Dust and Air Quality Innovation and Expertise

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

Date range: **Quarter 4 2024 (28 August – 20 November 2024)**

Date Report Issued: **20 February 2025**

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 28 August – 20 November 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 PM_{10} and $PM_{2.5}$ data from both on-site monitors, an increased emphasis is being placed on the frequency of short-term PM_{10} 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

September was generally mixed, with mild temperatures recorded and typical levels of rainfall, which increased towards the end of the month. Mild temperatures continued into October, with a decrease in temperature in the middle of the month, along with higher amounts of rainfall compared to the previous month. November was very dry, with generally mild temperatures before a decrease in late November.

During September, winds were predominantly blowing from the northeast, meaning that there may have been the potential for dust to propagate in a southwesterly direction. However, during October winds were predominantly coming from the south and November experienced winds from the south, west and east.

Deposited dust

During this period, deposited dust levels were below the site-specific threshold level at all locations. This is likely due to the generally wet weather experienced through the autumn months, as well as improvements to onsite dust management.

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 4 2024

Particulate Matter

The technical error affecting the Hawcliffe Road Osiris was resolved on 01 October 2024; data is available from this date onwards for this location.

On-site $PM_{2.5}$

$PM_{2.5}$ concentrations at Quorn house had a period average of 6.6 µg/m^3, with the $PM_{2.5}$ concentrations at Hawcliffe Road being higher with a period average of 8.1 µg/m^3 (Figure 2).

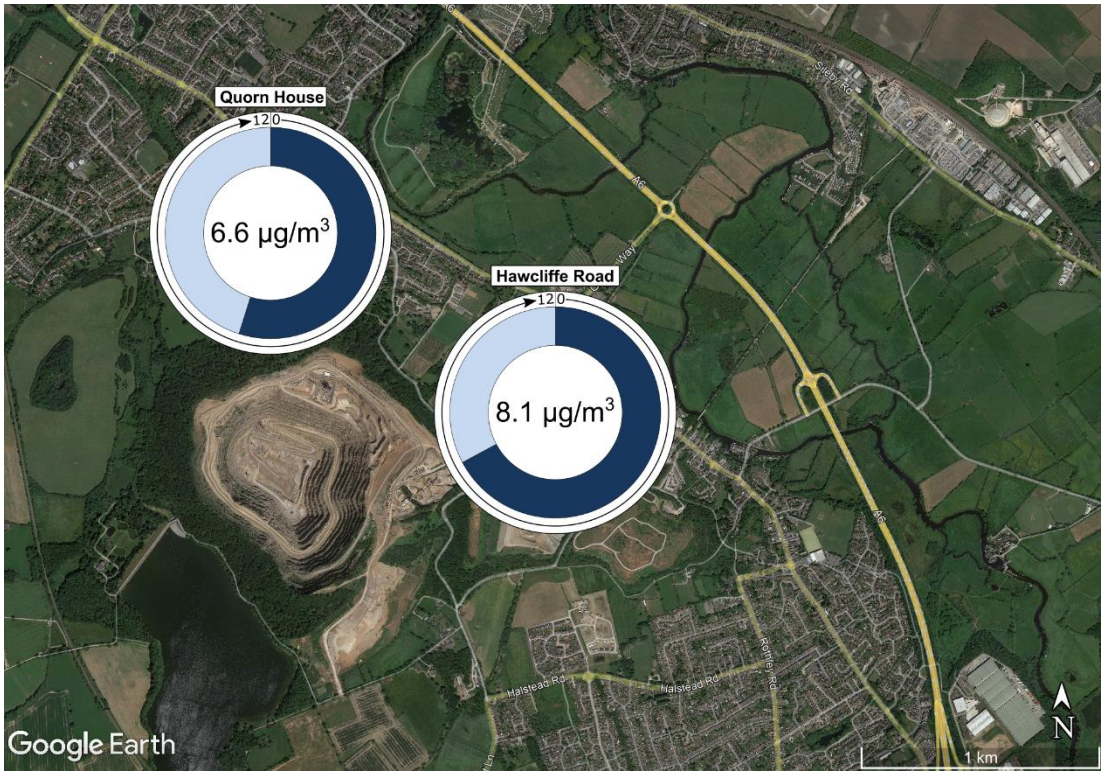

Figure 2: $PM_{2.5}$ monitoring summary, Quarter 4 2024

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 9.4 µg/m^3 or 78% of the AQO (12 µg/m^3 as an annual average). The period average concentration at the Leister University AURN monitoring station was lower, at 8.9 µg/m^3 or 74% of 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.

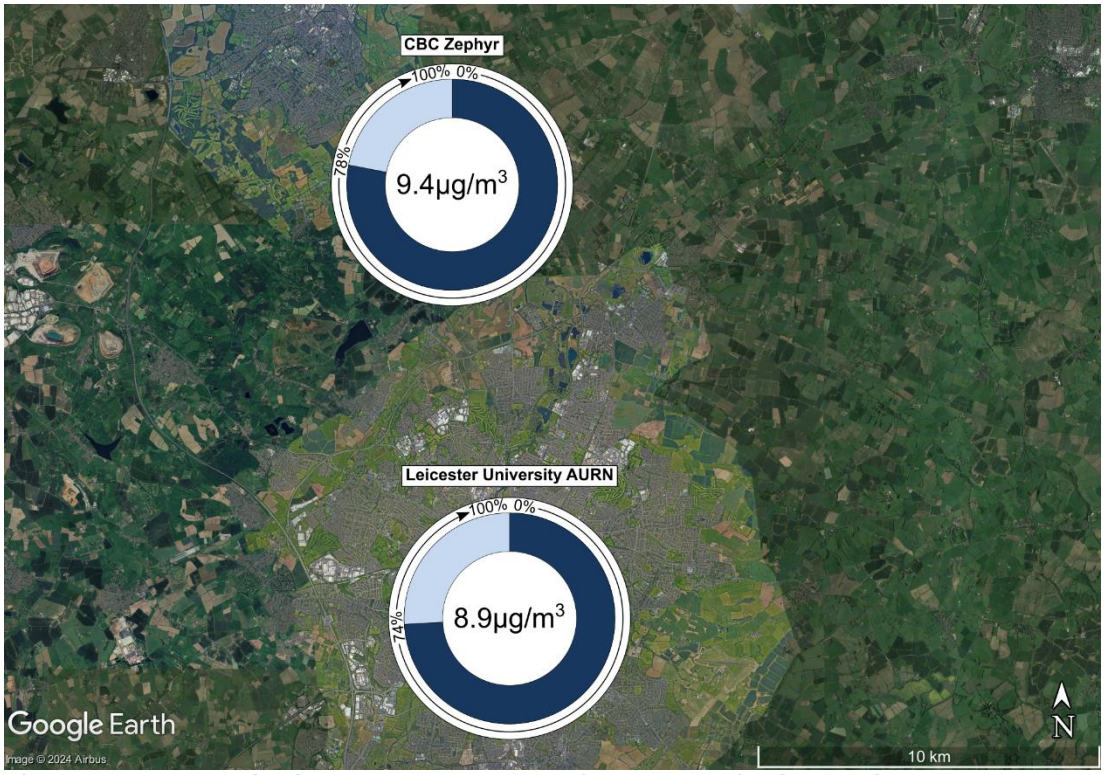

Figure 3: $PM_{2.5}$ monitoring summary, CBC and AURN monitoring stations, Quarter 4 2024

On-site PM_{10}

PM_{10} concentrations recorded at Quorn House had a period average of 9.3 µg/m^3 for this period, with the period average being 13.4 µg/m^3 at Hawcliffe Road.

The short-term PM_{10} trigger level (125 µg/m^3 over a 15-minute period) was not exceeded at either location, therefore no alerts were sent out during this quarter.

Figure 4: PM_{10} monitoring summary, Quarter 4 2024

Off-site PM_{10}

As shown in Figure 5, PM_{10} concentrations recorded at the CBC monitoring station at the southern end of Hawcliffe Road was 14.7 µg/m^3 or 37% of the AQO (40 µg/m^3). Concentrations at the Leicester University AURN monitoring station was similar, at 13.5 µg/m^3 or 34% of the AQO.

No days with an average PM_{10} concentration above 50 µg/m^3 were recorded during this quarter.

As with $PM_{2.5}$, the data show that Mountsorrel Quarry was not a significant source of PM_{10} during this period.

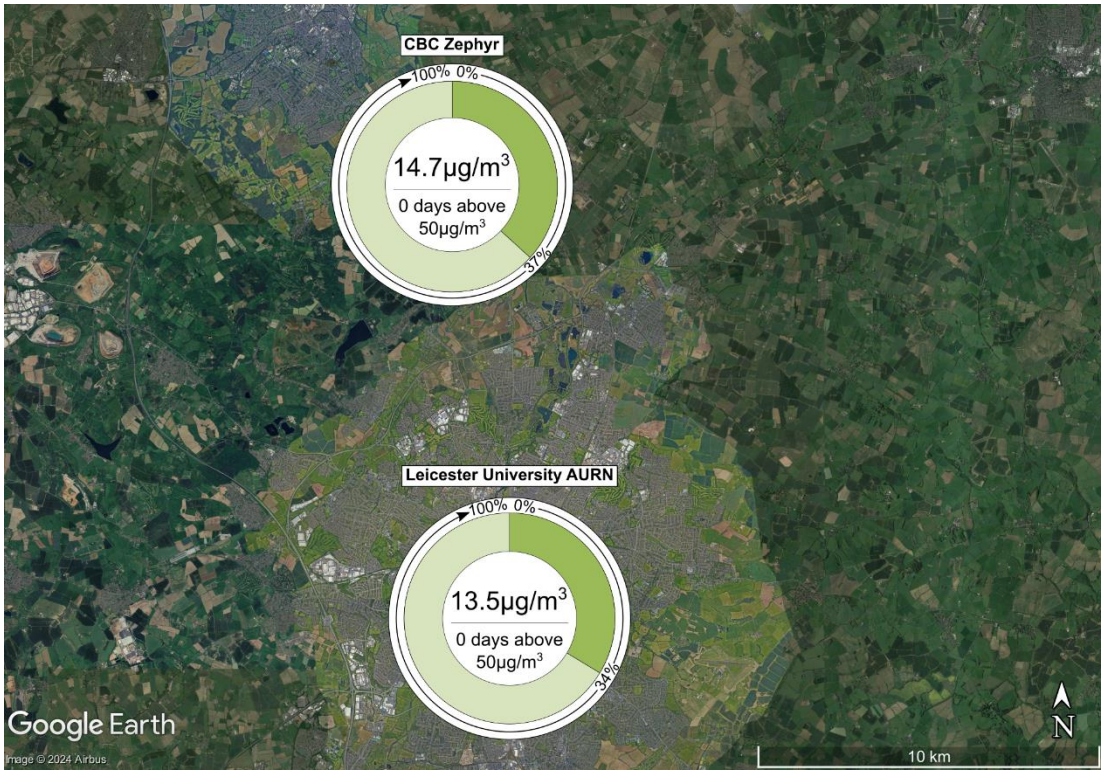

Figure 5: PM_{10} monitoring summary, CBC and AURN monitoring stations, Quarter 4 2024

Complaints

During the fourth quarter of 2024 the quarry received two complaints relating to dust or air quality.

DustScanAQ
February 2025

Dust, Particulate Matter and Weather Monitoring Report: September 2024

Mountsorrel Quarry

February, 2025

Tarmac

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Document Control Sheet

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Disclaimer

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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.

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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 August – 24 September 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 PM_{10} and is measured to agreed standards and forms part of the national Air Quality Objectives (AQO). The AQO for PM_{10} is currently 50 µg/m^3 for the 24-hour mean, not to be exceeded 35 times per year and 40 µg/m^3 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/m^3 for the annual mean (to be achieved by 2028), whilst the legal AQO for $PM_{2.5}$ is 10 µg/m^3 for the annual mean (to be achieved by 2040) as per The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023[1].

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 PM_{10}, $PM_{2.5}$ and PM_1 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.

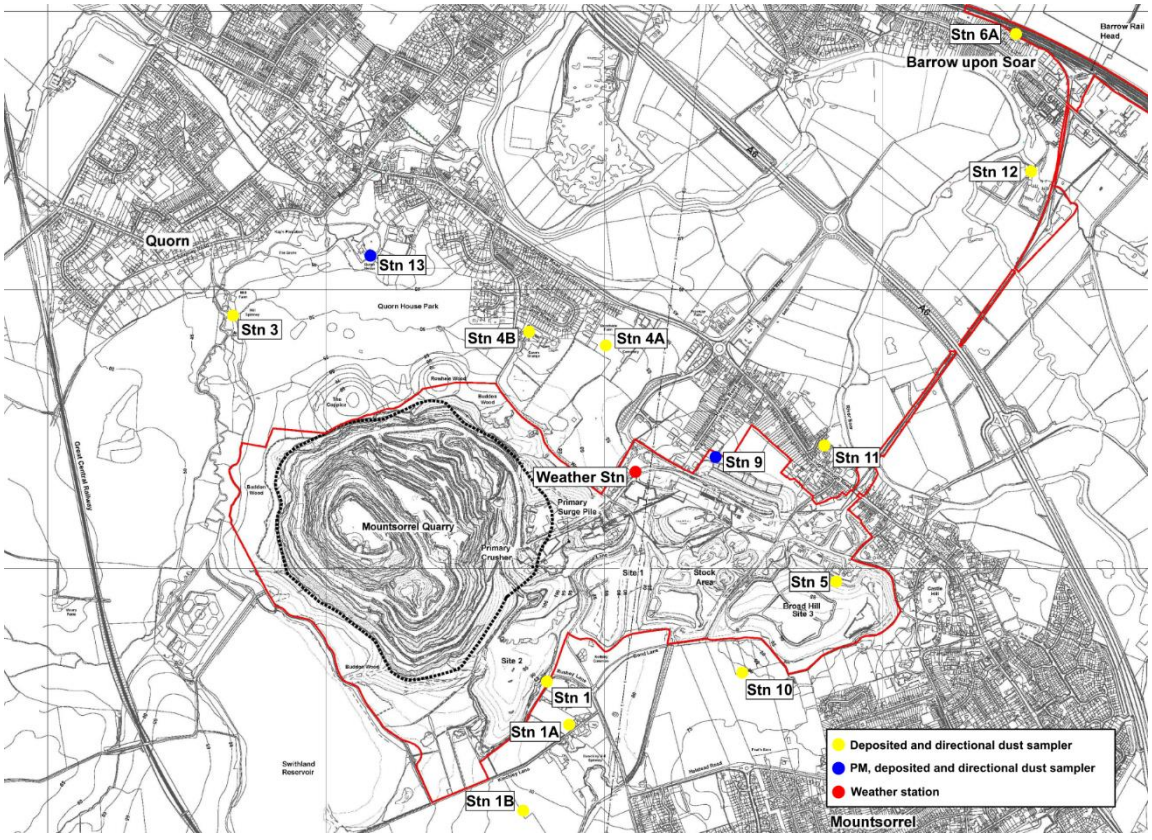

Figure 2.1: Particulate matter, dust and weather monitoring locations, Mountsorrel Quarry

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 PM_{10} and $PM_{2.5}$, allowing CBC to compare concentrations against the relevant AQOs for these pollutants.

For additional context, the latest PM_{10} 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 (PM_{10}) an alert threshold of 125 µg/m^3 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.

PM_{10} 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 PM_{10} and $PM_{2.5}$.

For deposited dust, the DMMP sets out a site-wide deposited dust threshold of 125 mg/m^2/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 to warm temperatures at the end of August, before a slight decrease in temperatures in mid-September. The maximum daily temperature was 19.5 °C recorded on 06 September and the minimum daily temperature was 9.4 °C recorded on 13 September. Overall, the monitoring period was reasonably mixed, with precipitation recorded on 50% of total days. There were two 5-day dry period at the end of August and middle of September; this combination of warm temperatures and lack of precipitation may have increased the risk of dust propagation beyond the site boundary during this period.

