456715	314109	Swithland Lane; Rushey Lane; Kinchley Lane
Stn 3	455681	315847	Mill Farm; Quorn House
Stn 4A	457000	315805	Woodside Farm; Leicester Road
Stn 4B	456733	315778	Quorn Grange, Unitt Road, Northage Close, Quorn Park
Stn 5	457789	314941	Bond Lane; Crown Lane
Stn 6A	458660	316786	Sileby Road; Huston Close; Sileby Road (commercial)
Stn 9 (inc. PM)	457374	315398	Hawcliffe Road
Stn 10	457487	314626	Glebe Close; Halstead Road (south); Halstead Road (north)
Stn 11	457791	315458	Loughborough Road; River Soar (marina / caravan park)
Stn 12	458575	315459	Meadow Farm Marina and Caravan Park
Stn 13 (incl. PM)	456158	316090	Northage Close, Meeting Street
Weather Station	457126	315376	Wood Lane Site Offices

Charnwood Borough Council (CBC) is responsible for the monitoring of air quality within the borough and prepares Air Quality Annual Status Reports (ASRs) for submission to Defra. It operates a Zephyr air quality monitor which is located within the Leicestershire County Council (LCC) depot at the southern end of Hawcliffe Road, in close proximity to the Osiris device at Stn 9. This device measures a number of pollutants including PM₁₀ and PM_{2.5}, allowing CBC to compare concentrations against the relevant AQOs for these pollutants.

For additional context, the latest PM₁₀ and PM_{2.5} monitoring data from CBC are summarised in Appendix A and Appendix B.

2.1 Alert thresholds and response procedures

To help the site reduce its impact on the surrounding area, a number of alert thresholds have been calculated, as outlined in Table 2.2.

Table 2.2: Alert thresholds

Pollutant	Threshold	Averaging period	Applies to
PM ₁₀	125 µg/m ³	15 minutes	Stn 9 (Hawcliffe Road), Stn 13 (Quorn House)
Deposited dust	125 mg/m ² /day	1 month	All deposited dust monitoring locations

For particulate matter (PM₁₀) an alert threshold of 125 µg/m³ for the 15-minute average has been in use for several years.

Many years of monitoring and research have shown that the quarry is not a significant source of fine particulate matter (PM_{2.5}) hence no alert threshold for this size fraction is required.

PM₁₀ and PM_{2.5} concentrations recorded by CBC at the southern end of Hawcliffe Road and by Defra through the Automatic Urban and Rural Network (AURN) at Leicester University are presented in Appendix A and Appendix B respectively. Data from both locations have been compared against relevant Air Quality Objectives (AQOs) for PM₁₀ and PM_{2.5}.

For deposited dust, the DMMP sets out a site-wide deposited dust threshold of 125 mg/m²/day ‘undissolved solids’ as a trigger limit for investigation to identify the potential dust source/s, taking account of the directional data.

3 Results

3.1 Weather monitoring

Weather conditions can have a significant effect on the potential for dust propagation from a minerals site. Of particular importance are wind speed, wind direction, and precipitation. Dust can be carried from a source towards receptors (such as nearby homes and other businesses) according to the strength and direction of wind. Precipitation is recognised to suppress dust and 0.2 mm antecedent rainfall is considered sufficient to suppress windblown dust for a number of hours.

The key weather data which might affect dust propagation (wind speed, wind direction, total daily precipitation and average daily temperature) for this reporting period are summarised in Figure 3.1 and Figure 3.2.

The monitoring period was characterised by generally warmer temperatures at the start of August, before a slight decrease in temperatures from mid to late August. The maximum daily temperature was 22.4 °C recorded on 12 August and the minimum daily temperature was 13.9 °C recorded on 25 August.

Overall, the monitoring period was reasonably mixed, with precipitation recorded on 48% of total days. There was an average of just 0.3 mm of precipitation at the start of August; this combination of warm temperatures and lack of precipitation may have increased the risk of dust propagation beyond the site boundary during this period.

