Dust Emissions Management Plan

Wroxton Quarry

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Earthline Ltd

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Document Control Sheet

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Report Prepared By

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

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1 Introduction

1.1 Overview

Earthline Ltd (herein Earthline) is seeking consent for an Environmental Permit for importation of inert fill for infilling and restoration on the eastern extraction area (Areas 5a, 5b and 6) at Wroxton quarry.

Earthline extract and process ironstone at Wroxton Quarry and planning permissions for the development of the eastern area was approved in 2020.

As part of the application, the Environment Agency (EA) require submission of a Dust Emissions Management Plan (DEMP) for the proposed operations.

DustScanAQ (DS) was instructed by GWP Consultants LLP on behalf of Earthline to produce a DEMP to be submitted with the application. DS are familiar with the operations at Wroxton Quarry and carried out the Dust and Air Quality Technical Note in 2020[1] and Dust Management Plan[2] in 2021 for support with the planning application for Earthline to take over operations at Wroxton Quarry and apply for permission to reduce the standoff distance to the nearest residential properties from circa 350 m to circa 300 m.

This DEMP report has been put together to detail the appropriate management, mitigation and monitoring for the proposed importation of inert waste and associated infilling activities.

1.2 Site setting

Wroxton Quarry is located along the A422 to the west of the village of Wroxton, in north Oxfordshire within the jurisdiction of Cherwell District Council (CDC). It is surrounded on all sides by agricultural land. The village of Balscote lies approximately 950 m to the west of site.

The nearest residential receptor to site lies 100 m to the northeast of the existing planning boundary, 350 m from the current working area boundary, and approximately 300 m from the proposed revised working area.

There are no international, European, or national protected sites or any designated protected areas within 1 km of the site. There are 2 No. local protected sites within 1 km of the site, these being, the Wroxton and Balscote Mills Local Wildlife Site (LWS) located c. 200 m south of the planning boundary and c. 500 m southwest of eastern excavation area 5a, 5b and 6 and the Horley LWS located c. 900 m north of the planning boundary and c. 1 km north of eastern excavation areas 5a, 5b and 6.

[1] ZELWQ_Dust and Air Quality Technical Note_A_Final
[2] ZELWQ_DMP_A_Final

The site is well screened by dense hedges on all sides, with thick hedges present in particular along the northern and eastern site boundaries (i.e. the boundaries closest to Wroxton and residential receptors).

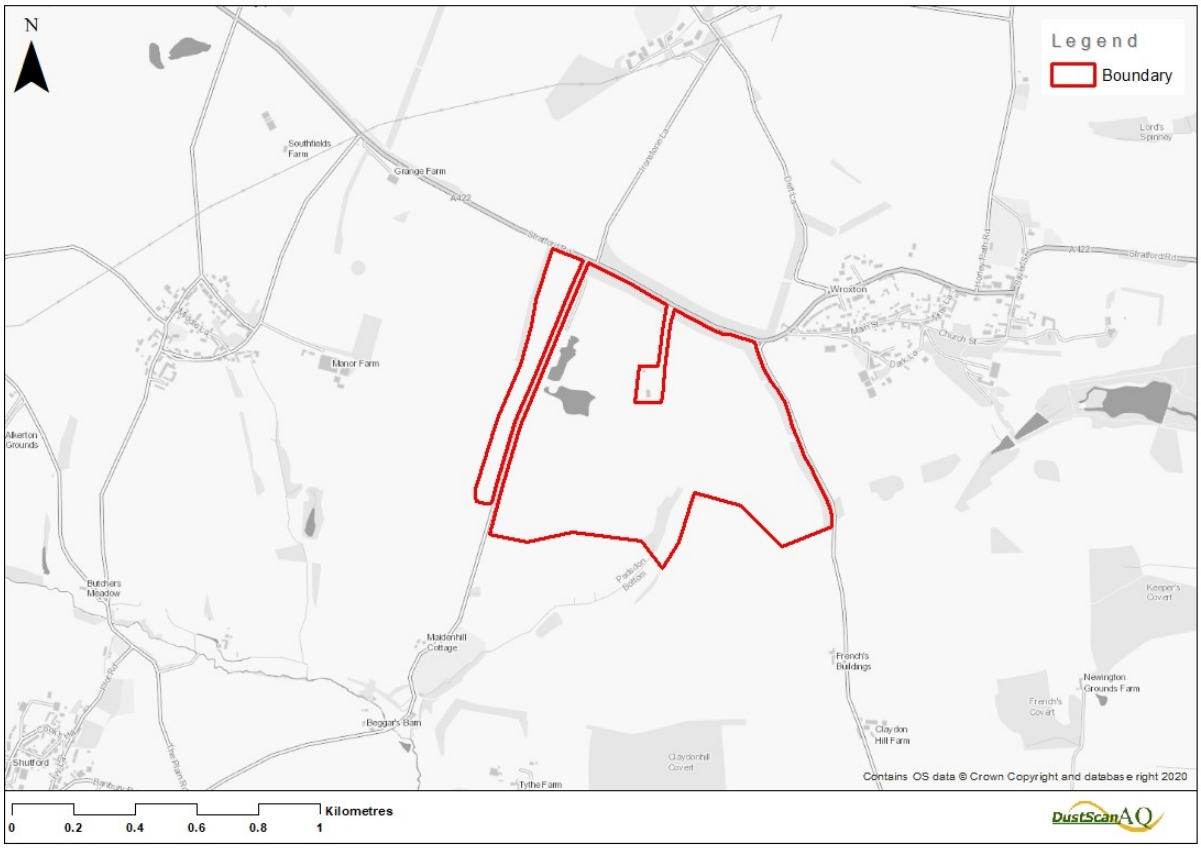


Figure 1.1: Site setting Wroxton Quarry

1.3 Planned development

Earthline propose to import inert waste for infilling the eastern extraction area (areas 5a, 5b and 6) at Wroxton Quarry (Appendix A) to achieve the restoration landform. The total amount of material imported is anticipated to be 540,000 m^3. In addition to the imported inert waste, indigenous material will also be utilised for infilling, including overburden soils and crushing/screening fines.

It is anticipated that the site will continue to operate 5 ½ days a week; 07:00 to 18:00 Monday to Friday and 07:00 to 13:00 on Saturday. No operations will take place on Sundays or on bank or public holidays.

The importation of inert material to infill will not affect existing site operations such as mineral extraction, handling and processing extracted material and storage and stockpiling.

1.3.1 Details of imported waste

The proposed waste types that will be imported to Wroxton Quarry which will be combined with indigenous material for infilling are set out in Table 1.1.

There will be no stockpiling, treatment or processing on-site of imported waste to be disposed of into the inert landfill.

The waste will be Landfill Directive inert Waste Acceptance Criteria (WAC) compliant i.e. the waste will comply with the leaching values for waste acceptable at landfills for inert waste set out in Section 2.1.2 of 'Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC'.