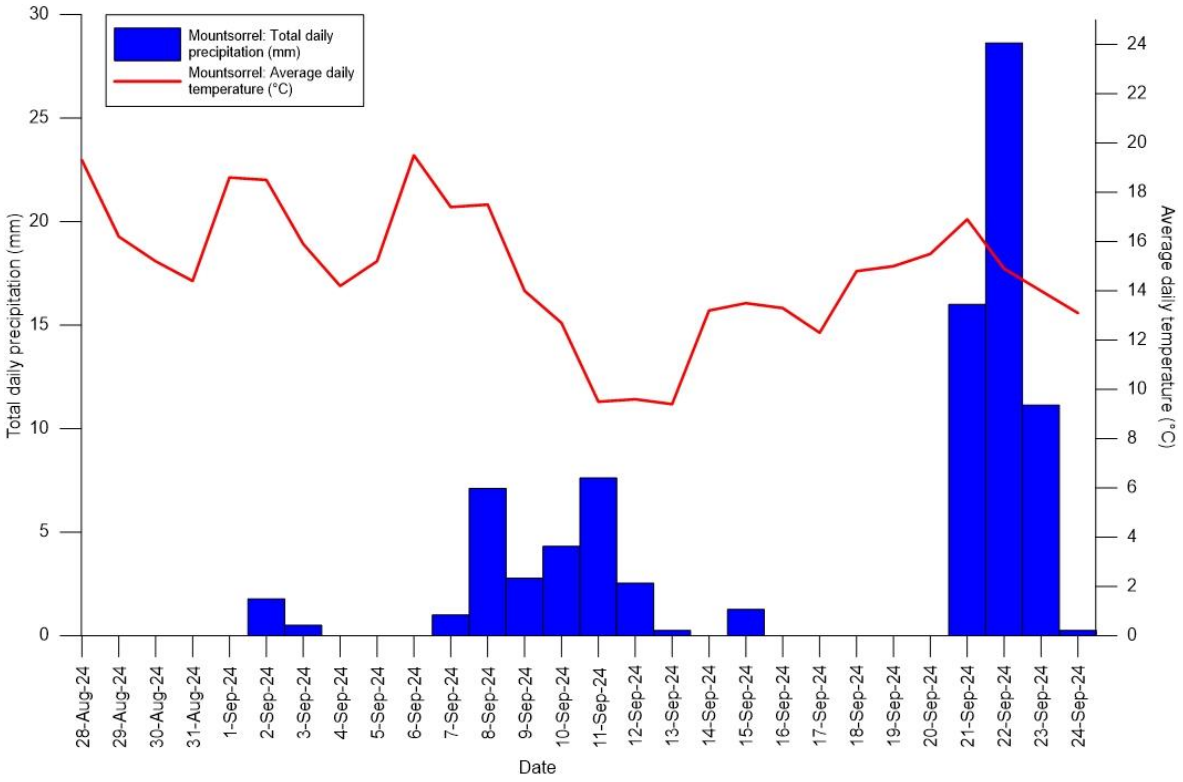

Figure 3.1: Total daily precipitation and average daily temperature, Mountsorrel Quarry, 28 August – 24 September 2024

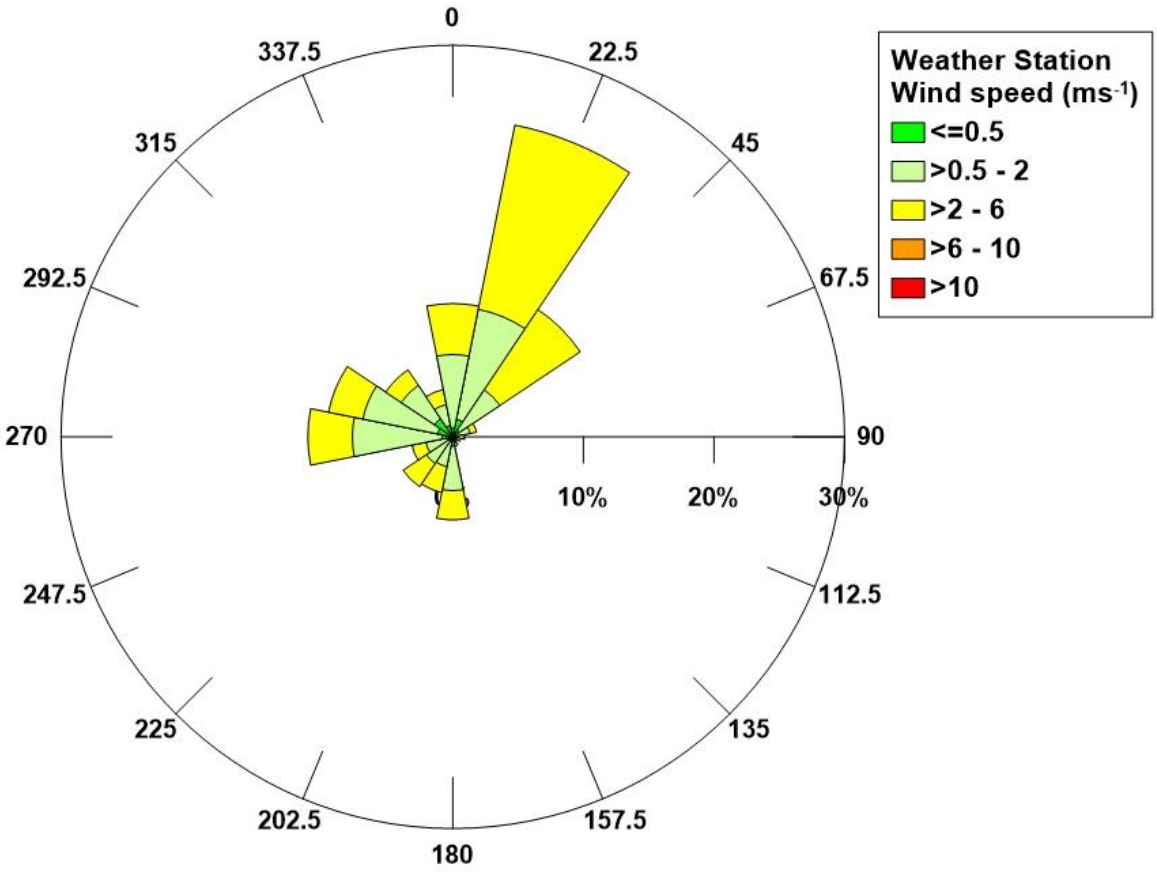

Figure 3.2: Wind rose, Mountsorrel Quarry, Mountsorrel, 28 August – 24 September 2024

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 north-northeast. Winds were also recorded from the west and south. Consequently, there may have been slight potential for dust propagation generally towards the south-southwest, east and north 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. This issue was resolved in early October, so data will be available for the next reporting period.

3.2.1 PM_{10}

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 PM_{10} monitoring data (collected by CBC and the Defra AURN monitoring network) are provided in Appendix A.

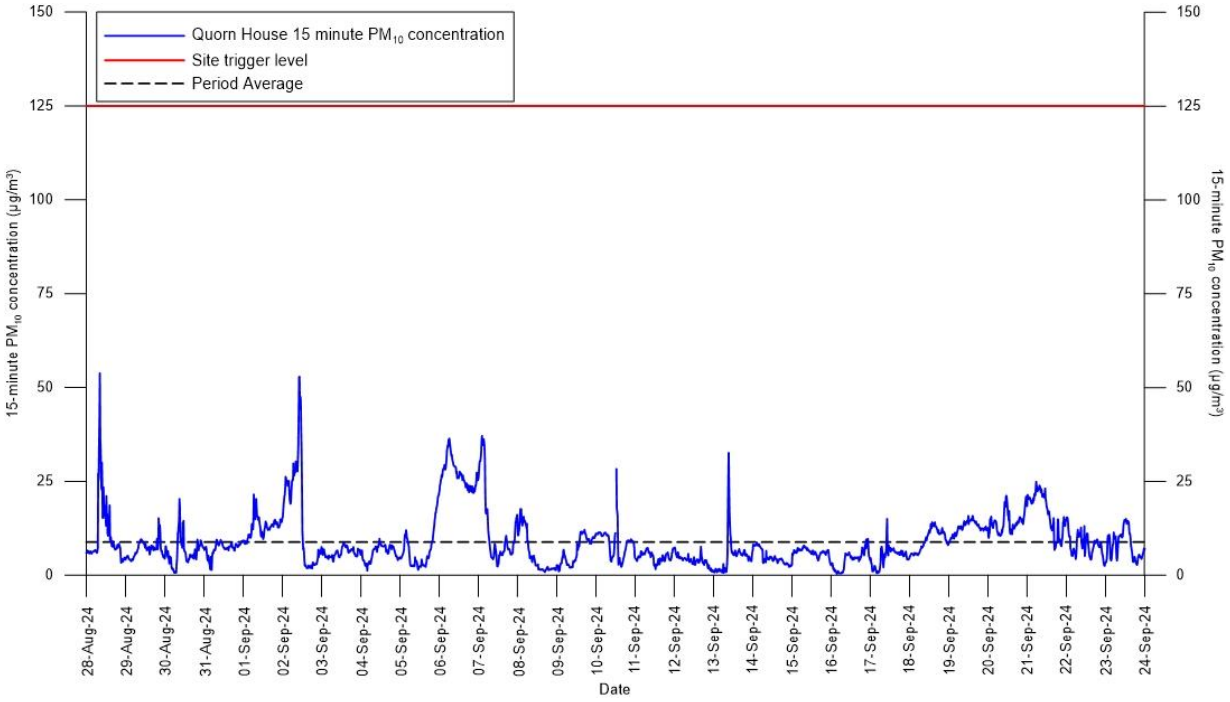

Figure 3.3: 15-minute mean PM_{10} concentration, Quorn House, 28 August – 24 September 2024

At Quorn house there were no exceedances of the PM_{10} site trigger, and the overall average for this period was 8.82 µg/m^3. The general similarity between the PM_{10} concentrations recorded at Quorn house, the CBC monitor and the AURN monitor suggests that the site was not a significant source of PM_{10} 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 6.5 µg/m^3 at Quorn house. As with PM_{10} 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, 73% of PM_{10} 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.

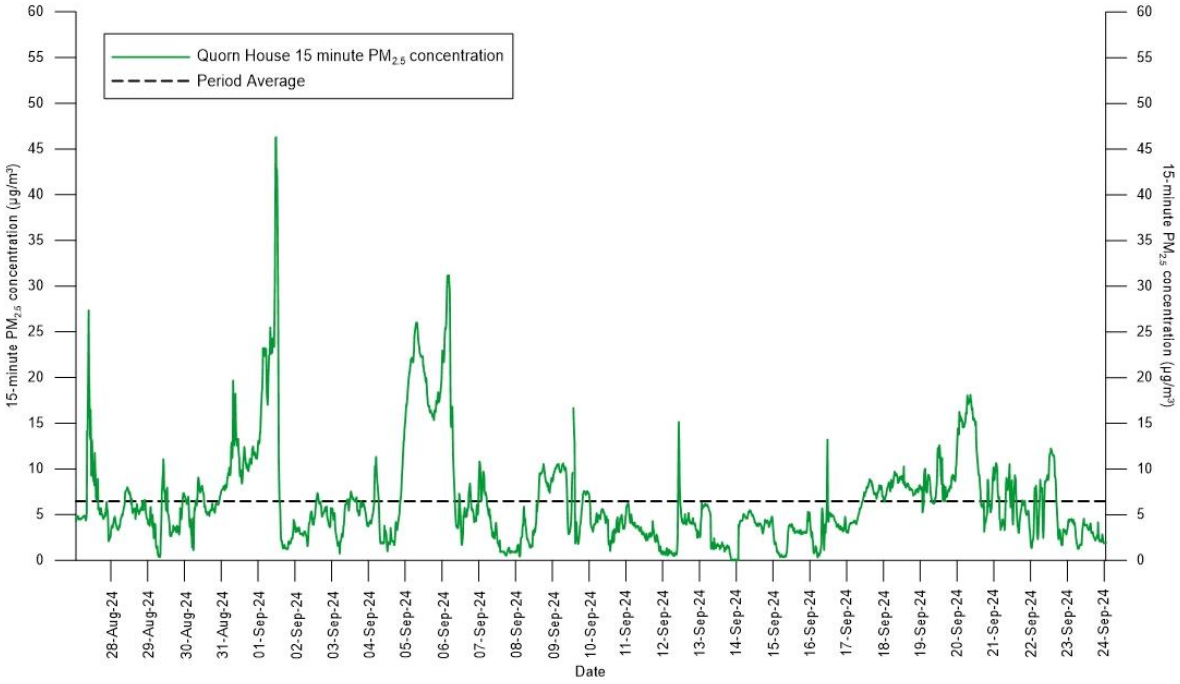

Figure 3.4: 15-minute mean $PM_{2.5}$ concentration, Quorn House, 28 August – 24 September 2024

3.3 Visible dust

3.3.1 Deposited dust monitoring summary

The deposited dust data for 28 August – 24 September 2024 are summarised in Table 3.1. As outlined earlier, there is a site-wide threshold 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 August – 24 September 2024 were all within the site-specific threshold for all stations.

Table 3.1: Summary of deposited dust (undissolved solids), 28 August – 24 September 2024

Undissolved solids (mg/m^2/day)				
This month report start date:		**28-Aug-24**		
This month report end date:		**24-Sep-24**		
Receptor location	**Nearest / appropriate dust monitoring point**	**Reported value**	**Trigger: ≥ 125[a]**	**Magnitude[b]**
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1	61	No	**Low**
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1A	51	No	**Low**
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	42	No	**Very Low**
Mill Farm; Quorn House	Stn 3	15	No	**Very Low**
Woodside Farm, Leicester Road	Stn 4A	21	No	**Very Low**
Quorn Grange, Unitt Road, Northage Close, Quorn Park	Stn 4B	23	No	**Very Low**
Bond Lane; Crown Lane	Stn 5	30	No	**Very Low**
Sileby Road; Huston Close; Sileby Road (commercial)	Stn 6A	22	No	**Very Low**
Hawcliffe Road	Stn 9	61	No	**Low**
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	65	No	**Low**
Loughborough Road; River Soar (marina / caravan park)	Stn 11	32	No	**Very Low**
Meadow Farm Marina and Caravan Park	Stn 12	35	No	**Very Low**
Quorn House Park	Stn 13	14	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/m^2/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. Dust levels at Stn 9 were considerably lower in September compared to the preceding three months.

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).