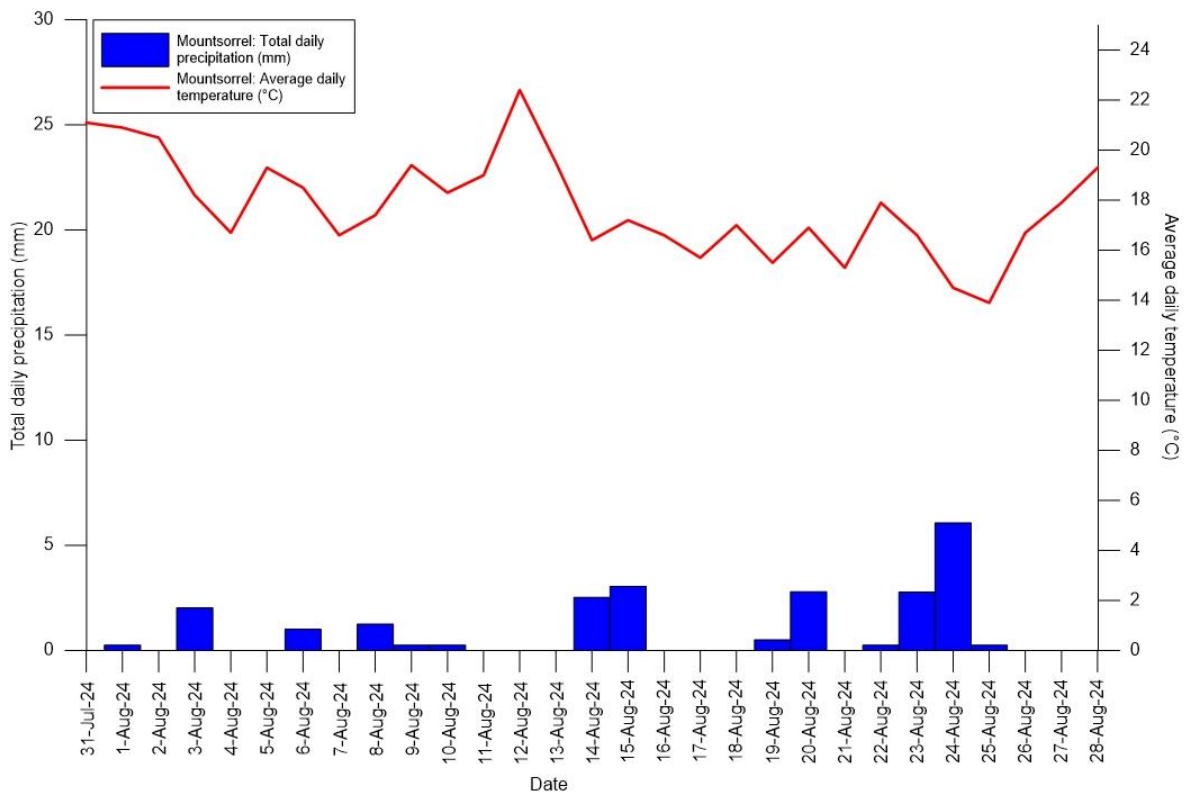


Figure 3.1: Total daily precipitation and average daily temperature, Mountsorrel Quarry, 31 July – 28 August 2024

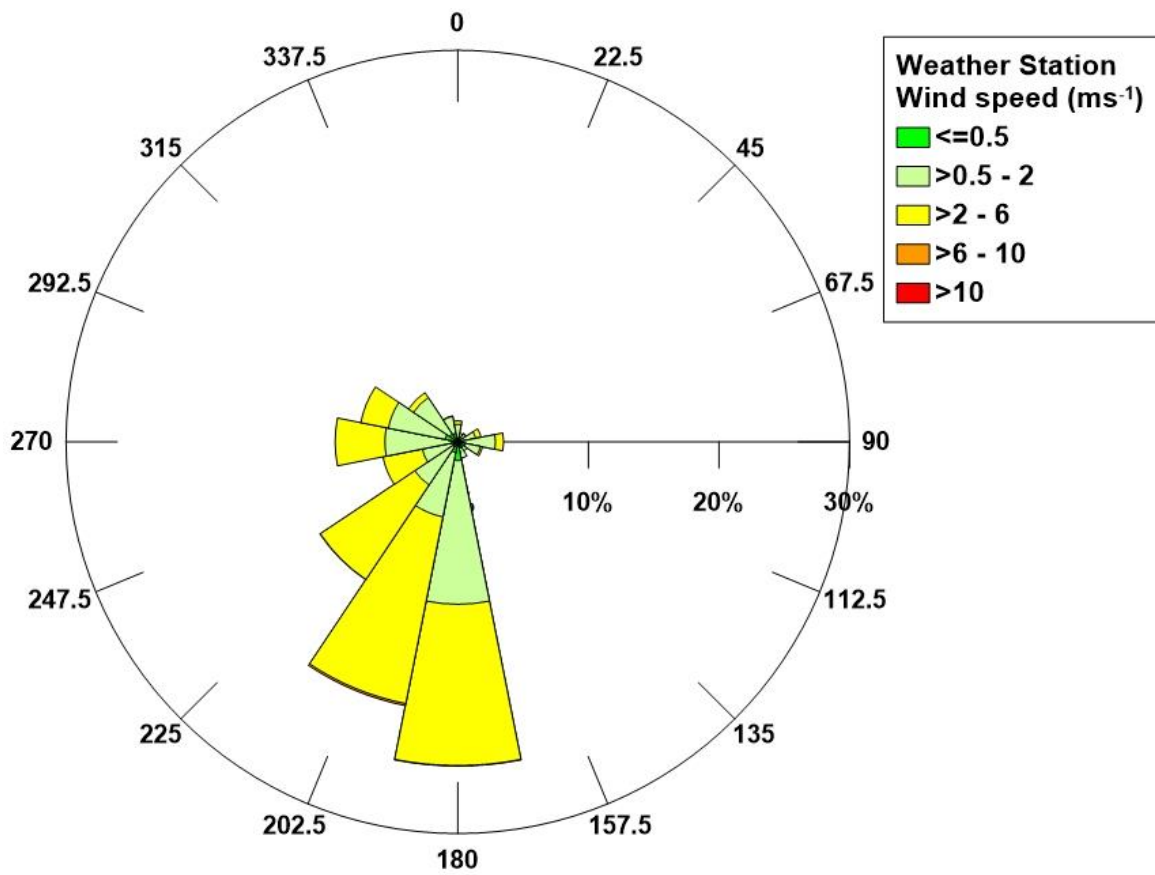


Figure 3.2: Wind rose, Mountsorrel Quarry, Mountsorrel, 31 July – 28 August 2024

As seen in Figure 3.2, winds for this monitoring period were predominantly calm to moderate in speed (>0.5 – 6 m/s) and from the south and south-southwest. Winds were also recorded from the west and southwest. Consequently, there may have been slight potential for dust propagation generally towards the north, north-northeast, east and northeast throughout the monitoring period.