Waste types	
Exclusions **Wastes having any of the following characteristics shall not be accepted:** **Consisting solely or mainly of dusts, powders or loose fibres** **Hazardous wastes** **Wastes in liquid form**	
Waste Code	**Description**
10	**WASTES FROM THERMAL PROCESSES**
10 11	**waste from manufacture of glass and glass products**
10 11 03	waste glass-based fibrous materials
15	**WASTE PACKAGING; ABSORBENTS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED**
15 01	**packaging (including separately collected municipal packaging waste)**
15 01 07	glass packaging
17	**CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)**
17 01	**concrete, bricks, tiles and ceramics**
17 01 01	concrete
17 01 02	bricks
17 01 07	mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06
17 02	**wood, glass and plastic**
17 02 02	glass
17 05	**soil (including excavated soil from contaminated sites), stones and dredging spoil**
17 05 04	soil and stones other than those mentioned in 17 05 03
19	**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF SITE WASTE WATER TREATMENT PLANTS AND PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION/INDUSTRIAL USE**
19 12	**wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified**
19 12 05	glass
20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS**
20 01	**Separately collected fractions (except 15 01)**
20 01 02	glass
20 02	**garden and park wastes (including cemetery waste)**
20 02 02	soil and stones

Table 1.1: Waste types imported to Wroxton Quarry

2 Potential for emissions

2.1 Disamenity dust

'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 Air Quality Objectives (AQO).

Coarser dust (essentially particles greater than 10 µm) is generally regarded as 'disamenity dust' (or 'nuisance') and can be associated with annoyance, although there are no official standards (such as AQO) for dust annoyance[3].

Although it is a widespread environmental phenomenon, dust is also generated through many human activities. This includes at minerals sites and surface mines, and also by heavy industry, waste management, construction and demolition, agriculture (especially arable farming) and road transport.

Dust is generally produced by mechanical action on materials and is carried by moving air when there is sufficient energy in the airstream. More energy is required for dust to become airborne than for it to remain suspended. Dust is removed through gravitational settling (sedimentation), washout (for example during rainfall or by wetting) and by impaction on surfaces (e.g. on vegetative screening). Dust can be re-suspended where conditions allow, such as from bare ground.

Dust emissions from a minerals site, its propagation and potential impacts can be considered in terms of 'source-pathway-receptor' relationships. Dust can arise from a variety of processes and locations within a site and can be difficult to quantify.

The common pathway for dust propagation is by air. Dust propagation depends on particle size, wind energy and disturbance activities. Large dust particles generally travel shorter distances than small particles. It is often considered that particles greater than 30 µm will largely deposit within 100 metres of sources, those between 10 – 30 µm will travel up to 250 – 500 metres and particles less than 10 µm will travel up to 1 km from sources.

The Institute of Air Quality Management (IAQM) (2016)[4] states that for 'hard rock' quarries (i.e. the quarrying of bedrock as opposed to unconsolidated sands and gravels) such as Wroxton Quarry, dust impacts may extend up to 400 m from the source, although it is commonly accepted that the greatest impacts from disamenity dust will occur within 100 m of the source.

[3] The expression 'disamenity dust' has been recently promoted as a suitable expression for 'nuisance' dust, *i.e.* generally visible particulate matter' rather than specifically and in a legal sense to statutory nuisance, as defined in Section 79 of the Environmental Protection Act 1990
[4] Institute of Air Quality Management (2016). *Guidance on the Assessment of Mineral Dust Impacts for Planning (v1.1)*

The nearest residential receptor is within 400 m of the current site, so it is necessary to assess potential disamenity dust impacts at this location. Potential impacts associated with the current and proposed standoff will be assessed and compared.

The Dust and Air Quality Technical Note[5], produced by DS in 2020, assessed the effects of site operations on the nearest receptors to the northeast of site on Stratford Road. The results of the dust assessment, when considering the proposed 300 m standoff, predicted no more than Slight Adverse Effects. Another technical note[6] was also produced to accompany the planning application to import inert waste for restoration. The results were predicted to be the same as existing site operation with no more than Slight Adverse Effects expected at the nearest receptors as a result of infilling activities.

2.2 Fine particulate matter PM_{10} and $PM_{2.5}$

Fine dust, essentially particles up to 10 µm, is commonly referred to as PM_{10}. Particles essentially up to 2.5 µm are commonly referred to as $PM_{2.5}$. PM_{10} and $PM_{2.5}$ are measured to agreed standards and, through the National Air Quality Strategy (NAQS) objectives to be achieved for a range of pollutants, forms part of the Air Quality Objectives (AQO). The AQOs for PM_{10} are 50 µg/m^3 averaged over 24 hours, not to be exceeded more than 35 times per year and 40 µg/m^3 as an annual mean. The annual mean objective for $PM_{2.5}$ is 20 µg/m^3. Currently, there are no 24 hour objectives for $PM_{2.5}$.

The 2016 IAQM minerals guidance states at Section 5.2: *'If the long term background PM_{10} concentration is less than 17 µg/m^3 there is little risk that the Process Contribution (PC) would lead to an exceedance of the annual-mean objective and such a finding can be put forward qualitatively, without the need for further consideration, in most cases.'*

Particulate matter monitoring was carried out at Wroxton School between 28 May and 31 August 2021 (Appendix B) in order to compare levels of PM_{10} and $PM_{2.5}$ with modelled background concentrations and relevant objectives and thresholds.

Despite monitoring during summer months, with prevailing southwesterly winds and generally warm, dry conditions, the overall average PM_{10} concentration recorded during this period was just 6.45 µg/m^3, which was lower than the Defra modelled background concentration for 2021 (13.9 µg/m^3), as well as well within the relevant Air Quality Objectives and the 17 µg/m^3 threshold published in the IAQM minerals guidance.

The overall average $PM_{2.5}$ concentration recorded over the same period was just 2.72 µg/m^3, well below the Defra modelled background concentrations for 2021, and well within the relevant AQO for $PM_{2.5}$.

Consequently, it is unlikely that operations associated with site restoration by infilling with inert material would have significant impacts on PM_{10} and $PM_{2.5}$ concentrations in the locality and lead to an exceedance of an AQO. Therefore, this DEMP concentrates on

[5] ZELWQ_Dust and Air Quality Technical Note_A_Final (2020)
[6] ZELWQ_Dust and Air Quality Technical Note_A (2023)

issues relating to visible 'disamenity' dust, although it will be revised as necessary and in accordance with any changes to the AQO.

2.3 Dust sources

There is a potential for dust emissions to occur at various stages of the operation, but these can generally be controlled by good practice. The specific site activities associated with the proposed importation of inert waste and associated that could give rise to dust are:

- Mobile plant (both on-site and off-site vehicle movements);
- Handling (tipping) imported inert waste;
- Soil, inert waste and on-site waste reinstatement; and
- Wind scouring of exposed surfaces.