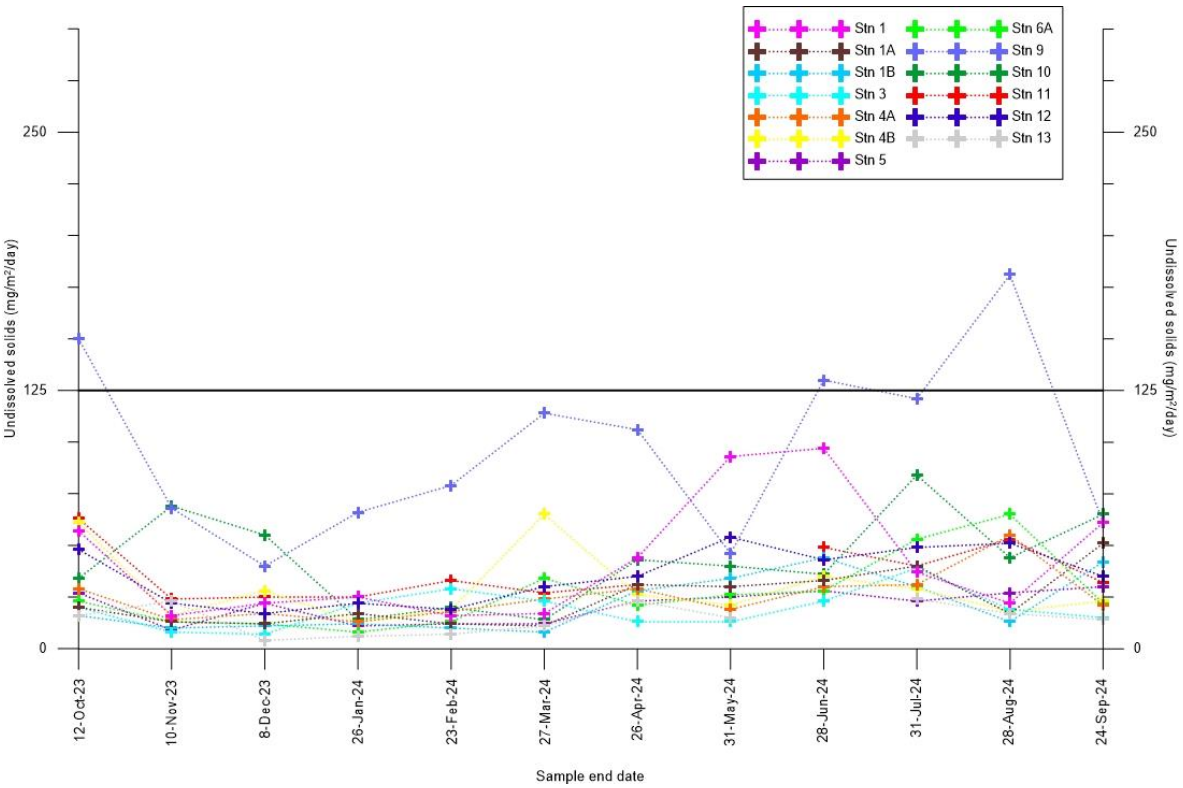

Figure 3.5: Dust deposition rates per sampling location over time (past 12 months)

3.3.2 Directional dust monitoring summary

The directional dust data for 28 August – 24 September 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 August – 24 September 2024, all station recorded either Very Low or Low dust levels from all directions.

Table 3.2: Summary of directional dust soiling, 28 August – 24 September 2024

Directional dust soiling (%EAC/day) by direction (°)									
This month report start date:		**28-Aug-24**							
This month report end date:		**24-Sep-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	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 1A	Reported value	0.1	0.2	0.1	0	0	0.1	0.1	0.1
		Trigger: ≥ 0.5[a]	No	No	No	No	No	No	No	No
		Magnitude[b]	Very Low	Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	Reported value	0.2	0.1	0	0	0	0.1	0.1	0.2
		Trigger: ≥ 0.5[a]	No	No	No	No	No	No	No	No
		Magnitude[b]	Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	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	0.1	0.2	0.1	0	0	0	0	0
		Trigger: ≥ 0.5[a]	No	No	No	No	No	No	No	No
		Magnitude[b]	Very Low	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	0.1	0.1	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	0.1	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	0.2	0.1	0	0.1	0.1	0
		Trigger: ≥ 0.5[a]	No	No	No	No	No	No	No	No
		Magnitude[b]	Very Low	Very Low	Low	Very Low	Very Low	Very Low	Very Low	Very Low
Hawcliffe Road	Stn 9	Reported value	0.1	0.1	0.1	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
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	Reported value	0.2	0.1	0	0	0	0	0	0.1
		Trigger: ≥ 0.5[a]	No	No	No	No	No	No	No	No
		Magnitude[b]	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	0.2	0.1	0	0	0	0	0.1
		Trigger: ≥ 0.5[a]	No	No	No	No	No	No	No	No
		Magnitude[b]	Very Low	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	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
Quorn House Park	Stn 13	Reported value	0	0	0	0	0	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

[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)

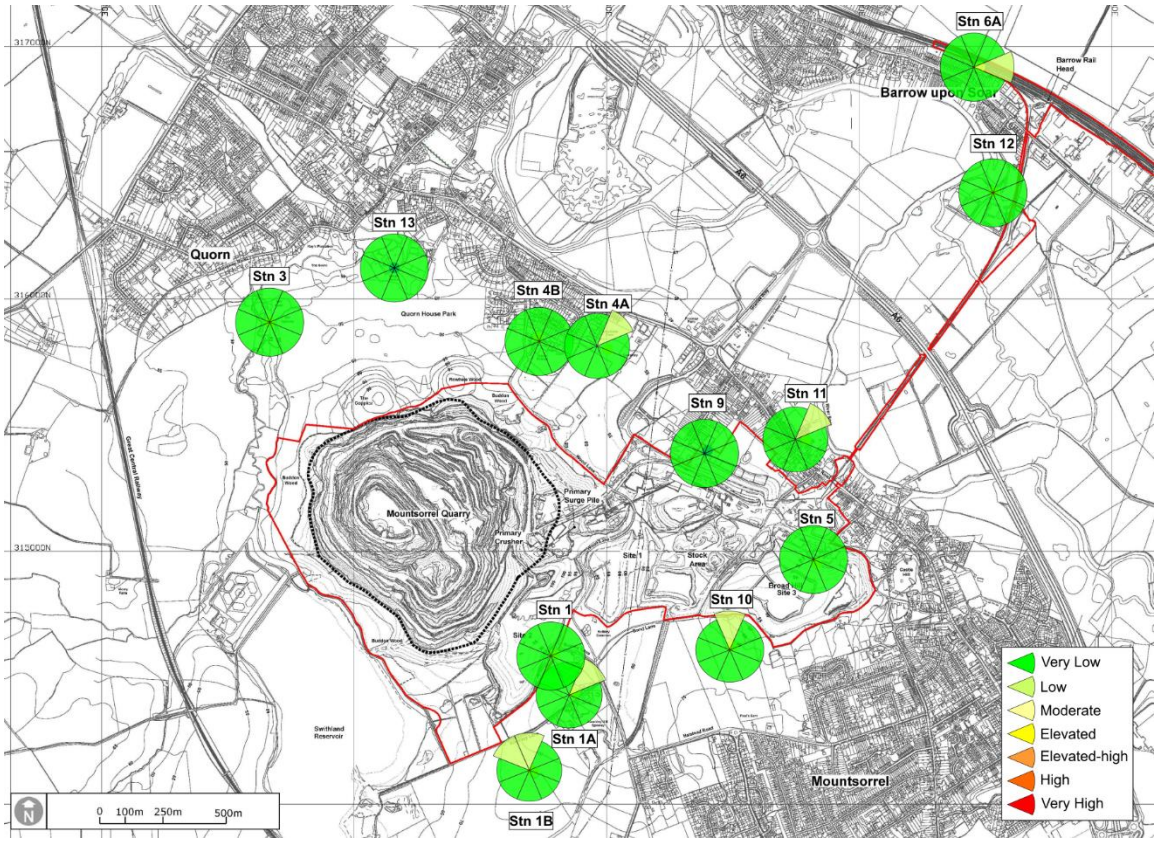

Figure 3.6: Directional dust soiling rose diagrams, 28 August – 24 September 2024

Table 3.3 shows that the 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	0.1	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	0.1	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 28 August – 24 September 2024 one dust complaint was received by the quarry. This is being investigated in accordance with the procedure outlined in the DMMP.

Appendix A: Off-site PM_{10} monitoring (CBC and AURN)

The daily average PM_{10} 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 University[2].

For the 12 months leading up to 28 August 2024, there were 362 daily PM_{10} readings taken by the CBC Zephyr, and 365 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 PM_{10} concentration for the 12 months to date at CBC Zephyr was 10.28 µg/m^3, which is approximately 26 % of the annual average PM_{10} concentration objective (40 µg/m^3). At the Leicester AURN the annual average daily PM_{10} concentration for the 12 months to date was 10.7 µg/m^3 which is approximately 26.8 % of the annual average PM_{10} concentration objective.

For the 12 months up to 24 September 2024 there were no recorded instances where the daily average PM_{10} concentrations exceeded 50 µg/m^3 at either location. In summary, for the 12 months up to 24 September 2024 neither the annual nor daily AQO were exceeded, except for one occasion on the 06 September where the annual average threshold was exceeded.

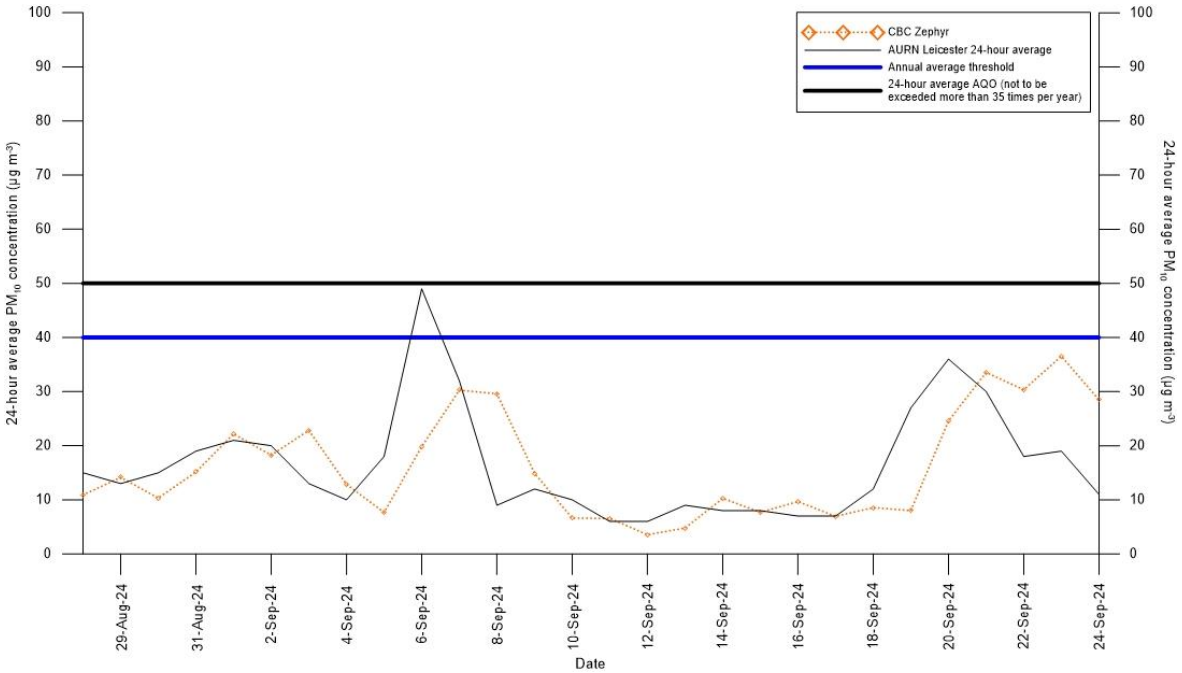

Figure A.1: Daily average PM_{10} concentration, CBC Zephyr and Leicester AURN, 28 August – 24 September 2024

[2] http://uk-air.defra.gov.uk/networks/network-info?view=aurn

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 24 September 2024, there were 362 daily $PM_{2.5}$ readings taken by the CBC Zephyr, and 365 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 6.4 µg/m^3, which is approximately 53 % of the interim annual average $PM_{2.5}$ concentration objective (12 µg/m^3) applicable from 31 January 2023. At the Leicester AURN the annual average daily concentration was 6.7 µg/m^3, which is approximately 55 % of the interim annual average $PM_{2.5}$ concentration objective.

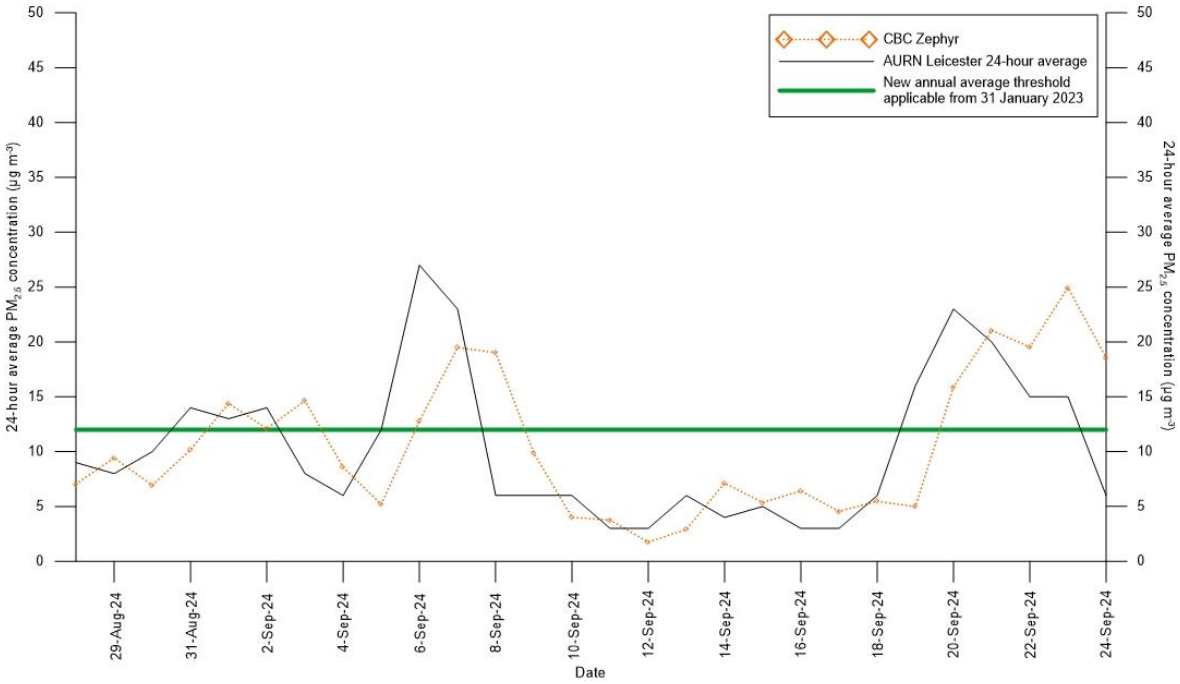

Figure B.1: Daily average $PM_{2.5}$ concentrations, CBC Zephyr and Leicester AURN, 28 August – 24 September 2024

Dust, Particulate Matter and Weather Monitoring Report: October 2024

Mountsorrel Quarry

December, 2024

Tarmac

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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.

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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 24 September – 22 October 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 PM_{10} and is measured to agreed standards and forms part of the national Air Quality Objectives (AQO). The AQO for PM_{10} is currently 50 µg/m^3 for the 24-hour mean, not to be exceeded 35 times per year and 40 µg/m^3 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/m^3 for the annual mean (to be achieved by 2028), whilst the legal AQO for $PM_{2.5}$ is 10 µg/m^3 for the annual mean (to be achieved by 2040) as per The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023[1].

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 PM_{10}, $PM_{2.5}$ and PM_1 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.