3.2 Particulate matter

Due to a technical issue with the Osiris monitor at Hawcliffe Road, data from this location are not available for this period.

3.2.1 PM₁₀

The available 15-minute data from the period of review are presented for Quorn House in Figure 3.3. The dashed black line denotes the average concentration recorded over this period.

Additional PM₁₀ monitoring data (collected by CBC and the Defra AURN monitoring network) are provided in Appendix A.

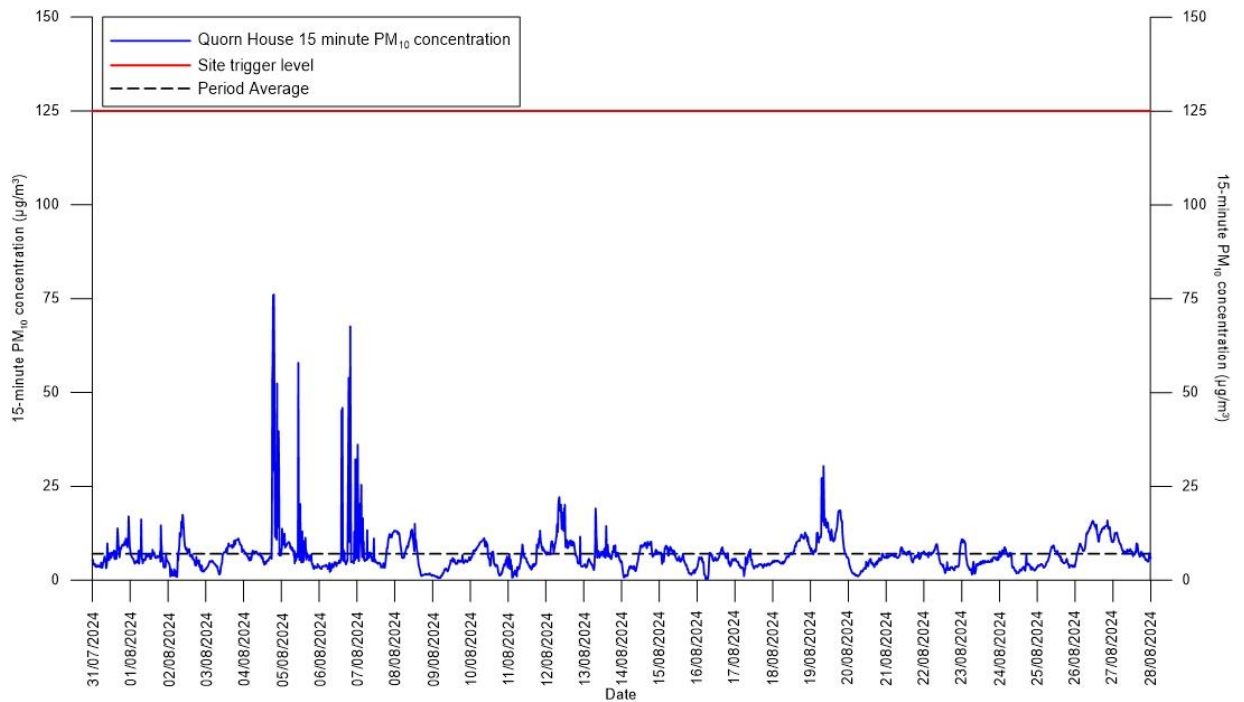


Figure 3.3: 15-minute mean PM₁₀ concentration, Quorn House, 31 July – 28 August 2024

At Quorn house there were no exceedances of the PM₁₀ site trigger, and the overall average for this period was 7.03 µg/m³. The general similarity between PM₁₀ concentrations recorded at Quorn House, the CBC monitor and the AURN monitor suggests that the site was not a significant source of PM₁₀ at this location during this period.

3.2.2 PM_{2.5}

The results of PM_{2.5} monitoring at Quorn House are presented in Figure 3.4. The dashed black line denotes the average concentration recorded over this period.

Additional PM_{2.5} monitoring data (collected by CBC and the Defra AURN monitoring network) are provided in Appendix B.

The overall average concentration for this period was 5.5 µg/m³ at Quorn House. As with the PM₁₀ concentrations, it is most likely that a regional rather than local PM_{2.5} signal was recorded during this period. This is supported by the CBC and AURN data presented in Appendix B. For this period, 78 % of PM₁₀ recorded at Quorn House was formed of PM_{2.5}. This strongly indicates that a regional rather than a local particulate matter signal was recorded during this period.