2.4 Receptors

Dust receptors can be within or beyond a quarry site boundary. Whilst dust generation within a minerals site is primarily of concern to its operator, staff and visitors, dust can propagate beyond the site boundary to affect people and properties beyond, unless adequate control measures are in place. It is important to recognise that there may be other dust sources in the vicinity of a quarry (such as road traffic or arable farmland).

As determined in previous reports, the receptors at Wroxton quarry are located to the northeast of site. Although some receptors are approximately 100 m from the site boundary (see Figure 2.1) mineral working has only been carried out up to 300 m to the nearest receptor as seen in Appendix A.

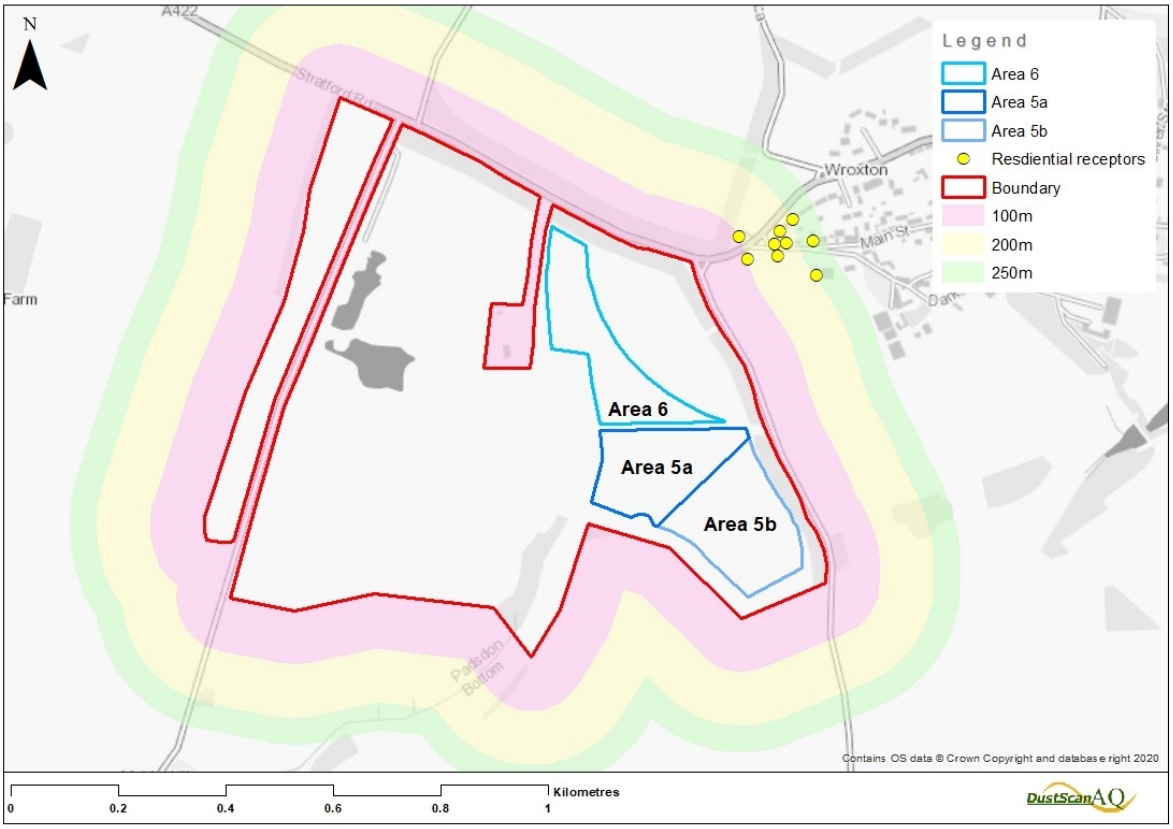


Figure 2.1: Site location and location of receptors

3 Dust and air quality impacts

3.1 Summary

Section 2.2 above states that Wroxton Quarry had no discernible impact on concentrations of PM_{10} or $PM_{2.5}$ during monitoring periods.

With regards to dust nuisance impacts, a dust assessment was previously carried out in 2020 in line with the IAQM minerals guidance[7] (2016) with results showing how the nearest receptors would only be likely to experience up to a Slight Adverse Effect. As previously mentioned in Section 2.1, the technical note[8] accompanying the planning application to import inert material for restoration concluded the same results, with no more than Slight Adverse Effects to be experienced by the nearest receptors.

Following a review of historical dust and PM_{10}/$PM_{2.5}$ monitoring and proposed operations, it was concluded that providing the operator continues to use appropriate mitigation measures, the proposed importation of inert waste and infilling can be carried out without causing adverse impacts to local air quality or dust disamenity.

[7] Institute of Air Quality Management (2016). *Guidance on the Assessment of Mineral Dust Impacts for Planning (v1.1)*
[8] ZELWQ_Dust and Air Quality Technical Note_A (2023)

4 Dust management

Standard good practice on dust control is set out in various publications, including PGN 3/08(12)[9] which sets out at Section 4 a summary of best available techniques for dust control at minerals sites. In accordance with good practice guidance, potentially unacceptable dust emissions from minerals sites can be addressed through a dust management plan[10].

4.1 General requirements

Unacceptable dust emissions can be mitigated by ensuring that routine checks of plant and machinery are carried out and that regular staff training is provided.

All activities with the potential to cause either airborne or wind-blown dust emissions will be monitored appropriately. This will include a visual assessment of any potential impacts at downwind receptors.

Should visible dust be generated, the source/s of the dust will be identified, and the necessary corrective action will be taken. Each event, its cause and the action taken will be recorded in the site logbook.

In order to avoid disamenity impacts at off-site receptors, if site operations are causing visible dust emissions across the site boundary towards a sensitive receptor, these identified operations will be reduced or suspended until the emissions can be controlled.

Site personnel will be empowered to take appropriate action whenever visible dust emissions are observed, or appear likely to occur, as a result of any operation or process on the site.

4.2 Weather conditions

Weather conditions can have a significant effect on the potential for dust propagation from a minerals site. Wind speed, wind direction and precipitation are of particular importance and 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 of antecedent rainfall is considered sufficient to suppress windblown dust for a number of hours.

A trigger system will be adopted to identify those weather conditions when there is an increased or high risk of wind-blown dust. Suggested weather trigger levels are detailed in Table 4.1.

[9] Process Guidance Note (PGN) 3/08 (12) *Statutory guidance for quarry processes* (Defra, 2012)
[10] AEA Technology, 2011: *Good practice guide: control and measurement of nuisance dust and PM_{10} from the extractive industries*

Table 4.1: Weather conditions and corresponding dust 'risk' conditions

Wind speed		Precipitation		
m/s	Beaufort Scale	Dry	Showers	Heavy Rain
> 6	4+ Dust and loose paper raised. Small branches begin to move.	**Red**	**Amber**	**Green**
2 – 6	2 – 3 Wind felt on exposed skin. Leaves rustle. Wind vanes begin to move.	**Amber**	**Green**	**Green**
< 2	0 – 1 Smoke drift indicates wind direction. Leaves and wind vanes are stationary.	**Green**	**Green**	**Green**

Interpretation of the weather trigger levels will be on the basis of:

- Red: All exposed areas of loose bare ground will be inspected and will be dampened down with the water bowser throughout the day;
- Amber: Loose bare ground within 100 m of the site boundary will be inspected and the water bowser will be used to dampen down as necessary, and
- Green: no action necessary.