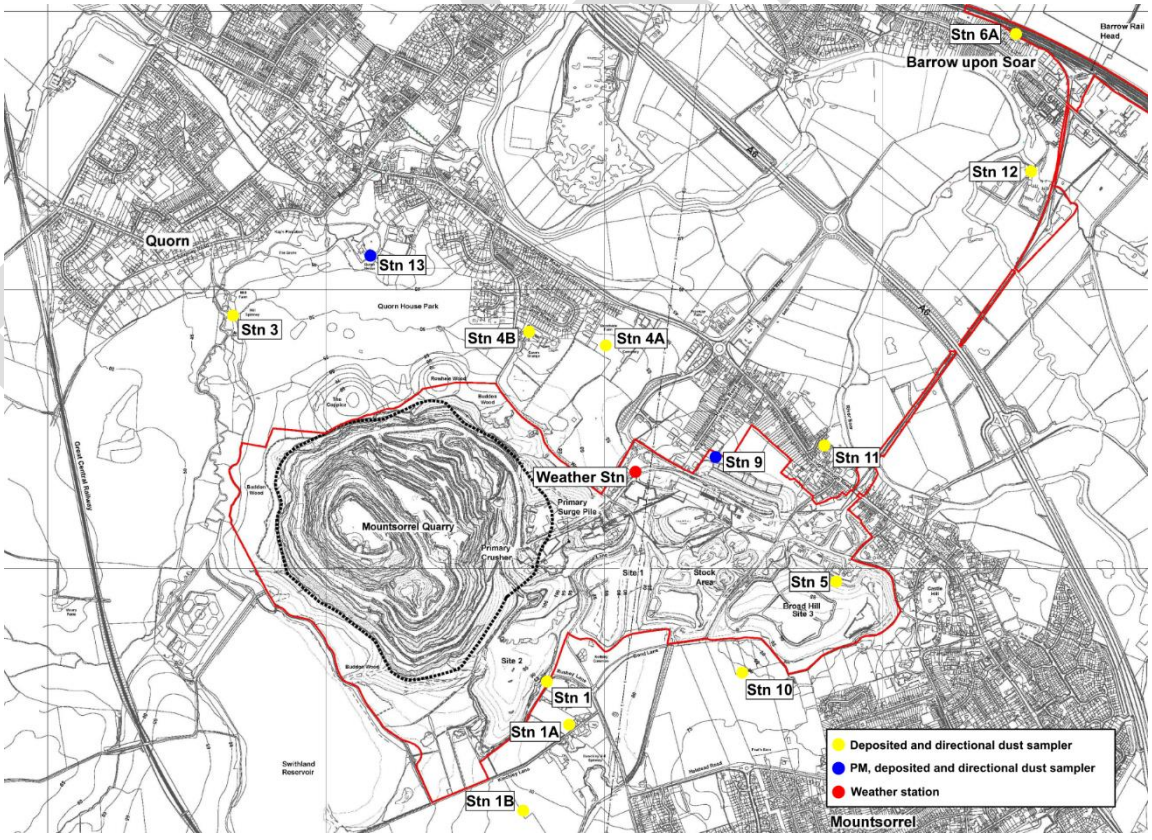

Figure 2.1: Particulate matter, dust and weather monitoring locations, Mountsorrel Quarry

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 PM_{10} and $PM_{2.5}$, allowing CBC to compare concentrations against the relevant AQOs for these pollutants.

For additional context, the latest PM_{10} 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 (PM_{10}) an alert threshold of 125 µg/m^3 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.

PM_{10} 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 PM_{10} and $PM_{2.5}$.

For deposited dust, the DMMP sets out a site-wide deposited dust threshold of 125 mg/m^2/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, with a cooler period recorded in mid-October. The maximum daily temperature was 15.4°C recorded on the 16 October and the minimum daily temperature was 6.4°C recorded on the 11 October. Overall, the monitoring period was wet, with precipitation recorded on 64% of total days, however, there was a 3-day dry period at the start of October. Whilst rainfall levels would have likely suppressed dust generation, the three-day dry period may have resulted in an increase in the potential for dust propagation.

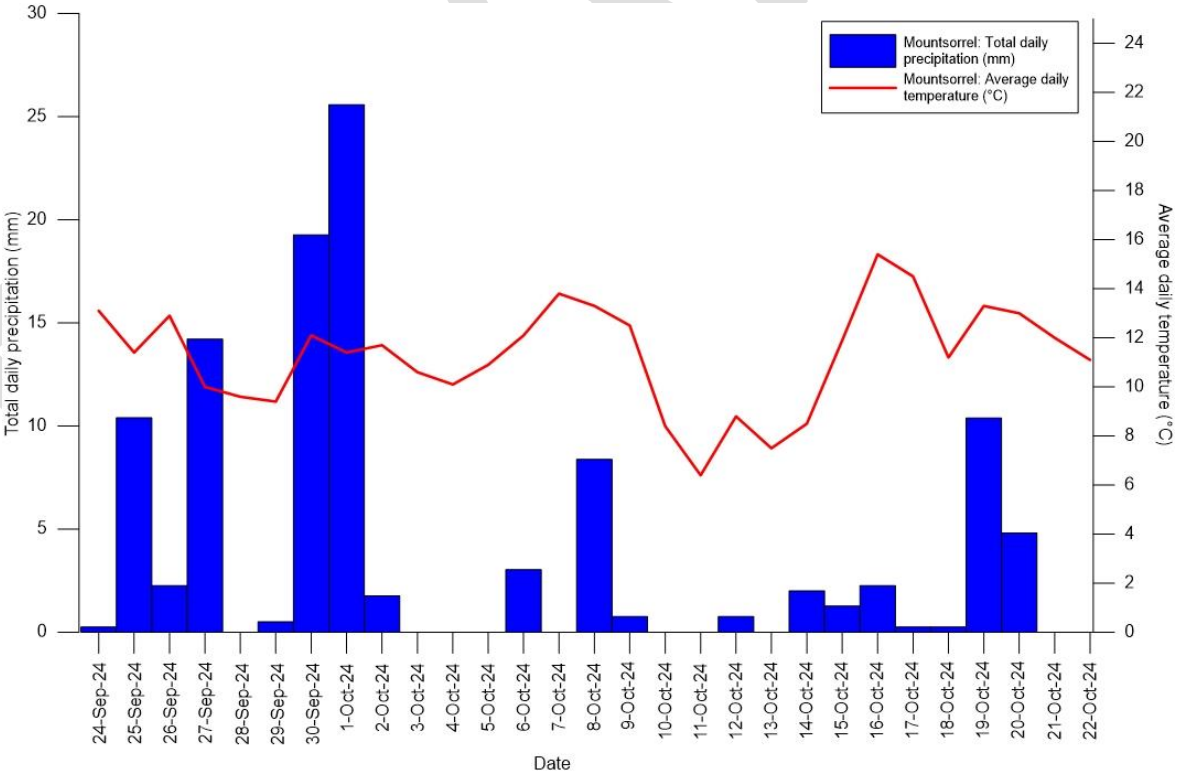

Figure 3.1: Total daily precipitation and average daily temperature, Mountsorrel Quarry, 24 September – 22 October 2024

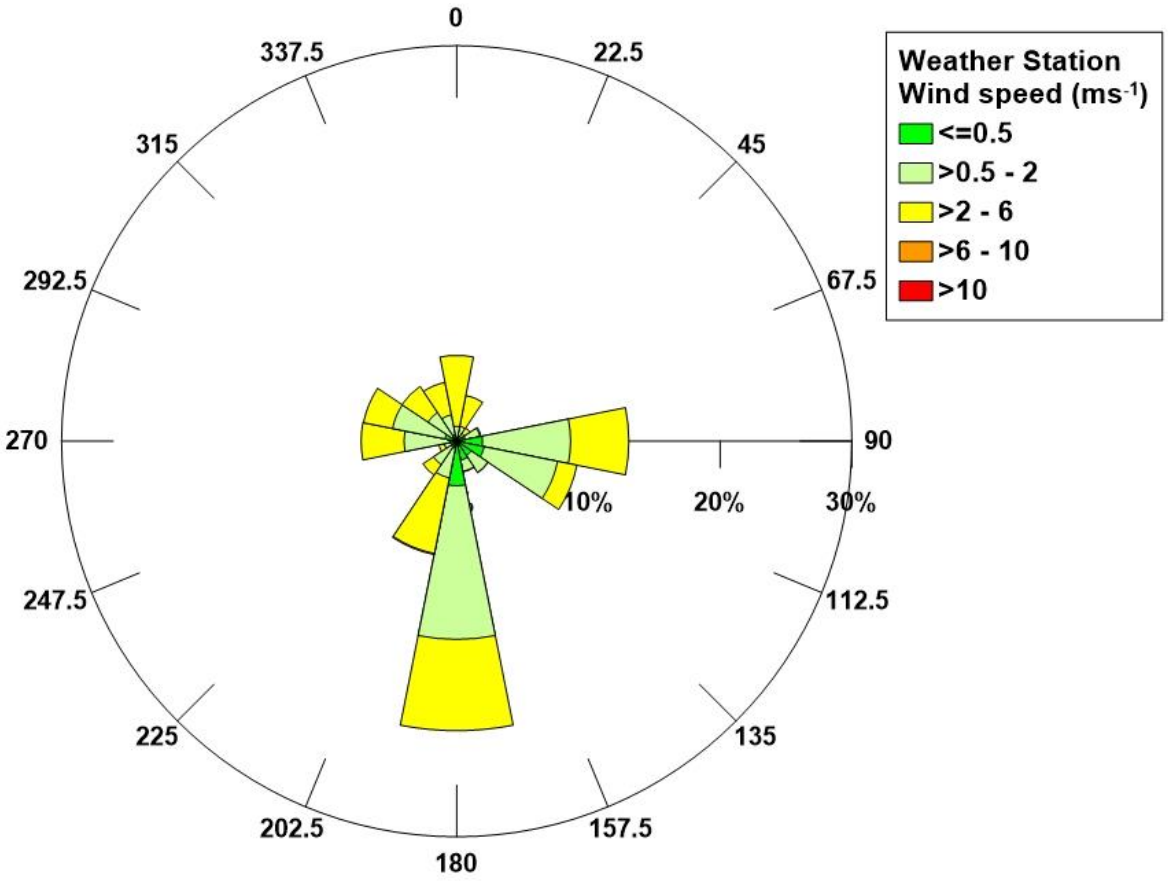

Figure 3.2: Wind rose, Mountsorrel Quarry, Mountsorrel, 24 September – 22 October 2024

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

3.2 Particulate matter

The technical error affecting the Hawcliffe Road Osiris was resolved on 01 October; data are available from this date onwards.

3.2.1 PM_{10}

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/m^3 for the 15-minute average), whilst the dashed black line denotes the average concentration recorded over this period.

Additional PM_{10} monitoring data (collected by CBC and the Defra AURN monitoring network) are provided in Appendix A.

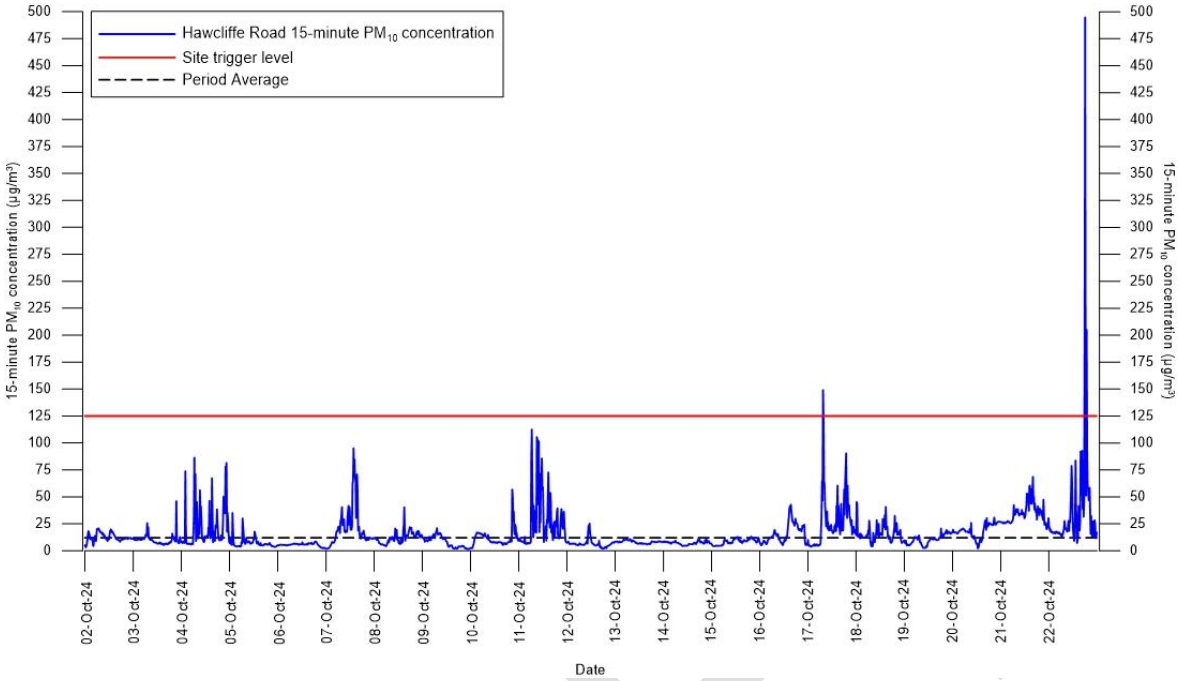

Figure 3.3: 15-minute mean PM_{10} concentration, Hawcliffe Road, 02 – 22 October 2024

Figure 3.3 indicates that the overall average concentration for this period was 12.4 µg/m^3, whilst there were a number of periods where elevated levels of PM_{10} concentrations were recorded, such as on 11, 17 and 22 October. The alert threshold was exceeded on two days; details of theses exceedances are provided in Table 3.1.

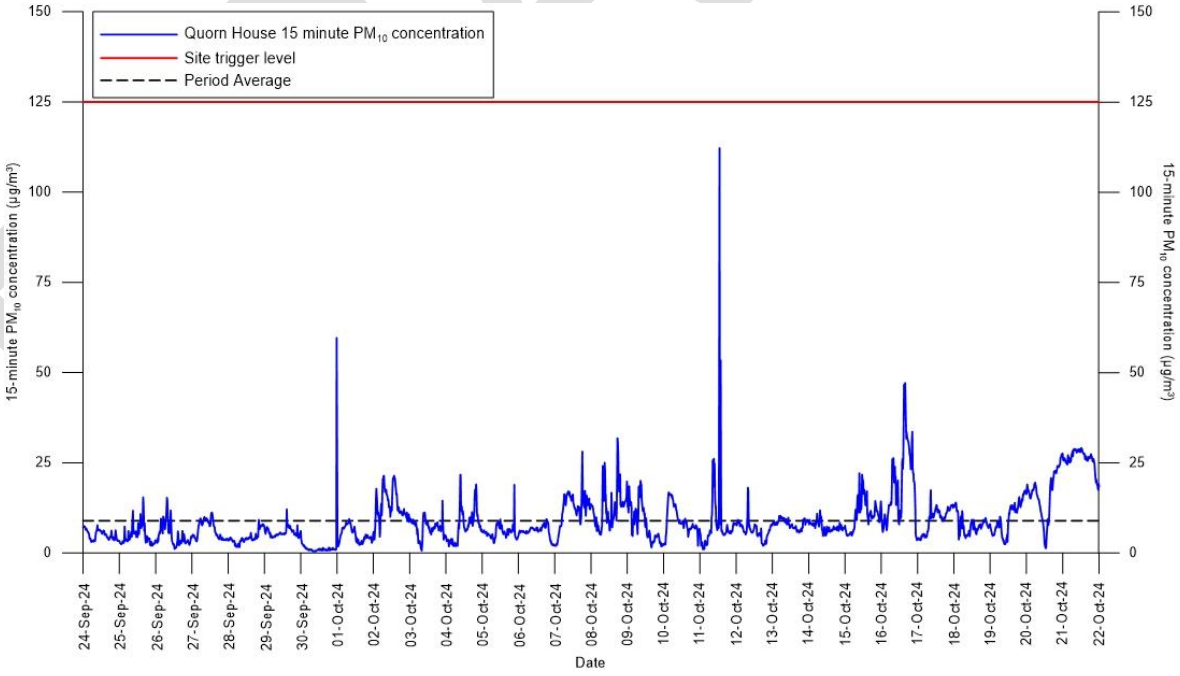

Figure 3.4: 15-minute mean PM_{10} concentration, Quorn House, 24 September – 22 October 2024

As shown in Figure 3.4, some short-term spikes in PM_{10} concentrations were recorded at Quorn House on 01 and 11 October, however there were no exceedances of the PM_{10} site trigger level. The overall average for this period was 9.1 µg/m^3.

During this review period, trigger emails alerting staff to high PM_{10} levels from the direction of site operations were sent out on two days from the Hawcliffe Road Osiris. Details of the corresponding causes and investigations are provided in Table 3.1.