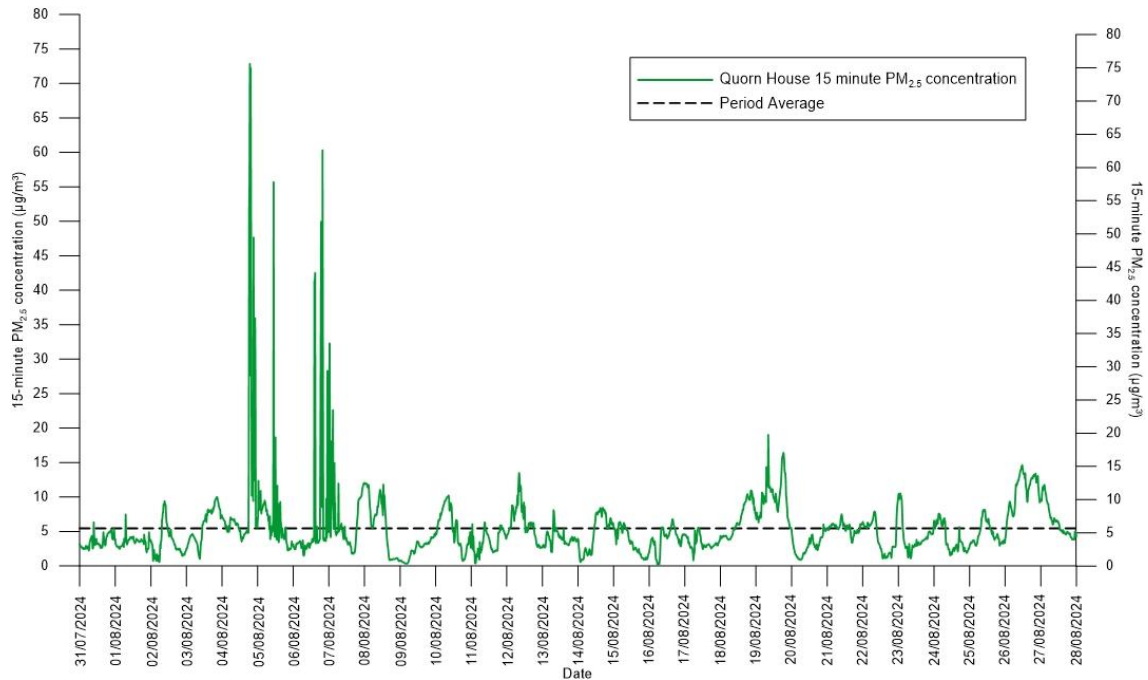


Figure 3.4: 15-minute mean PM_{2.5} concentration, Quorn House, 31 July – 28 August 2024

3.3 Visible dust

3.3.1 Deposited dust monitoring summary

The deposited dust data for 31 July – 28 August 2024 are summarised in Table 3.1. As outlined earlier, point-specific thresholds have been calculated for investigation to identify the potential dust source/s, taking account of the directional data. Table 3.1 shows that, for the available data, deposited dust levels during 31 July - 28 August 2024 were all within the site-specific threshold for all stations, excluding Stn 9 which recorded a 'High' level of deposited dust.

The directional dust results for Stn 9 (indicating a source from the southwest and west) would suggest the potential for both on-site and off-site dust sources during this period. The site reported that during this monitoring interval there had been an issue with dust from the Processing and Phase 1 (Quarry) operations. This resulted in a thorough review of dust control measures on site and was addressed during the subsequent Environmental Technical Meeting.

Table 3.1: Summary of deposited dust (undissolved solids), 31 July – 28 August 2024

Undissolved solids (mg/m ² /day)				
This month report start date:		31-Jul-24		
This month report end date:		28-Aug-24		
Receptor location	Nearest / appropriate dust monitoring point	Reported value	Trigger: ≥ 125 ^a	Magnitude ^b
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1	22	No	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1A	17	No	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	13	No	Very Low
Mill Farm; Quorn House	Stn 3	19	No	Very Low
Woodside Farm, Leicester Road	Stn 4A	55	No	Low
Quorn Grange, Unitt Road, Northage Close, Quorn Park	Stn 4B	18	No	Very Low
Bond Lane; Crown Lane	Stn 5	27	No	Very Low
Sileby Road; Huston Close; Sileby Road (commercial)	Stn 6A	65	No	Low
Hawcliffe Road	Stn 9	181	Yes	High
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	44	No	Very Low
Loughborough Road; River Soar (marina / caravan park)	Stn 11	53	No	Low
Meadow Farm Marina and Caravan Park	Stn 12	51	No	Low
Quorn House Park	Stn 13	17	No	Very Low

^a Trigger mass deposition and Effective Area Coverage rates as in Section 7.3, ZLFMS-AG008 Dust Management and Monitoring Plan (Updated), 2015

^b Magnitude of mass deposition rate assessed against typical rate for semi-rural areas (30 - 80 mg/m²/day)

Regarding dust deposition over time, the rates across the sampling area have varied considerably. Trends in dust deposition rates (as undissolved solids) for the previous 12 months, together with the site-wide dust threshold are illustrated in Figure 3.5.