As an overriding requirement, during dry windy weather, i.e. 'red' conditions as defined in Table 4.1, if any operations are identified as causing or likely to cause visible emissions across the site boundaries, or if abnormal emissions are observed within the site, the Site Manager will immediately modify, reduce or suspend those operations until either effective remedial actions can be taken or the weather conditions giving rise to the emissions have moderated.

A wind rose for Little Rissington (the nearest available reporting station to Wroxton Quarry with sufficient data), approximately 30 km southeast of the site for 'dry' hours[11] winds (for 2014 – 2018) is presented at Figure 4.1.

The wind rose shows the predominant wind direction for the area is from the southwest. Given that the majority of residential receptors are located to the east of Area 6, additional precautions, such as more frequent use of the water bowser and more regular visual inspections, should therefore be taken when winds are travelling from the southwest or west.

[11] Dry' hours are those with less than 0.2 mm liquid equivalent precipitation and are associated with an increased risk of dust propagation

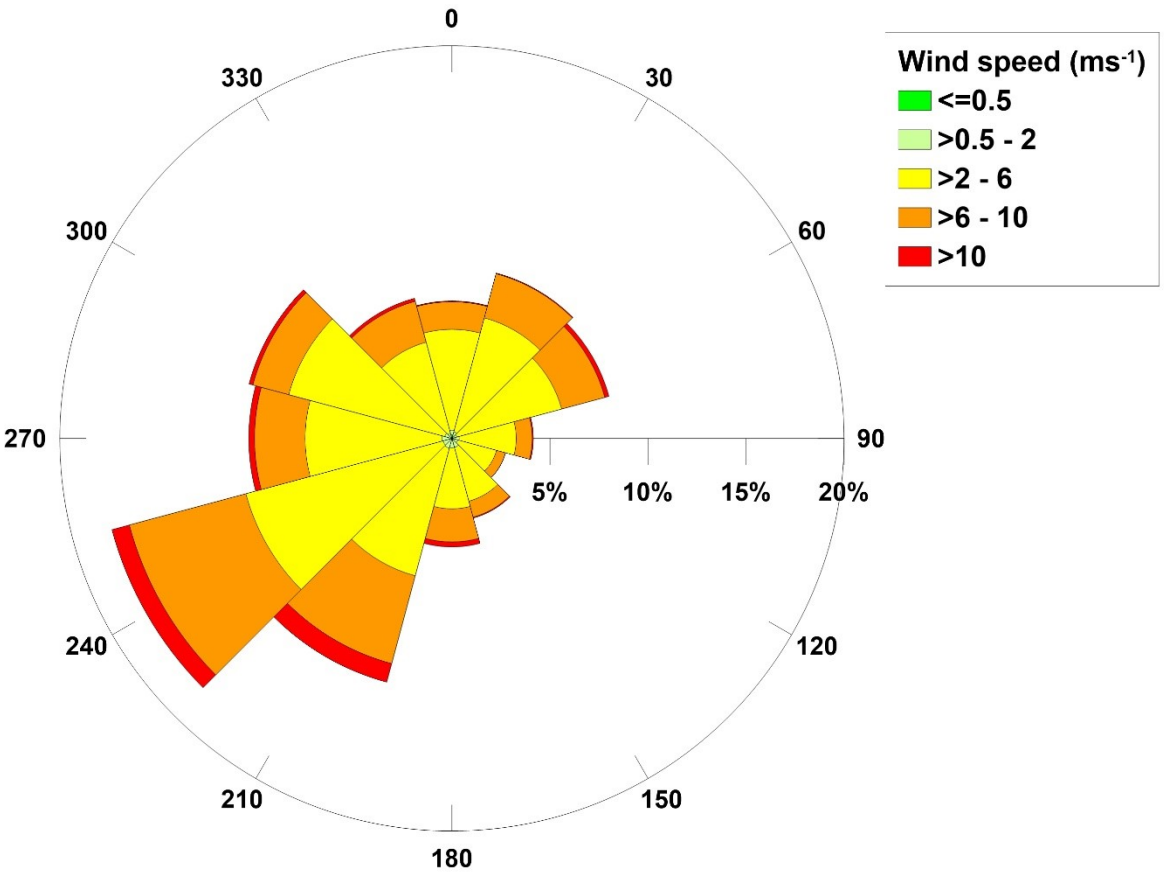


Figure 4.1: 5-year average wind rose, Little Rissington 2014 – 2018

4.3 Process controls

As summarised in Section 3.1, the site can be operated in a manner unlikely to impact dust disamenity and local air quality providing appropriate control measures are implemented.

Specific control measures for the dust sources identified in Section 2.3 that could be associated with the proposed importation of inert waste and infilling are set out below.

4.3.1 Mobile plant (both on-site and off-site vehicle movements)

The greatest risk of dust from mineral workings is often considered to be associated with site traffic and there is a high risk of dust emissions from transport on unpaved roads unless appropriate mitigation measures are applied.

As a general rule, mobile plant with upward or sideways exhausts will be used and all site haulage will keep to designated haul routes.

Vehicles leaving the site will be sheeted and be checked for loose deposits that could fall onto the public highway. Any spillages will be cleared as quickly as possible by appropriate means to prevent unnecessary track-out onto the public highway. All HGVs leaving the site will pass through the wheel wash before joining the A422.

A tractor and water bowser will be used for damping down internal haul roads around the quarry. The frequency of use of the water bowser will be determined by the Site Manger and will depend on site and weather conditions. As a general rule, the water bowser will be used more frequently in warmer, drier conditions when there is an increased risk of internal haul routes 'drying-out' and dust emissions from mobile plant movement.

Unmade access roads will be kept in good repair and all vehicles will keep to the site speed limit of 10 mph. All vehicles on-site will be operated in accordance with the Anti-idling Policy set out in Appendix C.

All plant within the quarry is less than 3 years old and have engines which comply with the latest European Stage V non-road emissions standards. The transport used on-site are all Scania XT models with Euro 6 diesel engines with an ad-blue system. If Earthline need to replace any mobile plant, all new plant will have the latest Euro 6 diesel engines.

Regular visual monitoring of the haul road, access and the A422 shall also take place to ensure that any spills are identified as soon as practicable.

4.3.2 Handling (including tipping) imported inert waste

The risk of airborne dust propagation emissions from imported inert waste for infilling will depend on the type and nature of the material. HGVs transporting inert waste to site will be covered whilst using the public highway and site access road.