Table 3.1: Email alert responses, between 24 September – 22 October 2024 (using the trigger threshold, 125 µg/m^3 for the 15-minute average)

Date of alert	Monitor	Details	Possible cause and investigation
17/10/2024	TNO3838 (Hawcliffe Road)	Exceedance recorded from the southwest in the morning	Full site inspection carried out at time of alert – no source identified. All dust suppression working leading up to and at the time of the alert.
22/10/2024	TNO3838 (Hawcliffe Road)	Exceedance recorded from the south and south-southwest in the evening	Full site inspection carried out at time of alert. Dust at head of conveyor 23A/toast rack identified. Material transfer stopped to reduce dust levels

3.2.2 $PM_{2.5}$

The results of $PM_{2.5}$ monitoring at both locations 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.

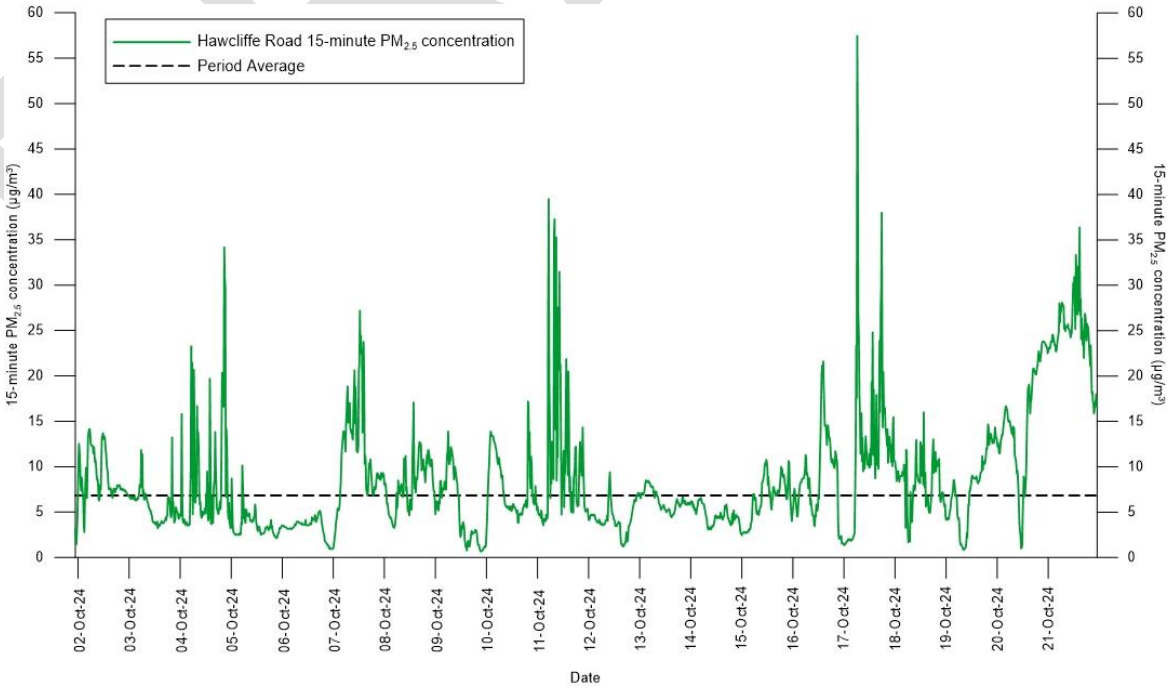

Figure 3.5: 15-minute mean $PM_{2.5}$ concentration, Hawcliffe Road, 02 – 22 October 2024

At Hawcliffe Road, the overall average concentration for this period was 7.03 µg/m^3 whilst at Quorn House, the overall average was 5.59 µg/m^3. In general, the overall pattern of $PM_{2.5}$ concentrations at both locations is similar, although concentrations tend to be higher at Hawcliffe Road. The patterns in $PM_{2.5}$ trends suggests that a regional signal is generally dominant at both locations, but that a local signal is also present at Hawcliffe Road, which is giving rise to short-term spikes not seen at Quorn House.

For this period, 57 % of PM_{10} recorded at Hawcliffe Road comprised of $PM_{2.5}$, whilst it made up 66% of PM_{10} at Quorn House.

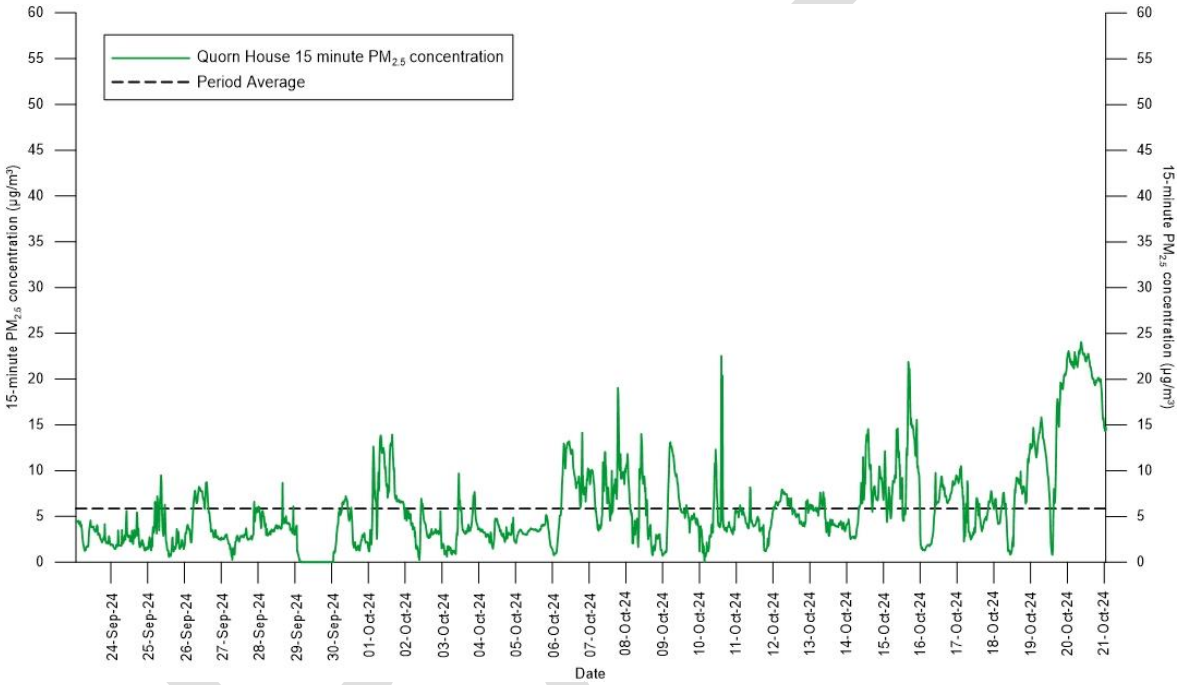

Figure 3.6: 15-minute mean $PM_{2.5}$ concentration, Quorn House, 24 September – 22 October 2024

3.3 Visible dust

3.3.1 Deposited dust monitoring summary

The deposited dust data for 24 September – 22 October 2024 are summarised in Table 3.2. As outlined earlier, there is a site-wide threshold for investigation to identify the potential dust source/s, taking account of the directional data. Table 3.2 shows that, for the available data, deposited dust levels during 24 September – 22 October 2024 were all within the site-specific threshold for all stations, however, Stn 9 recorded slightly elevated levels of deposited dust.

Table 3.2: Summary of deposited dust (undissolved solids), 24 September – 22 October 2024

Undissolved solids (mg/m^2/day)				
This month report start date:		24-Sep-24		
This month report end date:		22-Oct-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	21	No	**Very Low**
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	13	No	**Very Low**
Mill Farm; Quorn House	Stn 3	29	No	**Very Low**
Woodside Farm, Leicester Road	Stn 4A	23	No	**Very Low**
Quorn Grange, Unitt Road, Northage Close, Quorn Park	Stn 4B	18	No	**Very Low**
Bond Lane; Crown Lane	Stn 5	4	No	**Very Low**
Sileby Road; Huston Close; Sileby Road (commercial)	Stn 6A	28	No	**Very Low**
Hawcliffe Road	Stn 9	87	No	**Slightly Elevated**
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	27	No	**Very Low**
Loughborough Road; River Soar (marina / caravan park)	Stn 11	17	No	**Very Low**
Meadow Farm Marina and Caravan Park	Stn 12	24	No	**Very Low**
Quorn House Park	Stn 13	40	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/m^2/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 at Stn 9.

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).

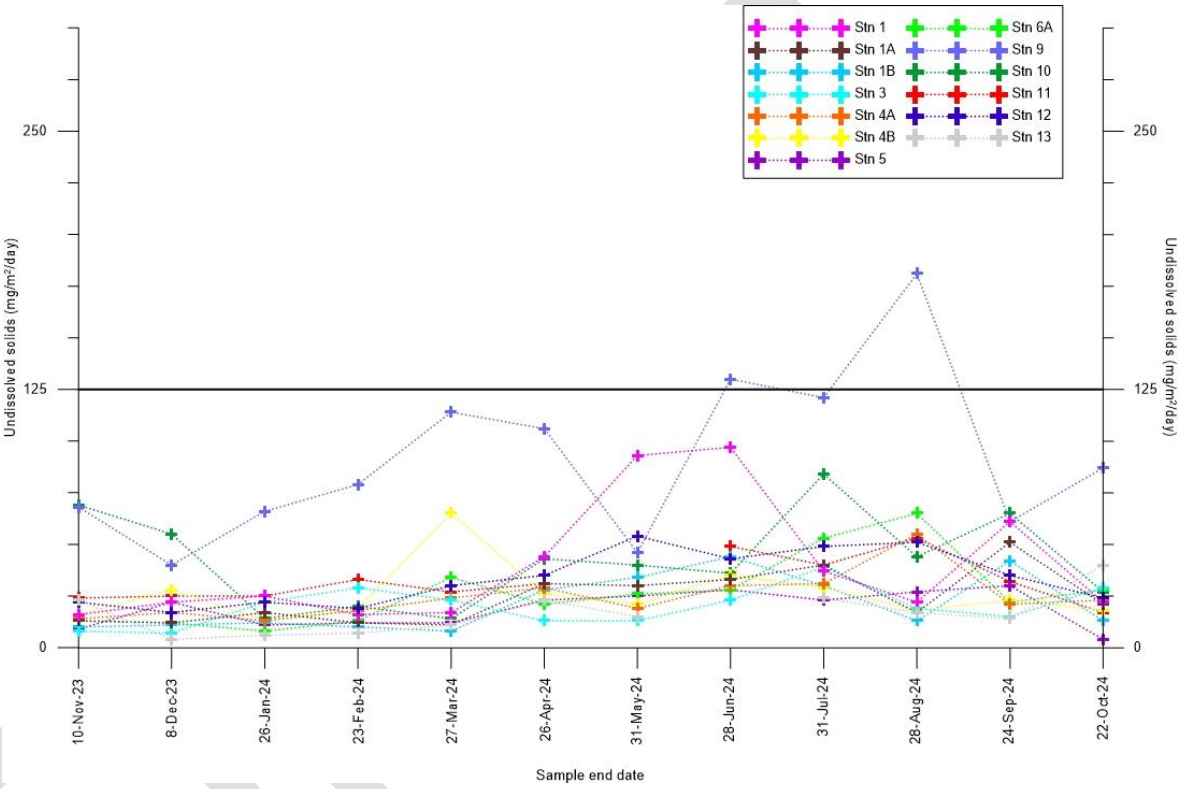

Figure 3.7: Dust deposition rates per sampling location over time (past 12 months

3.3.2 Directional dust monitoring summary

The directional dust data for 24 September – 22 October 2024 are summarised in Table 3.3 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 3.3 and Figure 3.8 show that during 24 September – 22 October 2024, all station recorded Very Low dust levels from all directions.

Table 3.3: Summary of directional dust soiling, 24 September – 22 October 2024

Directional dust soiling (%EAC/day) by direction (°)										
This month report start date:		24-Sep-24								
This month report end date:		22-Oct-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	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
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1A	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
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	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
Mill Farm; Quorn House	Stn 3	Reported value	0	0	0.1	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	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	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
Sileby Road; Huston Close; Sileby Road (commercial)	Stn 6A	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
Hawcliffe Road	Stn 9	Reported value	0	0	0.1	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
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	Reported value	0	0	0	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
Loughborough Road; River Soar (marina / caravan park)	Stn 11	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
Meadow Farm Marina and Caravan Park	Stn 12	Reported value	0	0.1	0	0.1	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
Quorn House Park	Stn 13	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

[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)

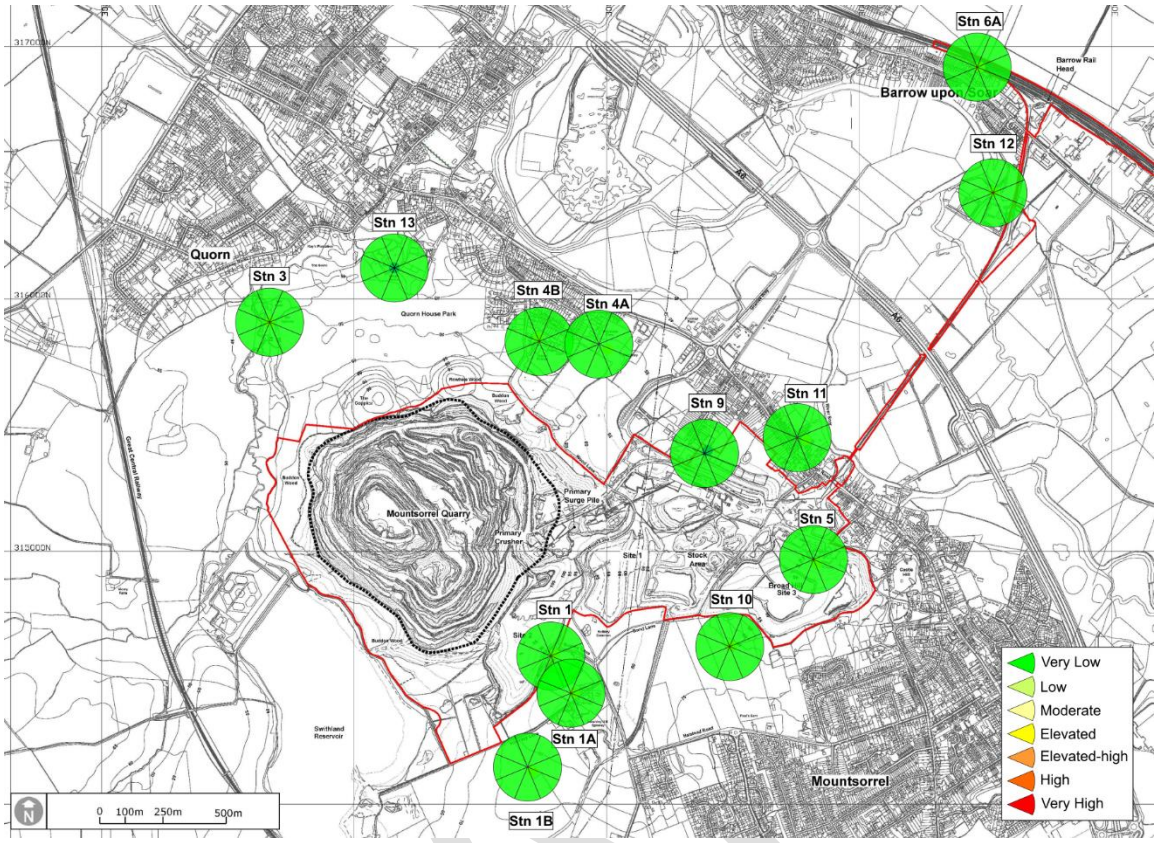

Figure 3.8: Directional dust soiling rose diagrams, 24 September – 22 October 2024

Table 3.4 shows that the 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 3.4: 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	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	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	0.1	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
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 24 September – 22 October 2024 no complaints relating to dust were received by the site.