In general, as would be expected, dust deposition rates are typically lower in winter months than in summer months. This trend is clearly seen for most monitoring points in Figure 3.5, with some exceptions. Dust deposition rates have been consistently below the 'trigger limit' at all sampling locations except at Stn 9.

In general, as shown in Figure 3.5, higher rates of dust deposition have been recorded near industrial settings (*i.e.* Stn 9) than in more residential areas (*e.g.* Stn 1, Kinchley Lane).

Figure 3.5 show that dust deposition rates were largely well within the site-specific trigger level during the previous 12 months although rates have occasionally been exceeded at Stn 9.

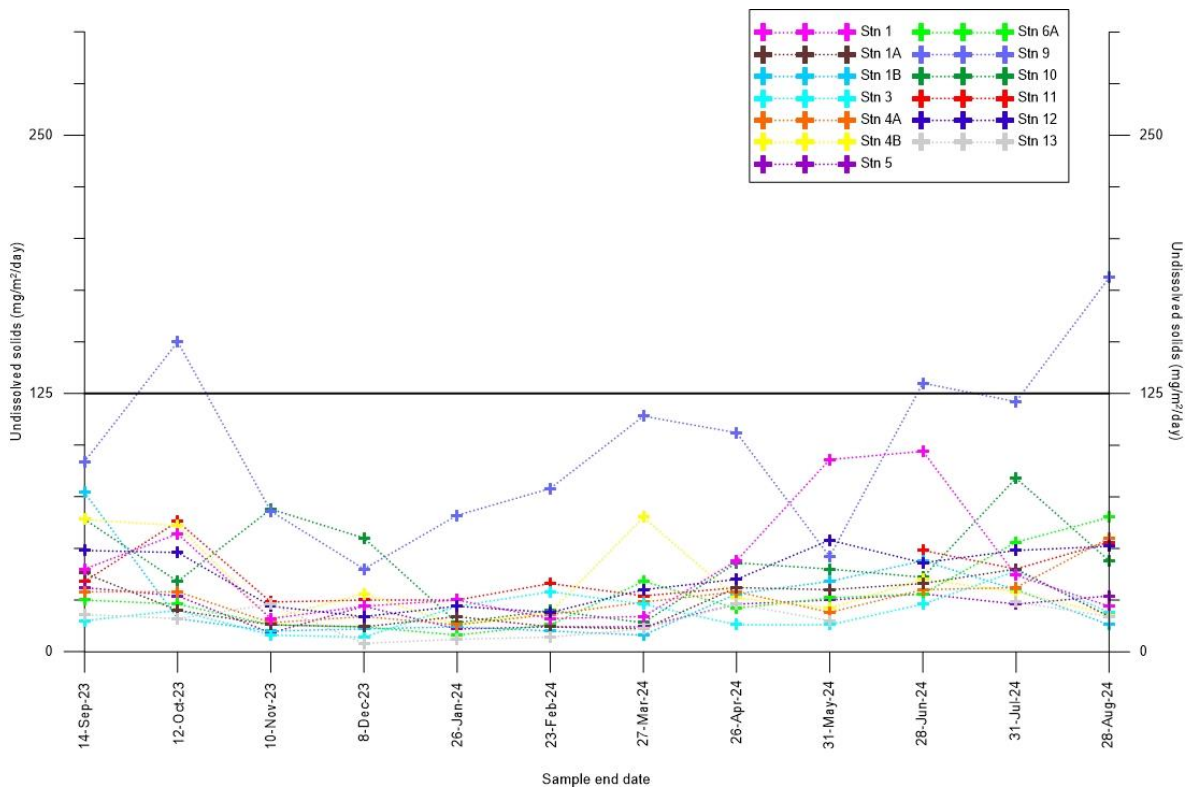


Figure 3.5: Dust deposition rates per sampling location over time (past 12 months)

3.3.2 Directional dust monitoring summary

The directional dust data for 31 July – 28 August 2024 are summarised in Table 3.2, and are presented graphically in Figure 3.6. As with deposited dust, the DMMP sets out a site-wide directional dust threshold. For directional dust soiling, 0.5 % effective area coverage (EAC) per day is a trigger limit for investigation to identify the likely dust source/s, again taking account of the direction.

Table 3.2 and Figure 3.6 show that during 31 July – 28 August 2024, all station recorded either Very Low or Low dust levels from all directions, with the exception of Moderate dust levels recorded from the west and southwest at Stn 9.