Visible dust emissions from tipping will generally be short-lived. Tipping will be avoided near the site boundary closest to off-site receptors. Imported material will be checked prior to tipping. Dry, friable material will be wetted down prior to tipping in dry, windy conditions. Drop heights at any transfer points will be minimised (although there will be no transfer points associated with the inert landfill activity). Waste consisting of solely or mainly dusts, powders or loose fibres will be rejected from site. Full details of any rejected waste consignments will be noted and an incident report will be entered into the site diary. In addition, a rejected load form will be completed and the site/customer will be informed.

Additional control measures, such as wetting down with a water bowser, will be used for imported material where there is a risk of wind-blow across the site boundary towards offsite receptors.

4.3.3 Soil, imported inert waste and on-site waste reinstatement

There is the potential for high levels of airborne and wind-blown dust propagation during reinstatement.

Unacceptable dust emissions from reinstatement can be controlled be minimising working with soil, inert waste and quarry waste in very dry, windy conditions, by reducing drop heights at transfer points (although there will be no transfer points associated with the inert landfill activity) and controlling vehicle speeds. Extra precaution will be taken working near the working boundary closest to the offsite receptors.

Additional control measures, such as the using the water bowser, will be used where there is a risk of wind-blow across the site boundary towards off-site receptors. Operations will be

suspended if visible dust emissions being carried towards off-site receptors cannot be controlled.

4.3.4 Wind scouring of exposed surfaces

The effects of wind-blow across stripped surfaces, unpaved vehicle circulation areas, and other areas of bare ground will be minimised by ensuring that loose materials are removed or treated as necessary. Additionally, dust emissions from exposed surfaces such as internal haul routes, will be minimised by wetting down with a water bowser as necessary, especially in periods of dry, windy weather.

Dust emissions from exposed surfaces will be minimised during operating hours by wetting down surfaces with a water bowser, especially in periods of dry, windy weather. This will also be undertaken at the end of the working day if conditions are expected to continue to be dry and windy to prevent dust emissions outside of operating hours.

There will not be any stockpiles associated with the importation of inert material for infilling.

4.3.5 Other general controls

General matters and the management of the site can affect the likelihood of significant dust emissions. These include:

- The use of clean water for dust suppression to avoid re-circulating fine material;
- High standards of house-keeping to minimise track-out and wind-blown dust; and
- Effective staff training in respect of the causes and prevention of dust.

The water supply to the wheel-wash and water bowser will be protected against frost to ensure its availability at all times.

4.4 Maintenance

Effective control of airborne dust emissions requires the maintenance and proper operation of all plant and equipment, including fixed and mobile dust extraction and suppression equipment.

A programme of planned maintenance will be carried out on all plant and equipment in accordance with the manufacturers' recommendations to ensure that it operates at optimum efficiency. Stocks of essential spares and consumable items will be held at the site or kept readily available for use at short notice.

Any malfunction or breakdown leading to abnormal emissions will be dealt with promptly and operations will be modified or suspended until normal working can be restored. All such malfunctions and the actions taken will be recorded in the site logbook.

4.5 Site management

The Site Manager will exercise, either personally or by delegation to suitably trained and responsible staff, day-to-day control of the site. They will be responsible for the satisfactory

working of the whole site and for ensuring full compliance with the dust management and monitoring plan.

Staff at all levels will receive the necessary training and instruction in their duties relating to all operations and the potential sources of dust emissions. Particular emphasis will be given to plant and equipment malfunctions and abnormal conditions.

The Site Manager will ensure that customers and suppliers are aware of the need to comply with the provisions of this plan so far as they are relevant to their activities on site. Specifically, an information sheet summarising the requirements in respect of road transport will be handed to drivers employed by external haulers. The drivers will be asked to sign for the sheet, acknowledging that they have read and understood the requirements.

Any member of staff who fails to comply with the provisions of the dust management and monitoring plan will be re-trained and may also be subject to disciplinary action. External hauliers failing to observe the requirements in respect of vehicle operations will be asked to leave the site.

4.6 Other consideration

Clean water supply for the bowser will be sourced from the rainwater storage lagoons. The storage lagoons provide more than enough water for the water bowser and wheel-wash.

In the event of a water shortage, dust suppression throughout the site will be a priority. If in extreme circumstances where there is not enough water in the lagoons, mains water will be utilised and some or all site operations will be suspended so as not to cause adverse dust impacts beyond the site boundary.

5 Monitoring

As summarised in the Technical Note, there would be no significant change in the magnitude of dust effects as a result of infilling and restoration activities working up to the proposed circa 300 m standoff on Area 6, provided all mitigation measures continue to be deployed on site and provided that appropriate care is taken when working along sensitive site boundaries and in Area 6 in particular. The visual and particulate matter monitoring procedures are given below.

5.1 Visual

All activities with the potential to cause either airborne or wind-blown dust emissions will be monitored appropriately. This will include a visual assessment of any potential impacts at downwind receptors, particularly when working within Area 6 and/or in dry, windy conditions.

A daily site inspection will be carried out by the Site Manager (or other suitably qualified person). The current weather conditions will be recorded, and the Site Manager will determine the appropriate control measures to deploy to reduce dust emissions e.g. use of the tractor and water bowser to dampen down haul roads.

The visual monitoring locations will vary depending on the current phase of the infilling activities; however; visual assessments will include any potential impacts at downwind receptors, particularly when working close to the site boundary and/or in dry, windy conditions.

In addition to the daily inspection by the Site Manager, all staff working at the site will be responsible for monitoring and reporting visible dust emission at all times. Staff will be provided with radios to contact the Site Manager or Supervisor to update them on the current site conditions.

Should visible dust be generated, the source/s of the dust will be identified, and the necessary corrective action will be taken. Each event, its cause and the action taken will be recorded in the site logbook.

There are no arrangements to carry out visual monitoring outside of operating hours. However, a 24/7 contact number will be made available to local residents to report any complaints or concerns in the unlikely event that dust impacts occur outside of operating hours.

5.2 Particulate matter monitoring

As detailed above in Section 2.2 baseline particulate matter monitoring was conducted in 2021.

After completion of the three months it was found that the PM_{10} levels are within the 17 $\mu g/m^3$ threshold for further consideration (as recommended in the IAQM minerals guidance), therefore the need for further particulate matter monitoring has be scoped out. If there is any change to the AQO for PM_{10} or $PM_{2.5}$, the requirement for real-time particulate matter monitoring will be reconsidered.

5.3 Response

The results of the dust monitoring programme will be used to evaluate site dust control at Shellingford Quarry. As set out below, results of the dust monitoring programme will be reported to CDC and EA as requested, and the dust monitoring data will be reviewed in relation to any relevant community response or complaint records.

A record will be kept of the findings of the visual dust monitoring and of any actions which are subsequently taken.