Appendix A: Off-site PM_{10} monitoring (CBC and AURN)

The daily average PM_{10} 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 University[2].

For the 12 months leading up to 22 October 2024, there were 362 daily PM_{10} readings taken by the CBC Zephyr, and 365 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 PM_{10} concentration for the 12 months to date at CBC Zephyr was 10.39 µg/m^3, which is approximately 26 % of the annual average PM_{10} concentration objective (40 µg/m^3). At the Leicester AURN the annual average daily PM_{10} concentration for the 12 months to date was 10.6 µg/m^3 which is approximately 26.6 % of the annual average PM_{10} concentration objective.

For the 12 months up to 24 September 2024 there were no recorded instances where the daily average PM_{10} concentrations exceeded 50 µg/m^3 at either location. In summary, for the 12 months up to 22 October 2024 neither the annual nor daily AQO were exceeded.

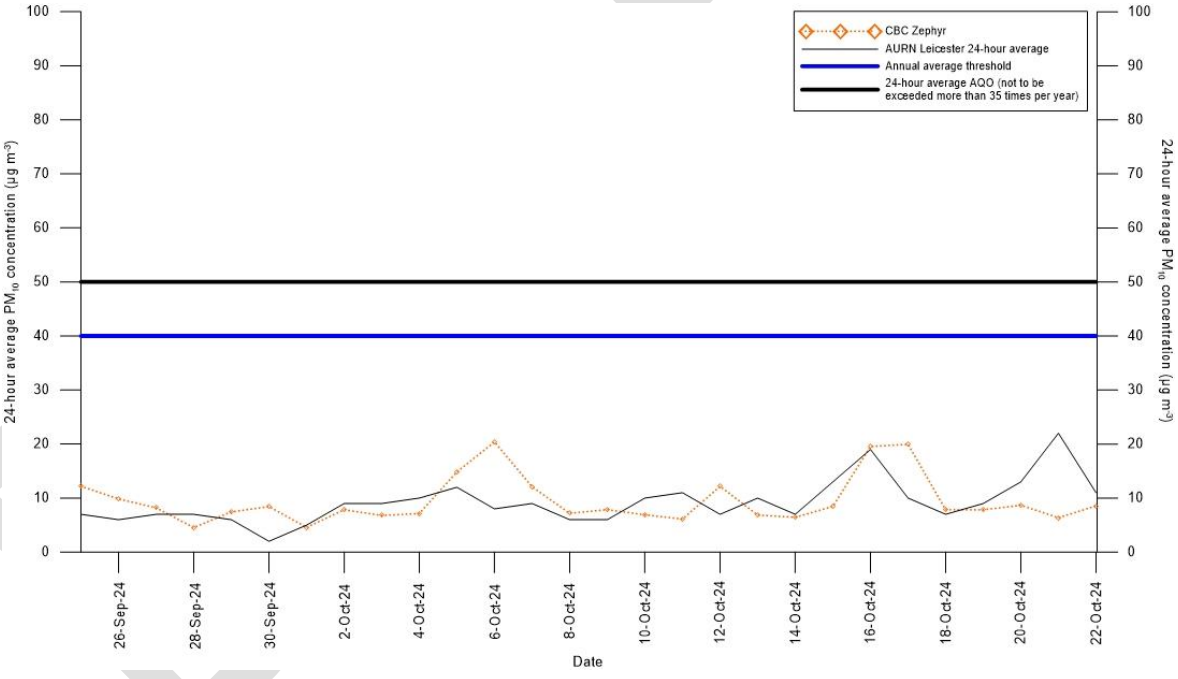

Figure A.1: Daily average PM_{10} concentration, CBC Zephyr and Leicester AURN, 25 September – 22 October 2024

[2] http://uk-air.defra.gov.uk/networks/network-info?view=aurn

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 22 October 2024, there were 362 daily $PM_{2.5}$ readings taken by the CBC Zephyr, and 365 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 6.5 µg/m^3, which is approximately 54 % of the interim annual average $PM_{2.5}$ concentration objective (12 µg/m^3) applicable from 31 January 2023. At the Leicester AURN the annual average daily concentration was 6.6 µg/m^3, which is approximately 55 % of the interim annual average $PM_{2.5}$ concentration objective.

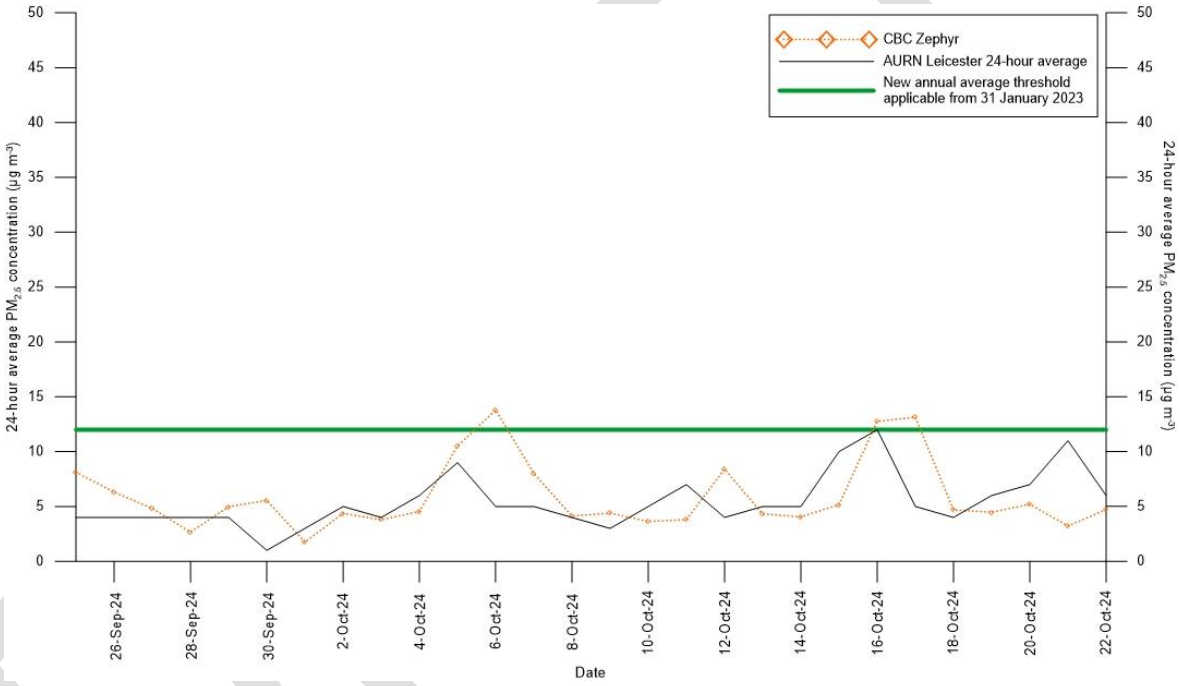

Figure B.1: Daily average $PM_{2.5}$ concentrations, CBC Zephyr and Leicester AURN, 25 September – 22 October 2024

Dust, Particulate Matter and Weather Monitoring Report: November 2024

Mountsorrel Quarry

January, 2025

Tarmac

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Document Control Sheet

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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.

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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 22 October – 20 November 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 PM_{10} and is measured to agreed standards and forms part of the national Air Quality Objectives (AQO). The AQO for PM_{10} is currently 50 µg/m^3 for the 24-hour mean, not to be exceeded 35 times per year and 40 µg/m^3 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/m^3 for the annual mean (to be achieved by 2028), whilst the legal AQO for $PM_{2.5}$ is 10 µg/m^3 for the annual mean (to be achieved by 2040) as per The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023[1].

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 PM_{10}, $PM_{2.5}$ and PM_1 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.

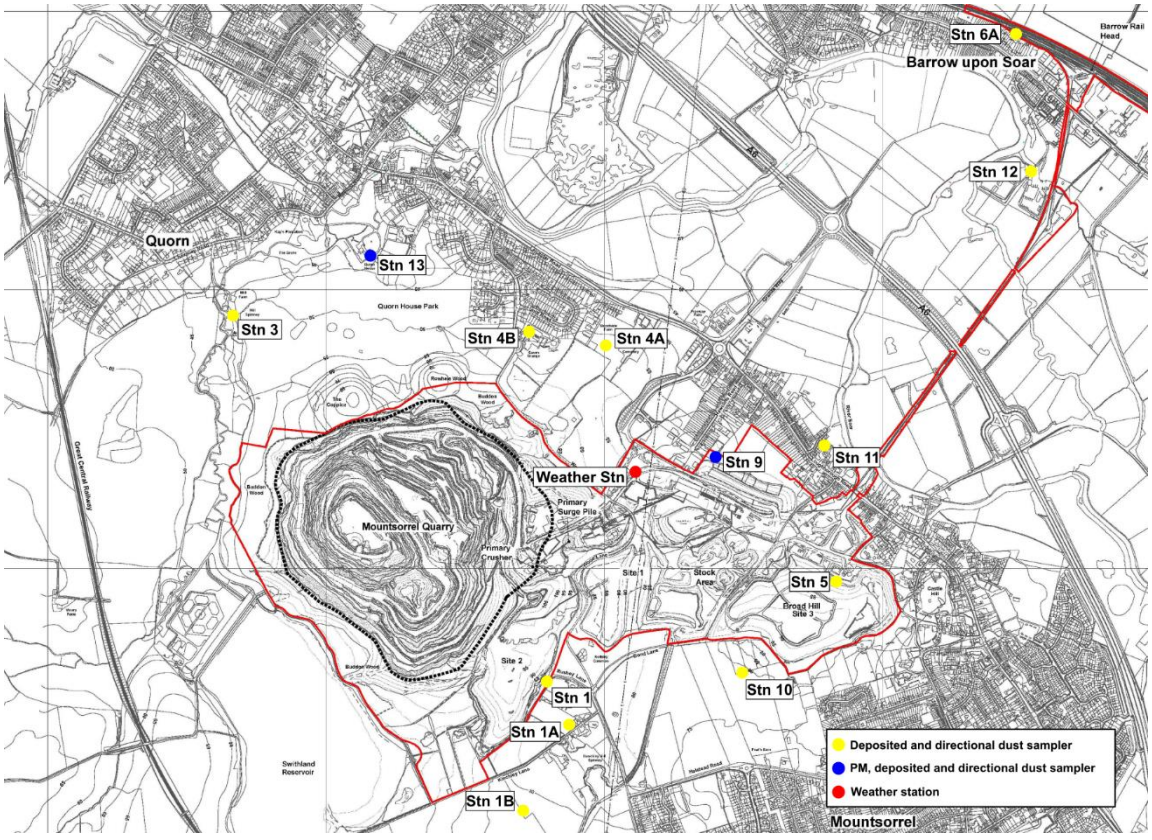

Figure 2.1: Particulate matter, dust and weather monitoring locations, Mountsorrel Quarry

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 PM_{10} and $PM_{2.5}$, allowing CBC to compare concentrations against the relevant AQOs for these pollutants.

For additional context, the latest PM_{10} 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 (PM_{10}) an alert threshold of 125 µg/m^3 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.

PM_{10} 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 PM_{10} and $PM_{2.5}$.

For deposited dust, the DMMP sets out a site-wide deposited dust threshold of 125 mg/m^2/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 mineral site. Of particular importance are wind speeds, 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, before a decrease in temperature in mid-late November. The maximum daily temperature was 13.3 °C recorded on 29 October and the minimum daily temperature was 0.7 °C recorded on 19 November. Overall this monitoring period was very dry, with precipitation only recorded on 37% of total days. There was a 13-day dry period at the start of November; this lack of precipitation may have increased the risk of dust propagation beyond the site boundary during this period.

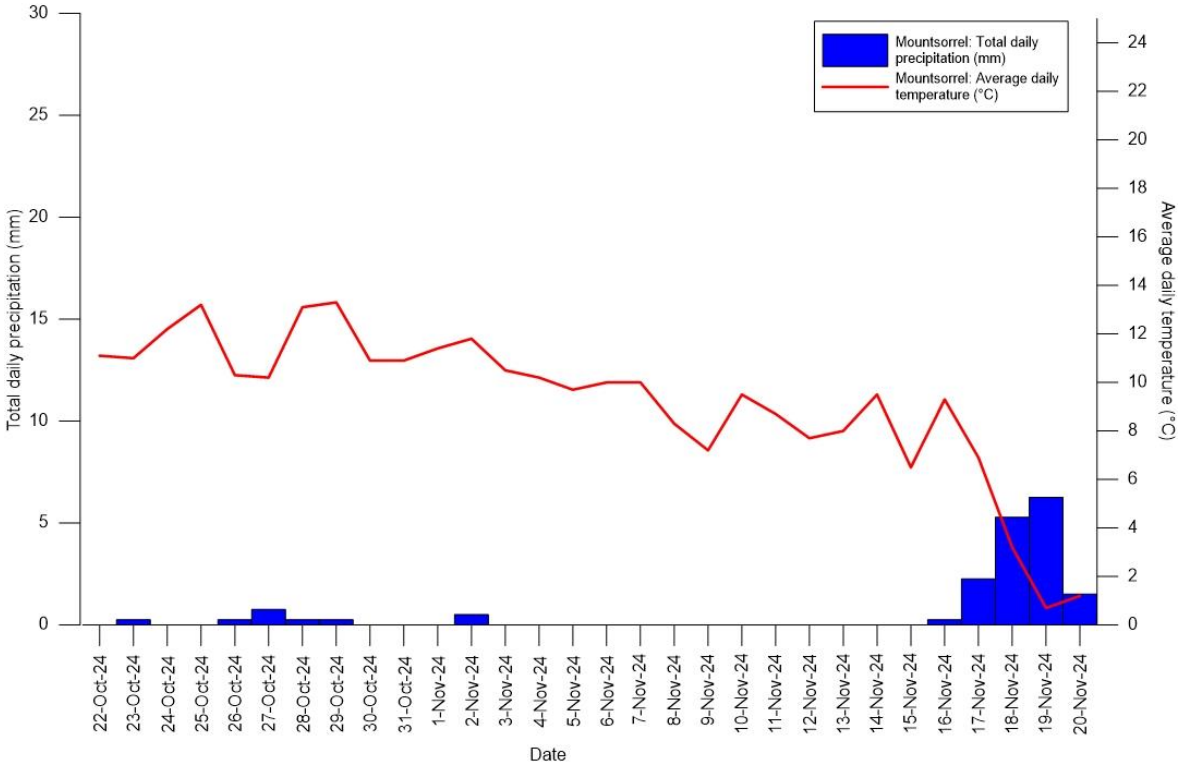

Figure 3.1: Total daily precipitation and average daily temperature, Mountsorrel Quarry, 22 October – 20 November 2024