Table 3.2: Summary of directional dust soiling, 31 July – 28 August 2024

		Directional dust soiling (%EAC/day) by direction (°)									
This month report start date:		31-Jul-24									
This month report end date:		28-Aug-24									
Receptor location	Nearest / appropriate dust monitoring point	Direction (°)									
		0	45	90	135	180	225	270	315		
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1	Reported value	0.1	0	0.1	0.1	0.1	0.2	0.2	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Low	Very Low	
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1A	Reported value	0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Very Low	
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	Reported value	0	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Low	Very Low	Very Low	Very Low	
Mill Farm; Quorn House	Stn 3	Reported value	0	0.1	0.1	0.1	0.1	0.1	0	0	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	
Woodside Farm, Leicester Road	Stn 4A	Reported value	0	0.1	0.1	0.1	0	0.1	0.2	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Very Low	
Quorn Grange, Unitt Road, Northage Close, Quorn Park	Stn 4B	Reported value	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Low	Very Low	Very Low	Very Low	
Bond Lane; Crown Lane	Stn 5	Reported value	0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Very Low	
Sibley Road; Huston Close; Sibley Road (commercial)	Stn 6A	Reported value	0	0.1	0.2	0.1	0.1	0.3	0.3	0.3	0.2
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Low	Very Low	Very Low	Low	Low	Low	
Hawcliffe Road	Stn 9	Reported value	0.1	0.2	0.2	0.1	0.1	0.5	0.5	0.2	0.2
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	Yes	Yes	No	
		Magnitude ^b	Very Low	Low	Low	Very Low	Very Low	Moderate	Moderate	Low	
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	Reported value	0.1	0.1	0	0.1	0.1	0.3	0.1	0.1	0.2
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Very Low	Low	
Loughborough Road; River Soar (marina / caravan park)	Stn 11	Reported value	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Low	Low	Low	Very Low	
Meadow Farm Marina and Caravan Park	Stn 12	Reported value	0.1	0.2	0.1	0.1	0.3	0.2	0.2	0.2	0.2
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Low	Very Low	Very Low	Low	Low	Low	Low	
Quorn House Park	Stn 13	Reported value	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		Trigger: ≥ 0.5 ^a	No	No	No	No	No	No	No	No	No
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	

^a Trigger mass deposition and Effective Area Coverage rates as in Section 7.3, ZLFMS-AG008 Dust Management and Monitoring Plan (Updated), 2015

^b Magnitude of directional dust soiling derived from Beaman and Kingsbury, 1981

^c Direction/s not determined for daily EAC below 0.1%/day (very low soiling)

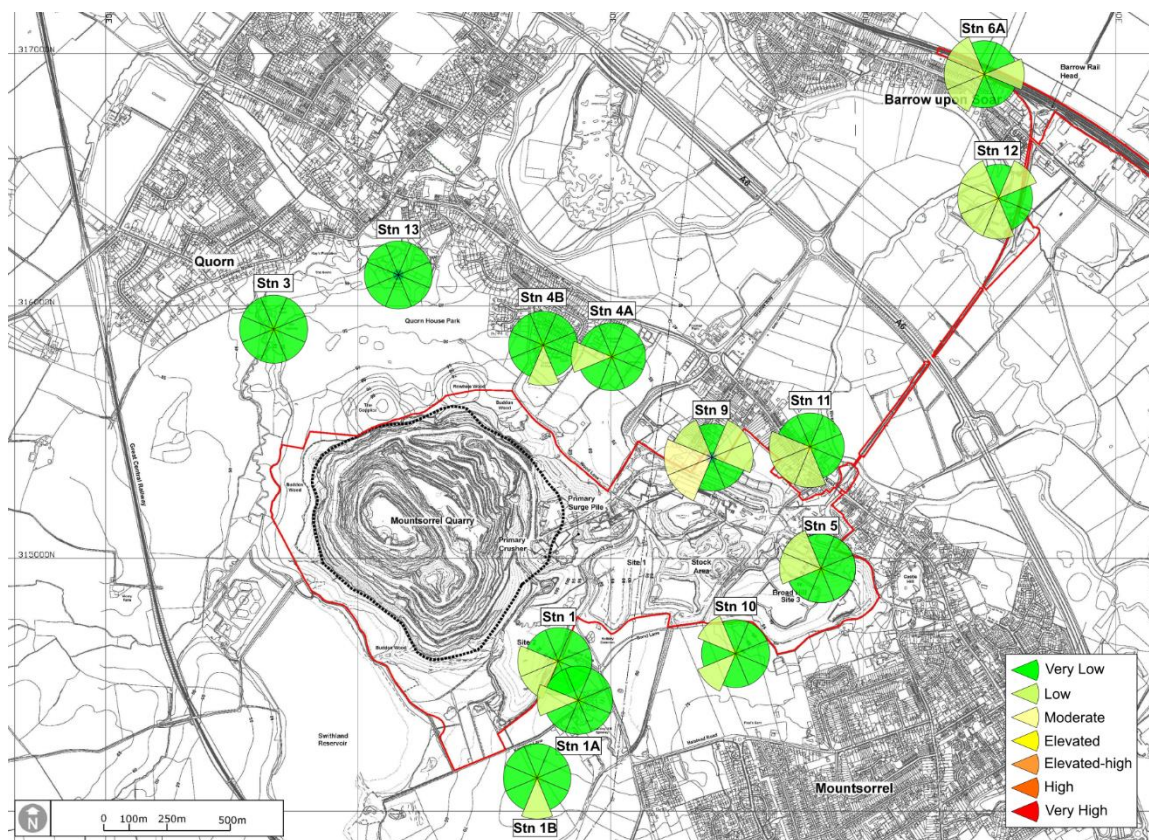


Figure 3.6: Directional dust soiling rose diagrams, 31 July – 28 August 2024

Table 3.3 shows that average directional soiling rates have been at very low levels at most monitoring locations, for most directions, over the past year. At Stn 9, the annual average soiling rate to date was 0.2 % - 0.3% EAC/day from the southwest and west resulting in 'Low' magnitudes being recorded. The cause or causes of these consistently, but marginally elevated dust soiling rates at this monitoring point are under review, as they may be related to site activities such as operations at the PSV yard, Granite Way and/or the toast rack.