The suitability of the dust monitoring regime will be reviewed over time. Any potential revision to include passive dust monitoring or real-time particulate matter monitoring, the sampling locations, methods or trigger levels will be discussed with CDC/EA before implementation.

6 Emergency response

An emergency response procedure, to be followed in the event of a major dust emission, will be kept at the site office.

For the purposes of emergency response, major dust emissions will be defined as including:

- visible dust crossing the site boundaries;
- persistent fugitive dust from mineral processing;
- persistent fugitive dust when loading or tipping soils, minerals or inert waste;
- persistent fugitive dust from transport or plant movements; and
- persistent wind-blown dust.

The contact details of key personnel and organisations will be listed in the procedure.

7 Complaints

All complaints regarding dust emissions will be recorded and reported to the Site Manager, who will investigate the circumstances and ensure that the necessary corrective measures are taken.

In the event of a complaint from a member of the public regarding dust emissions from the site, a record will be kept and made available to the relevant authorities as required.

All complaints will be investigated as soon as possible, and the complainant kept informed throughout the investigation. All complaints will be logged in the format described in Appendix D. The relevant authorities will be kept informed of the results of any subsequent investigation.

In the event of multiple complaints associated with different operations, site operations will be reduced or suspended until the investigation into the complaints is complete.

In the event of repeat complaints for the same operations, the operation/source of concern will be reduced or suspended until a further investigation has been carried out to identify the reason for repeated failure to control dust emissions. Following the outcome of the further investigation, additional control measures will be adopted.

In the event of any dust complaint substantiated after consultation with the relevant authorities, the effectiveness of the DEMP will be reviewed and updated.

8 Review and update

The continuing effectiveness of this dust management and monitoring plan will be reviewed annually. The reviews will take into account the compliance records, complaints history, monitoring records and any recent sensitive developments on neighbouring land.

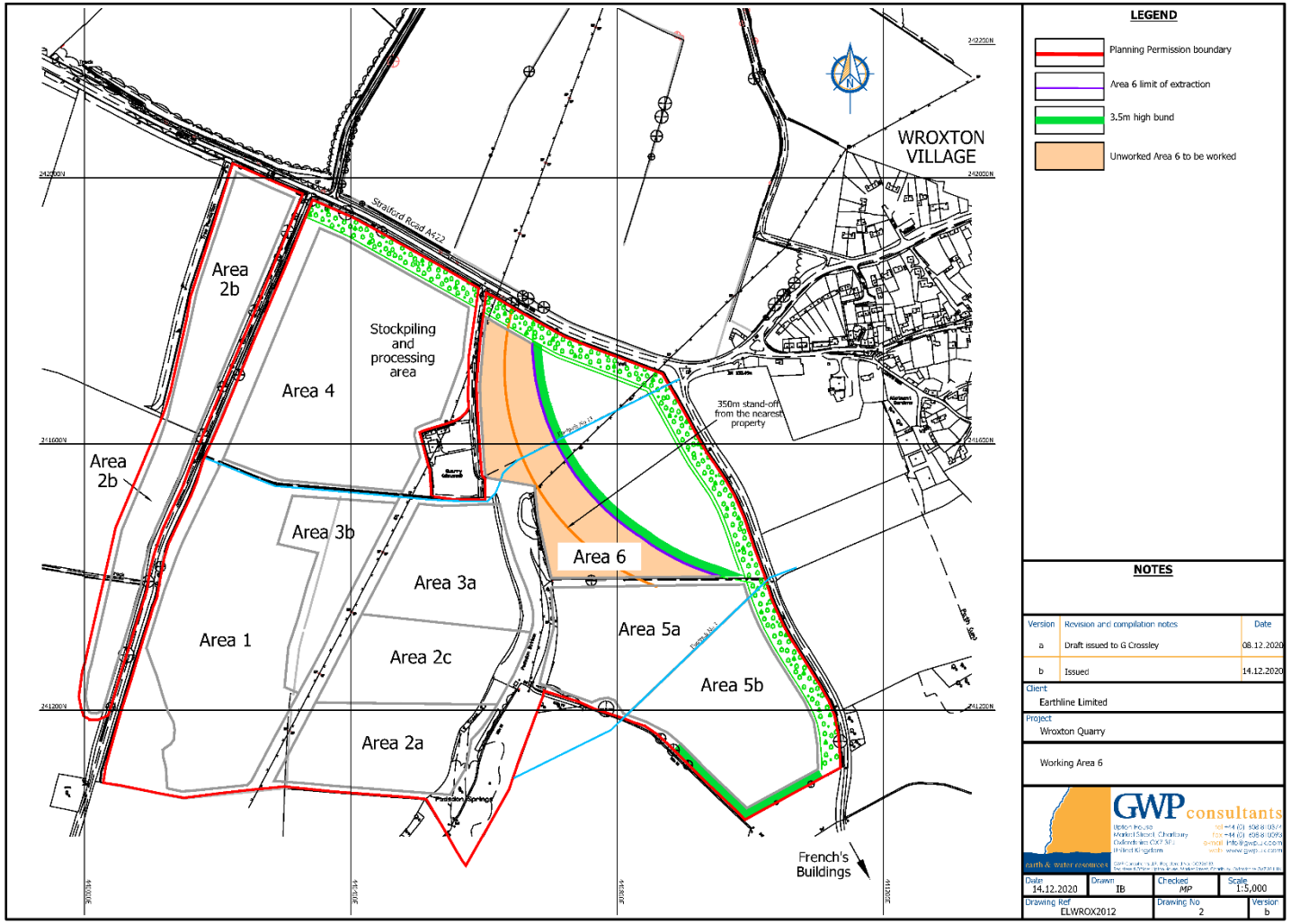
Reviews of the plan will also be undertaken in the event of:

- Changes to the AQO for PM_{10} and/or $PM_{2.5}$;
- Dust complaints from nearby residents or businesses;
- Significant changes to site operations; or
- Introduction of new receptors within close proximity to the site.
- Consistently high results from the directional dust risk criteria in the direction of sensitive receptors; or
- Consistently high or low results from the twice-yearly PM_{10} and $PM_{2.5}$ monitoring.

The DEMP will be amended as necessary, including any changes to the monitoring methods and control measures which may be agreed.