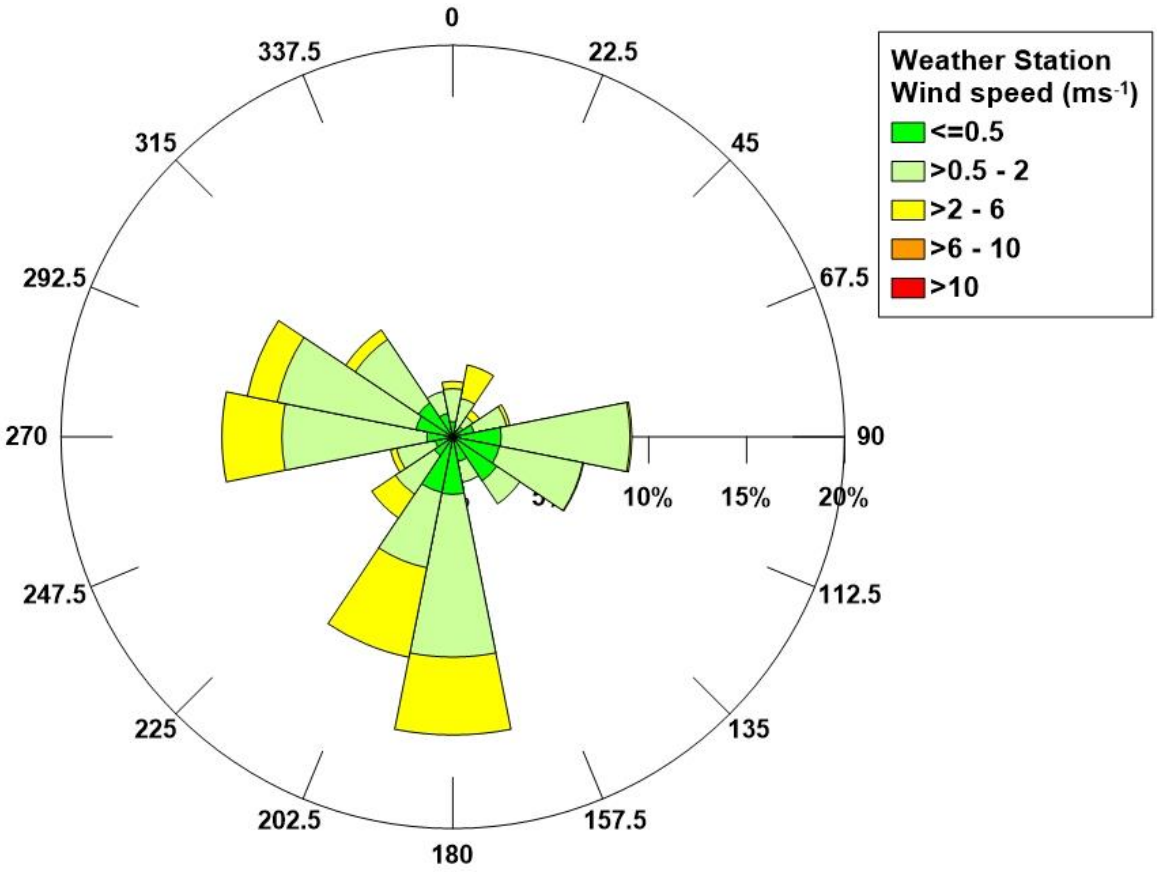

Figure 3.2: Wind rose, Mountsorrel Quarry, Mountsorrel, 22 October – 20 November 2024

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 west, with less frequent easterly winds. Consequently, there may have been slight potential for dust propagation generally towards the north and east throughout the monitoring period.

3.2 Particulate matter

3.2.1 PM_{10}

The available 15-minute data from the period of review are presented for both monitoring locations in Figure 3.4 and Figure 3.4. The red line denotes the site trigger level (125 µg/m^3 over the 15-minute average), whilst the dashed black line denotes the average concentration recorded over this period.

Additional PM_{10} monitoring data (collected by CBC and the Defra AURN monitoring network) are provided in Appendix A.

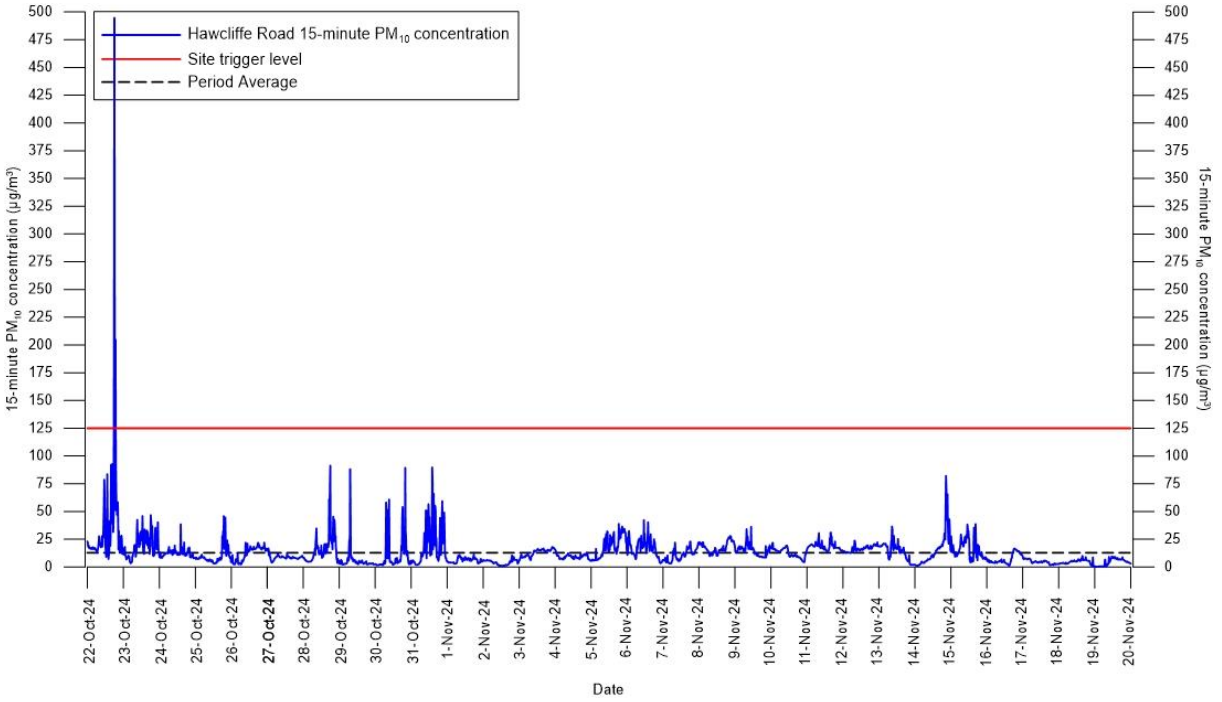

Figure 3.3: 15-minute mean PM_{10} concentration, Hawcliffe Road, 22 October – 20 November 2024

Figure 3.3 indicates that there were no exceedances of the site trigger level at Hawcliffe Road during this period, expect for one on the 22 October 2024. The outcome of the investigation into this exceedance is outlined in the October 2024 report.

The overall average concentration for this period was 12.84, with some short-term spikes being recorded.

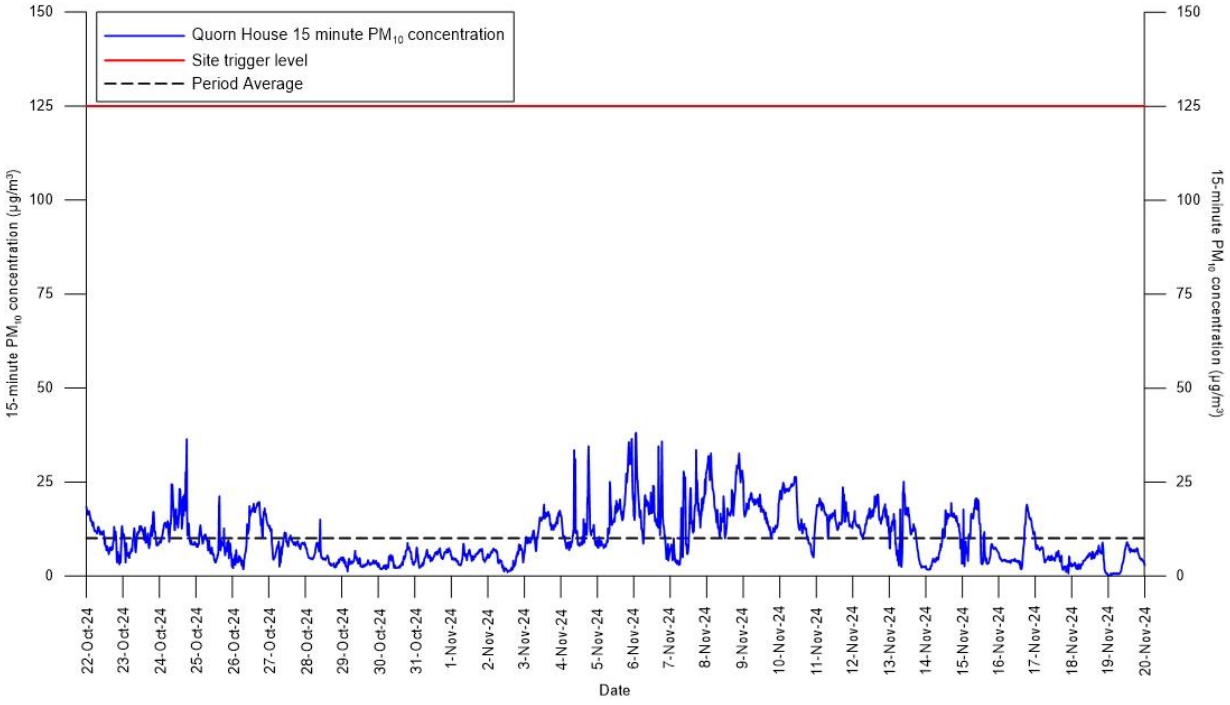

Figure 3.4: 15-minute mean PM_{10} concentration, Quorn House, 22 October – 20 November 2024

At Quorn house there were no exceedances of the PM_{10} site trigger, and the overall average for this period was 10.05 µg/m^3. The slightly elevated PM_{10} concentrations recorded in early November coincided with the extended dry period discussed earlier.

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.

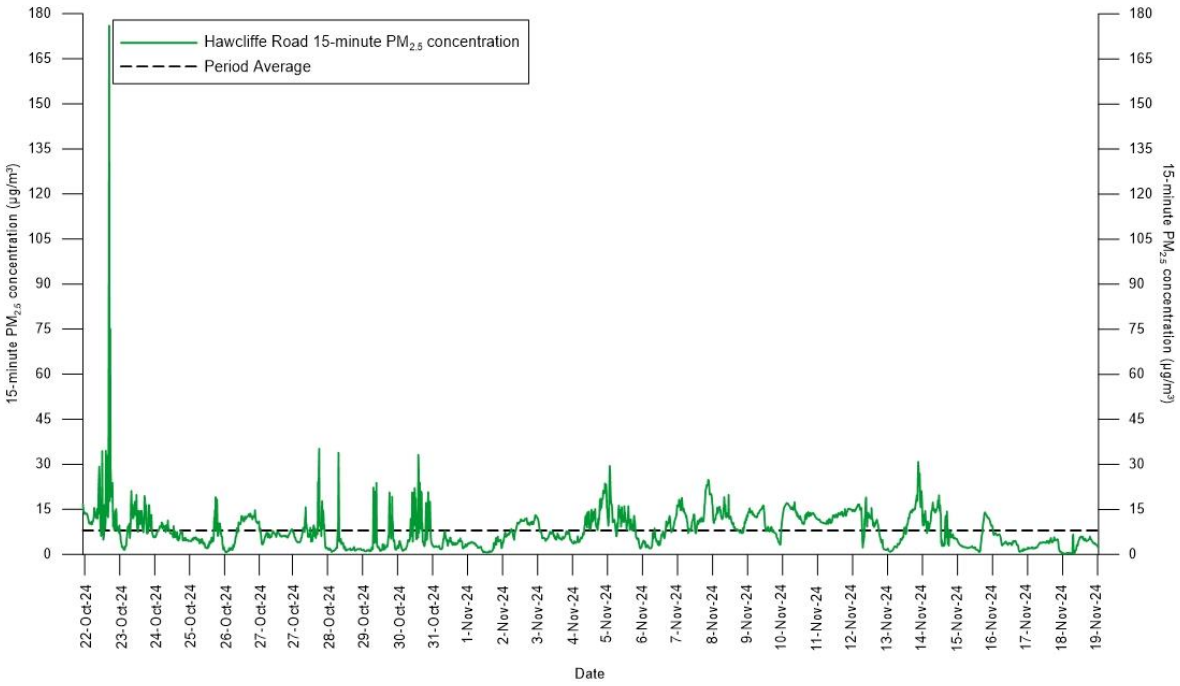

Figure 3.5: 15-minute mean $PM_{2.5}$ concentration, Hawcliffe Road, 22 October – 20 November 2024

At Hawcliffe Road, the overall average concentration for this period was 7.95 µg/m^3, whilst at Quorn House, the overall average was 7.31 µg/m^3. In general, the overall pattern of $PM_{2.5}$ concentrations at both locations is similar, although concentrations tend to be slightly higher at Hawcliffe Road. It is clear from the monitoring data that the dry weather in November led to a slight increase in the recorded $PM_{2.5}$ concentrations.

For this period, 62% of PM_{10} recorded at Hawcliffe Road comprised of $PM_{2.5}$, whilst it made up 73% at Quorn House.

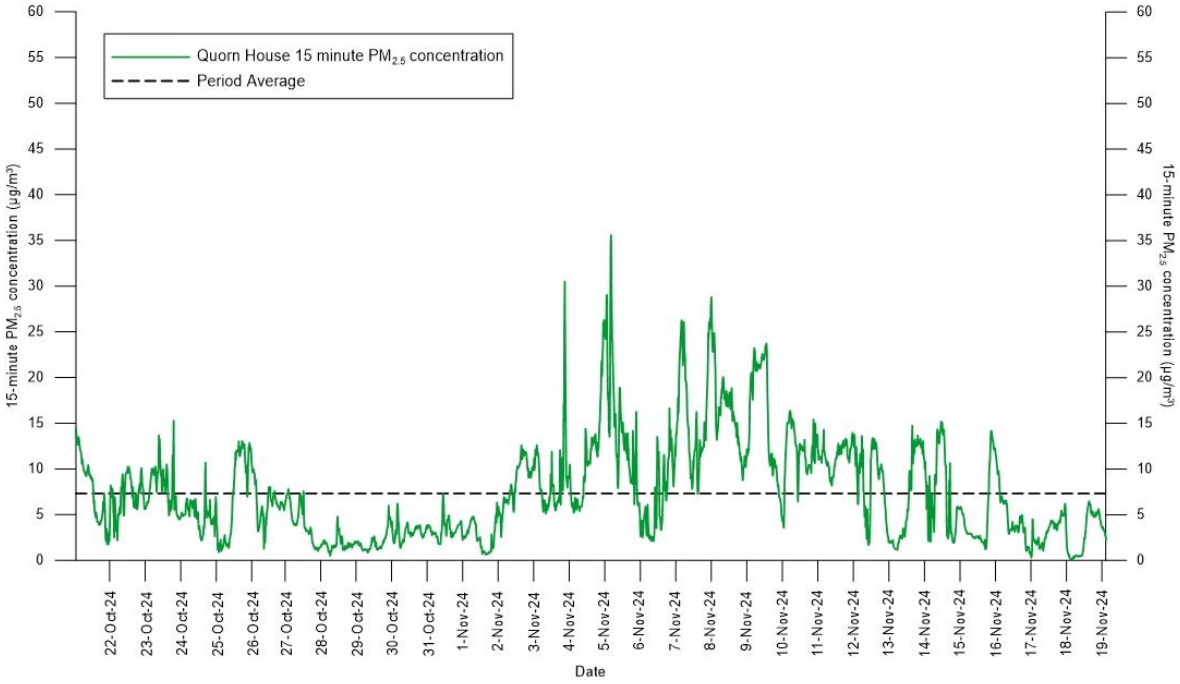

Figure 3.6: 15-minute mean $PM_{2.5}$ concentration, Quorn House, 22 October – 20 November 2024

3.3 Visible dust

3.3.1 Deposited dust monitoring summary

The deposited dust data for 22 October – 20 November 2024 are summarised in Table 3.1. As outlined earlier, there is a site-wide threshold 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 22 October – 20 November 2024 were all within the site-specific threshold for all stations, with Stn 9 experiencing slightly elevated levels during this period.