Table 3.3: Running average directional dust soiling (past 12 months)

Receptor location	Nearest / appropriate dust monitoring point		Direction (°)							
			0	45	90	135	180	225	270	315
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1	Average value	0.1	0	0	0	0	0.1	0.1	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1A	Average value	0	0	0	0	0	0	0.1	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	Average value	0	0	0	0	0.1	0.1	0	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Mill Farm; Quorn House	Stn 3	Average value	0	0	0	0	0	0	0	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Woodside Farm, Leicester Road	Stn 4A	Average value	0	0	0	0	0	0.1	0.1	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Quorn Grange, Unitt Road, Northage Close, Quorn Park	Stn 4B	Average value	0	0	0.1	0	0.1	0	0	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Bond Lane; Crown Lane	Stn 5	Average value	0	0	0	0	0.1	0.1	0.1	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Sibley Road; Huston Close; Sibley Road (commercial)	Stn 6A	Average value	0	0.1	0.1	0	0	0.1	0.1	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Hawcliffe Road	Stn 9	Average value	0.1	0.1	0.1	0.1	0	0.3	0.2	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Low	Very Low
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	Average value	0.1	0	0	0	0.1	0.1	0	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Loughborough Road; River Soar (marina / caravan park)	Stn 11	Average value	0.1	0	0	0	0.1	0.1	0.1	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Meadow Farm Marina and Caravan Park	Stn 12	Average value	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Quorn House Park	Stn 13	Average value	0	0	0	0	0	0	0	0
		Magnitude ^b	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low

^a Trigger mass deposition and Effective Area Coverage rates as in Section 7.3, ZLFMS-AG008 Dust Management and Monitoring Plan (Updated), 2015

^b Magnitude of directional dust soiling derived from Beaman and Kingsbury, 1981

^c Direction/s not determined for daily EAC below 0.1%/day (very low soiling)

4 Complaints

During 31 July – 28 August 2024 four dust complaints were received by the quarry. These are being investigated in accordance with the procedure outlined in the DMMP.

Appendix A: Off-site PM₁₀ monitoring (CBC and AURN)

The daily average PM₁₀ concentrations recorded by the CBC Zephyr are presented below in Figure A.1, alongside similar data from the Defra Automatic Urban and Rural Network (AURN) station in Leicester University².

For the 12 months leading up to 28 August 2024, there were 362 daily PM₁₀ readings taken by the CBC Zephyr, and 363 daily readings taken by the Leicester AURN, representing a ~99% data collection rate at each respective location.

From the available data the annual average daily PM₁₀ concentration for the 12 months to date at CBC Zephyr was 9.99 µg/m³, which is approximately 25 % of the annual average PM₁₀ concentration objective (40 µg/m³). At the Leicester AURN the annual average daily PM₁₀ concentration for the 12 months to date was 10.6 µg/m³ which is approximately 26.5 % of the annual average PM₁₀ concentration objective.

For the 12 months up to 28 August 2024 there were no recorded instances where the daily average PM₁₀ concentrations exceeded 50 µg/m³ at either location. In summary, for the 12 months up to 28 August 2024 neither the annual nor daily AQO were exceeded.