DustScanAQ
February 2023

Appendix A: Site layout plan



Appendix B: Addendum to DEMP, Baseline PM Monitoring Report

Baseline Particulate Matter Monitoring Report

Earthline Ltd

November, 2021

Wroxton Quarry

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Document Control Sheet

Project Information

Title	Baseline Particulate Matter Monitoring Report
Project Ref	ZELWQ
Report Ref	ZELWQ Baseline PM Monitoring Report_RevA_Final
Report Type	Baseline Monitoring Report
Client	Earthline Ltd
Client Contact	Gemma Crossley (GMKC Ltd)
Revision	A
Status	Final
Date of Issue	29/11/2021

Revision History

Revision	Date	Author	Reviewer	Approver	Status
A	20/10/2021	David Povey	Daniel Quinn	Daniel Quinn	Draft
A	29/11/2021	David Povey	Daniel Quinn	Daniel Quinn	Final

Distribution

Organisation	Contact	Date of Issue	Copies
GMKC Ltd	Gemma Crossley	29/11/2021	1

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 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
Griffin House
Market Street
Charlbury
Oxford OX7 3PJ
United Kingdom
Tel: + 44 (0) 1608 810110
E-mail: info@dustscan.co.uk
Web: www.DustScan.co.uk

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1 Introduction

Earthline Ltd (Earthline) instructed DustScanAQ (DSAQ) to carry out baseline PM_{10} and $PM_{2.5}$ monitoring in close proximity to Wroxton Quarry, near Banbury in Oxfordshire. This baseline monitoring is required as set out in the Dust and Air Quality Technical Note[1] and Dust Management Plan (DMP)[2] DSAQ produced in regard to the proposed workings within Area 6 of the Quarry.

The quarry extracts ironstone and the main concern is the impacts it will have on the village of Wroxton.

As detailed within the DMP, provided that the measured baseline PM_{10} and $PM_{2.5}$ levels are comparable to the modelled background concentrations, and provided the PM_{10} levels are within the 17 µg/m^3 threshold for further consideration (as recommended in the IAQM minerals guidance), the need for further particulate matter monitoring can be scoped out.

This report summarises the PM_{10} and $PM_{2.5}$ concentrations recorded from this baseline monitoring programme between 28 May 2021 – 31 August 2021.

2 Site setting and sampler location

Wroxton Quarry is located along the A422 approximately 320 m to the west of the village of Wroxton, in north Oxfordshire. It is surrounded on all sides by agricultural land. The village of Balscote lies approximately 950 m to the west of site.

The nearest residential receptor to site lies 100 m to the west of the existing planning boundary, 350 m from the current working area boundary, and approximately 300 m from the proposed revised working area.

There are no national or local designated ecological sites (such as Sites of Special Scientific Interest (SSSI) Special Areas of Conservation (SPA) or Local Wildlife Reserves (LWR)) within 1 km of the site.

A site visit was undertaken on 09 November to assess the site, its surrounding area and the extent of vegetative screening along the site boundary. The site is well screened by dense hedges on all sides, with thick hedges present in particular along the northern and eastern site boundaries (i.e. the boundaries closest to Wroxton and residential receptors).

As the main concern is impacts on Wroxton Village a Turnkey Osiris real-time continuous particulate matter monitor was installed at Wroxton Primary School on 28 May 2021 which is approximately 325 m to the east of the quarry as shown in Figure 2.1. Figure 2.2 also presents a site map showing current site extraction areas and the proposed workings of Area 6.