Table 3.1: **Summary of deposited dust (undissolved solids), 22 October – 20 November 2024**

Undissolved solids (mg/m^2/day)				
This month report start date:		**22-Oct-24**		
This month report end date:		**20-Nov-24**		
Receptor location	**Nearest / appropriate dust monitoring point**	**Reported value**	**Trigger: ≥ 125[a]**	**Magnitude[b]**
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1	25	No	**Very Low**
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1A	31	No	**Very Low**
Swithland Lane; Rushey Lane; Kinchley Lane	Stn 1B	22	No	**Very Low**
Mill Farm; Quorn House	Stn 3	3	No	**Very Low**
Woodside Farm, Leicester Road	Stn 4A	47	No	**Very Low**
Quorn Grange, Unitt Road, Northage Close, Quorn Park	Stn 4B	27	No	**Very Low**
Bond Lane; Crown Lane	Stn 5	16	No	**Very Low**
Sileby Road; Huston Close; Sileby Road (commercial)	Stn 6A	6	No	**Very Low**
Hawcliffe Road	Stn 9	82	No	**Slightly Elevated**
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	52	No	**Low**
Loughborough Road; River Soar (marina / caravan park)	Stn 11	35	No	**Very Low**
Meadow Farm Marina and Caravan Park	Stn 12	29	No	**Very Low**
Quorn House Park	Stn 13	11	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/m^2/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 at Stn 9. Dust levels at Stn 9 were considerably lower in September compared to the preceding three months.

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).

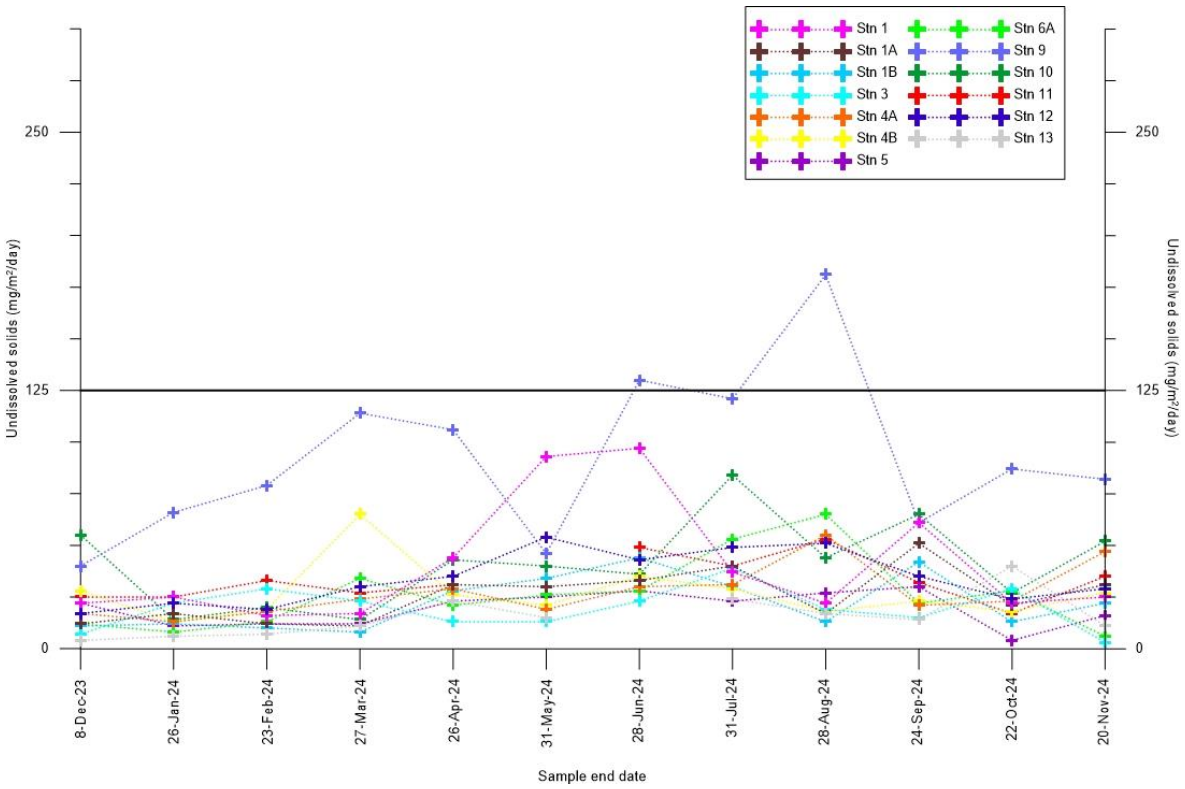

Figure 3.7: Dust deposition rates per sampling location over time (past 12 months)

3.3.2 Directional dust monitoring summary

The directional dust data for 22 October – 20 November 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 22 October – 20 November 2024, all station recorded Very Low dust levels from all directions.

Table 3.2: Summary of directional dust soiling, 22 October – 20 November 2024

Directional dust soiling (%EAC/day) by direction (°)										
This month report start date:		**22-Oct-24**								
This month report end date:		**20-Nov-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	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	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	0.1	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
Mill Farm; Quorn House	Stn 3	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
Woodside Farm, Leicester Road	Stn 4A	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
Quorn Grange, Unitt Road, Northage Close, Quorn Park	Stn 4B	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
Bond Lane; Crown Lane	Stn 5	Reported value	0	0	0	0	0	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
Sileby Road; Huston Close; Sileby Road (commercial)	Stn 6A	Reported value	0	0	0.1	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
Hawcliffe Road	Stn 9	Reported value	0	0	0.1	0.1	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
Glebe Close; Halstead Road (south); Halstead Road (north)	Stn 10	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
Loughborough Road; River Soar (marina / caravan park)	Stn 11	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
Meadow Farm Marina and Caravan Park	Stn 12	Reported value	0.1	0.1	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
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)

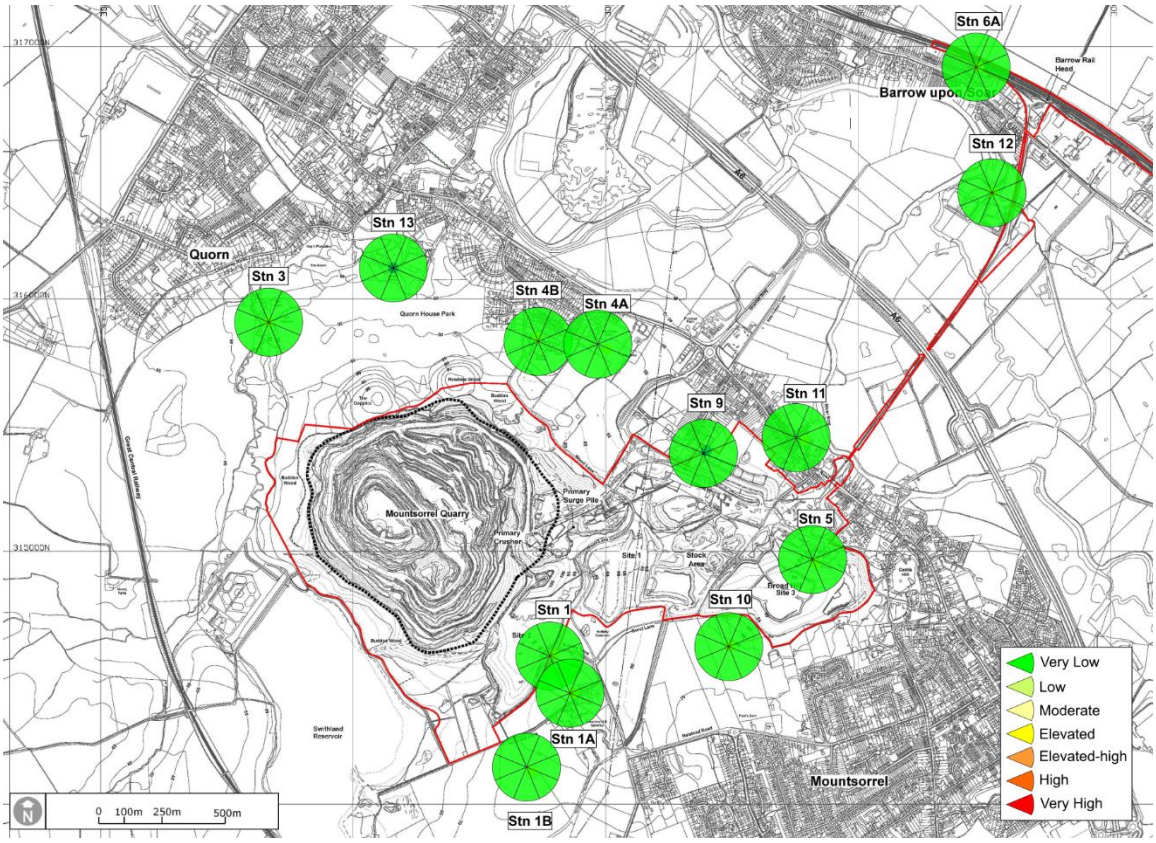

Figure 3.8: Directional dust soiling rose diagrams, 22 October – 20 November 2024

Table 3.3 shows that the 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	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	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	0.1	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
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 22 October – 20 November one dust complaint was received by the quarry. This was investigated in accordance with the procedure outlined in the DMMP.

Appendix A: Off-site PM_{10} monitoring (CBC and AURN)

The daily average PM_{10} 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 University[2].

For the 12 months leading up to 20 November 2024, there were 362 daily PM_{10} readings taken by the CBC Zephyr, and 365 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 PM_{10} concentration for the 12 months to date at CBC Zephyr was 11.05 µg/m^3, which is approximately 27.6 % of the annual average PM_{10} concentration objective (40 µg/m^3). At the Leicester AURN the annual average daily PM_{10} concentration for the 12 months to date was 10.9 µg/m^3 which is approximately 27.5 % of the annual average PM_{10} concentration objective.

For the 12 months up to 20 November 2024 there were no recorded instances where the daily average PM_{10} concentrations exceeded 50 µg/m^3 at either location. In summary, for the 12 months up to 24 November 2024 neither the annual nor daily AQO were exceeded.

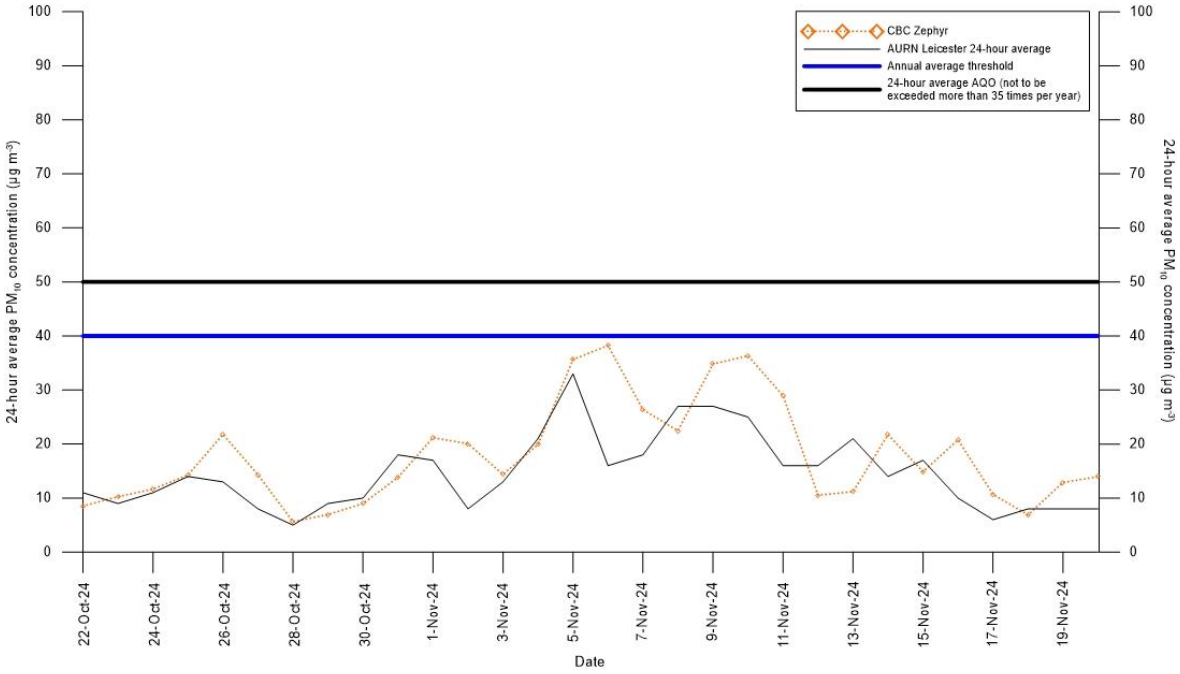

Figure A.1: Daily average PM_{10} concentration, CBC Zephyr and Leicester AURN, 22 October – 20 November 2024

[2] http://uk-air.defra.gov.uk/networks/network-info?view=aurn

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 24 November 2024, there were 362 daily $PM_{2.5}$ readings taken by the CBC Zephyr, and 365 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 6.9 µg/m^3, which is approximately 58 % of the interim annual average $PM_{2.5}$ concentration objective (12 µg/m^3) applicable from 31 January 2023. At the Leicester AURN the annual average daily concentration was 6.9 µg/m^3, which is approximately 58 % of the interim annual average $PM_{2.5}$ concentration objective.

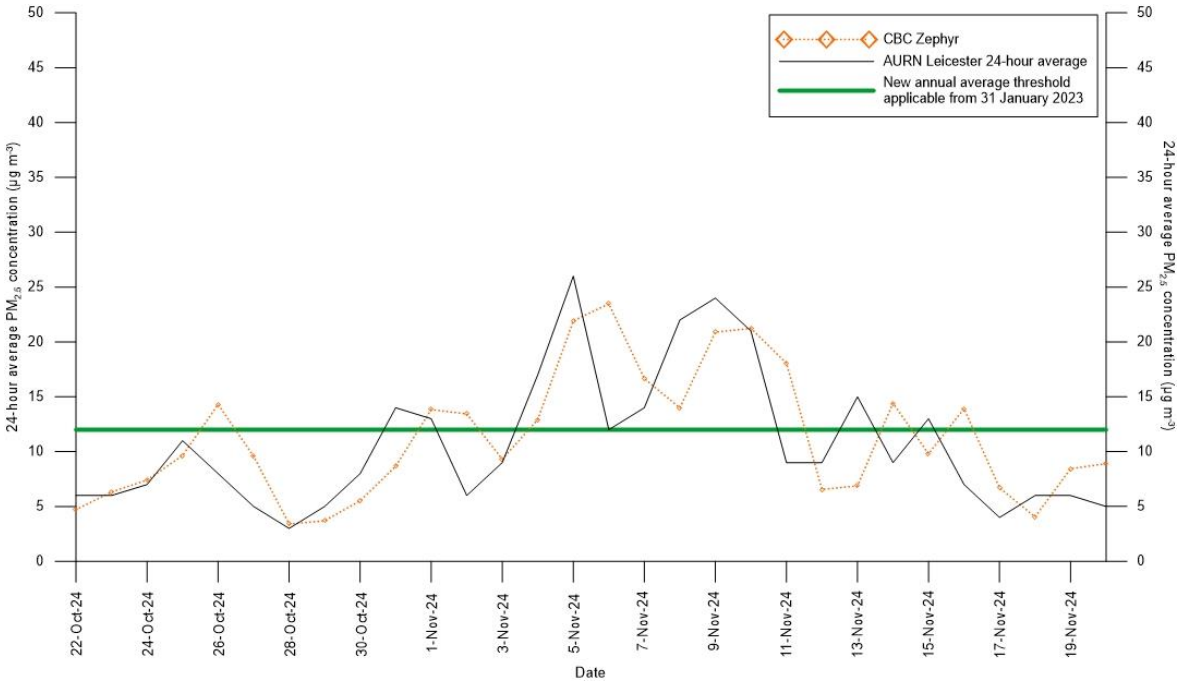

Figure B.1: Daily average $PM_{2.5}$ concentrations, CBC Zephyr and Leicester AURN, 22 October – 20 November 2024