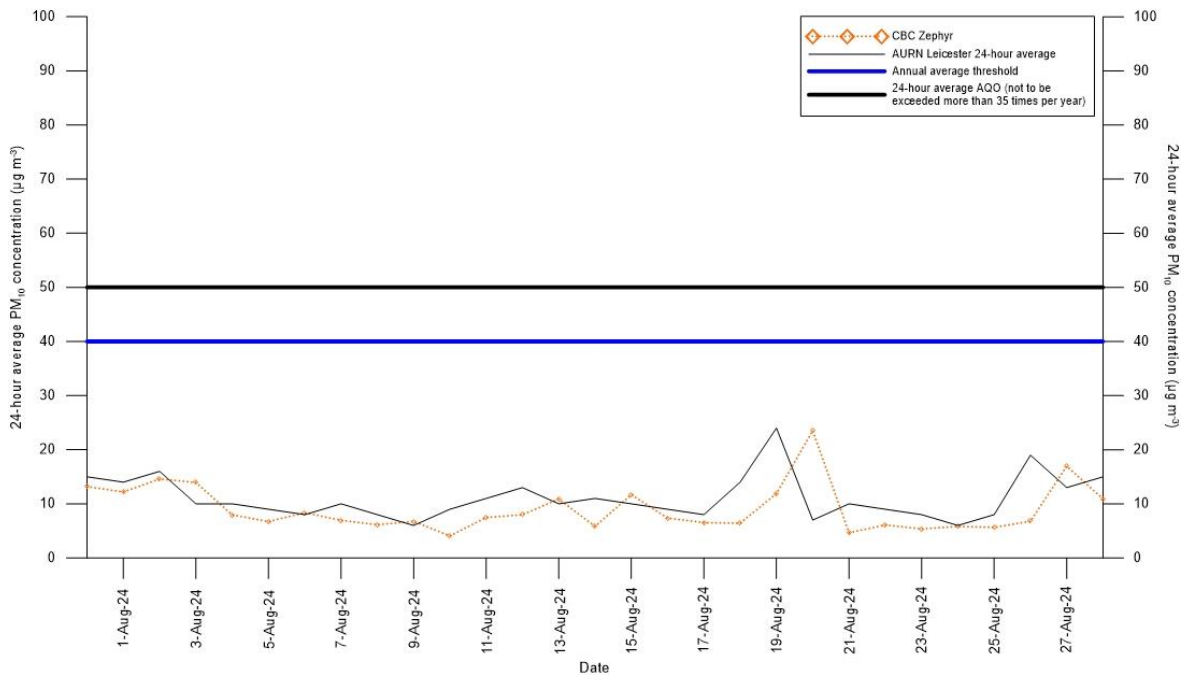


Figure A.1: Daily average PM₁₀ concentration, CBC Zephyr and Leicester AURN, 31 July – 28 August 2024

² <http://uk-air.defra.gov.uk/networks/network-info?view=aur>

Appendix B: Off-site PM_{2.5} monitoring (CBC and AURN)

The daily average PM_{2.5} concentrations recorded by the CBC Zephyr are presented below in Figure B.1, alongside similar data from the Defra Automatic Urban and Rural Network (AURN) station in Leicester University.

For the 12 months leading up to 28 August 2024, there were 362 daily PM_{2.5} readings taken by the CBC Zephyr, and 363 readings taken by the Leicester AURN, representing a ~99 % data collection rate respectively. From the available data the annual average daily PM_{2.5} concentration for the 12 months at the CBC Zephyr was 6.2 µg/m³, which is approximately 52 % of the interim annual average PM_{2.5} concentration objective (12 µg/m³) applicable from 31 January 2023. At the Leicester AURN the annual average daily concentration was 6.51 µg/m³, which is approximately 54 % of the interim annual average PM_{2.5} concentration objective.

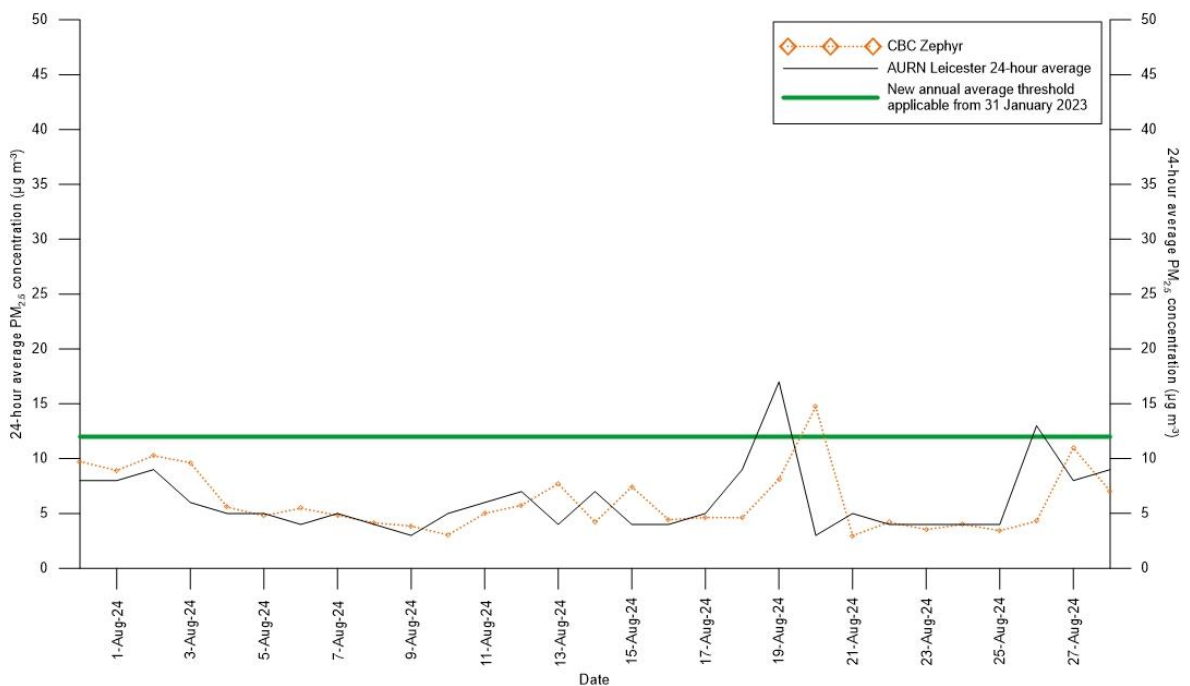


Figure B.1: Daily average PM_{2.5} concentrations, CBC Zephyr and Leicester AURN, 31 July – 28 August 2024