[1] ZELWQ_Dust and Air Quality Technical Note_A_Final
[2] ZELWQ_DMP_A_Final

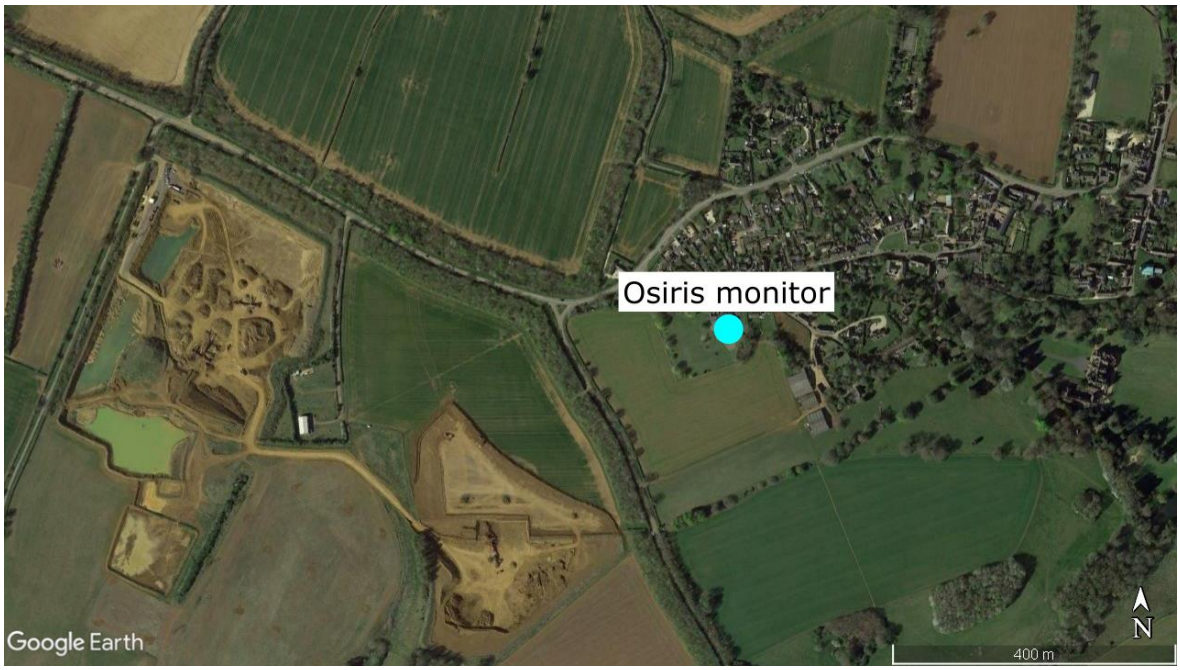

Figure 2.1: Osiris monitoring location, Wroxton Primary School, Wroxton

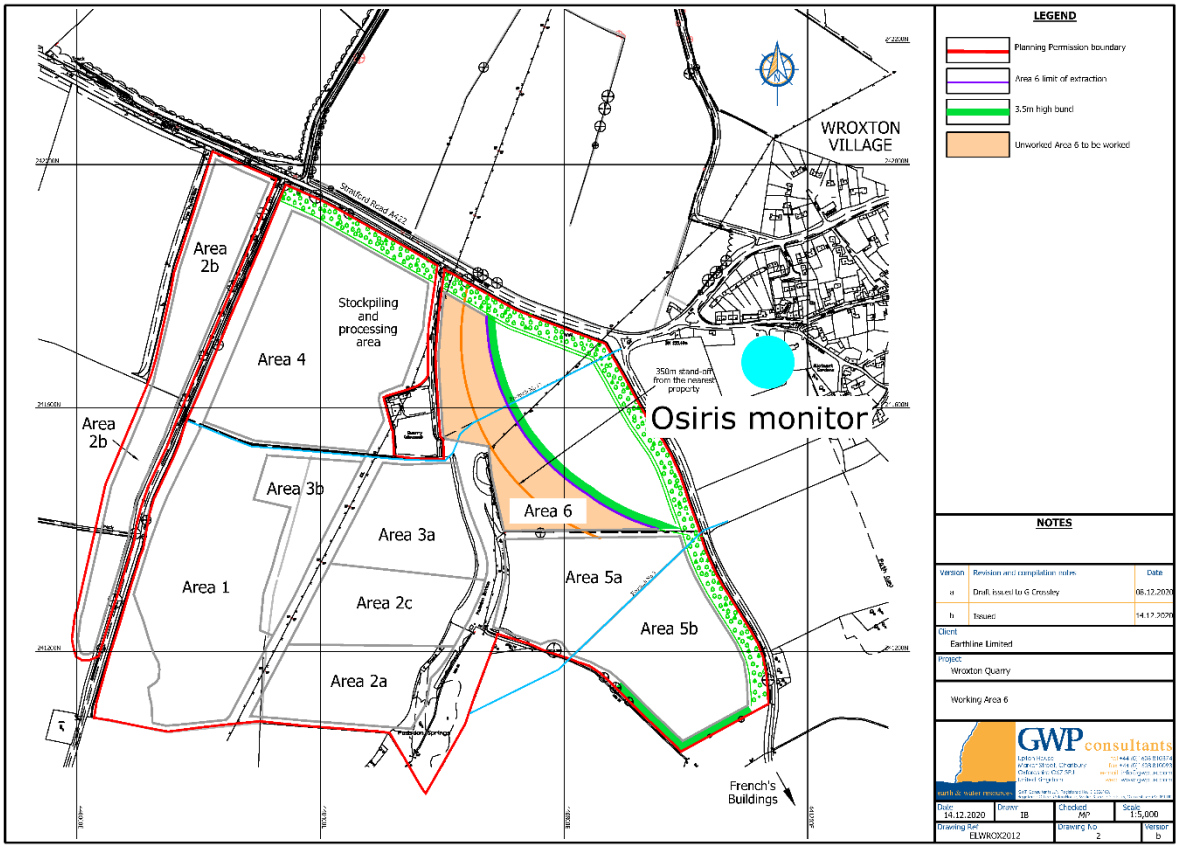

Figure 2.2: Site map showing current extraction areas and planned extraction area of Area 6

3 Relevant air quality standards

'Dust' is generally regarded as particulate matter up to 75 µm (microns) diameter and can be considered in two categories. 'Fine' dust including particles up to 10 µm and 2.5 µm in diameter is commonly referred to as PM_{10} and $PM_{2.5}$ respectively and is measured to agreed standards and forms part of the National Air Quality Objectives (AQO).

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

A summary of the relevant AQO for PM_{10} and $PM_{2.5}$ are stated in TG.16[3] and are presented in Table 3.1. Although the Osiris is not a filter reference device, the instrument is certificated by MCERTS[4] for PM_{10} in the range 0 – 100 µg/m^3. As such, tentative comparisons against the below AQO can be made in this report for the purposes of assessing baseline data.

Table 3.1: AQOs relevant to PM_{10} and $PM_{2.5}$

Pollutant	**Air Quality Objectives**		**Concentration measured as:**	**Applicable to:**
	Concentration	Allowance		
Particulate Matter (PM_{10})	50 µg/m^3	35 per calendar year	24-hour mean	All local authorities
	40 µg/m^3	N/A	Annual mean	All local authorities
Particulate Matter ($PM_{2.5}$)	25 µg/m^3	N/A	Annual mean	All local authorities

Source: Defra (TG16)

[3] Department for Environment Food and Rural Affairs (2014): 'Local Air Quality Management Technical Guidance' (TG16).
[4] http://turnkey-instruments.com/wp-content/uploads/2016/11/MC09015705.pdf

4 Baseline PM conditions

In the absence of site-specific or local authority monitoring data, modelled background concentrations have been obtained from Defra, who provide background pollution concentration estimates to assist local authorities in undertaking their 'Review and Assessment' work. This data is available to download from the Defra air quality resource website for NO_x, NO_2, PM_{10} and $PM_{2.5}$ for every 1 km x 1 km grid square for all local authorities. The current dataset is based on 2018 background data and future year projections are available for 2018 to 2030.

The estimated PM_{10} and $PM_{2.5}$ concentrations for 2018 (the Defra baseline year), 2021 and 2022 for the grid squares at the proposed development site and village of Wroxton are set out in Table 4.1 and Table 4.2.

Table 4.1: Defra estimated background ambient PM_{10} concentrations for the grid squares in which the quarry and receptors are located

Grid reference		PM_{10} concentration (µg/m^3)		
Eastings	**Northings**	**2018**	**2021**	**2022**
440500	241500	14.8	14.1	14.0
441500	241500	14.4	13.7	13.5
Average		**14.6**	**13.9**	**13.75**
As % of annual AQO		**36.5%**	**34.8%**	**34.4%**

Table 4.2: Defra estimated background ambient $PM_{2.5}$ concentrations for the grid squares in which the quarry and receptors are located

Grid reference		$PM_{2.5}$ concentration (µg/m^3)		
Eastings	**Northings**	**2018**	**2021**	**2022**
440500	241500	9.1	8.6	8.4
441500	241500	9.1	8.6	8.5
Average		**9.1**	**8.6**	**8.45**
As % of annual AQO		**36.4%**	**34.4%**	**33.8%**

Table 4.1 shows that the 2021 predicted PM_{10} background concentration in the vicinity of the site is approximately 34.8 % of the annual mean objective (40 µg/m^3) whilst the 2022 predicted PM_{10} background concentration is 34.4 % of the annual mean objective.

Table 4.2 shows that the 2021 predicted $PM_{2.5}$ background concentration in the vicinity of the site is approximately 34.4 % of the annual mean objective (25 µg/m^3), whilst the 2022 predicted $PM_{2.5}$ background concentration is approximately 33.8 % of the annual mean objective.

5 Methodology

5.1 Weather monitoring

No weather monitoring is currently undertaken on site. Consequently, data have been obtained from the closet Met Station in Little Rissington, roughly 30 km to the southeast of Wroxton. The main weather parameters relevant to this investigation and to dust propagation in general are precipitation, temperature, wind speed and wind direction.

5.2 Real-time particulate matter monitoring

One Turnkey Osiris real-time continuous particulate matter monitor was installed by DS on 28 May 2021 for a three-month period. As stated above, this instrument has MCERTS 'indicative' certification and Osiris data may be tentatively compared against the relevant AQOs for PM_{10} and $PM_{2.5}$. The monitor is located at Wroxton Primary School on 28 May 2021 which is approximately 325 m to the east of the quarry as shown in Figure 2.1.

The monitor has been set to record PM_{10} concentrations at 15-minute averaging periods. If the 15-minute average exceeds 100 µg/m^3 an alert was sent to Wroxton Quarry staff and DustScanAQ via email.

6 Results

6.1 Weather monitoring summary

The key weather variables which could affect dust propagation (wind speed, wind direction, total daily precipitation and average daily temperature) are summarised in Figure 6.1 and Figure 6.2 below for this monitoring period.

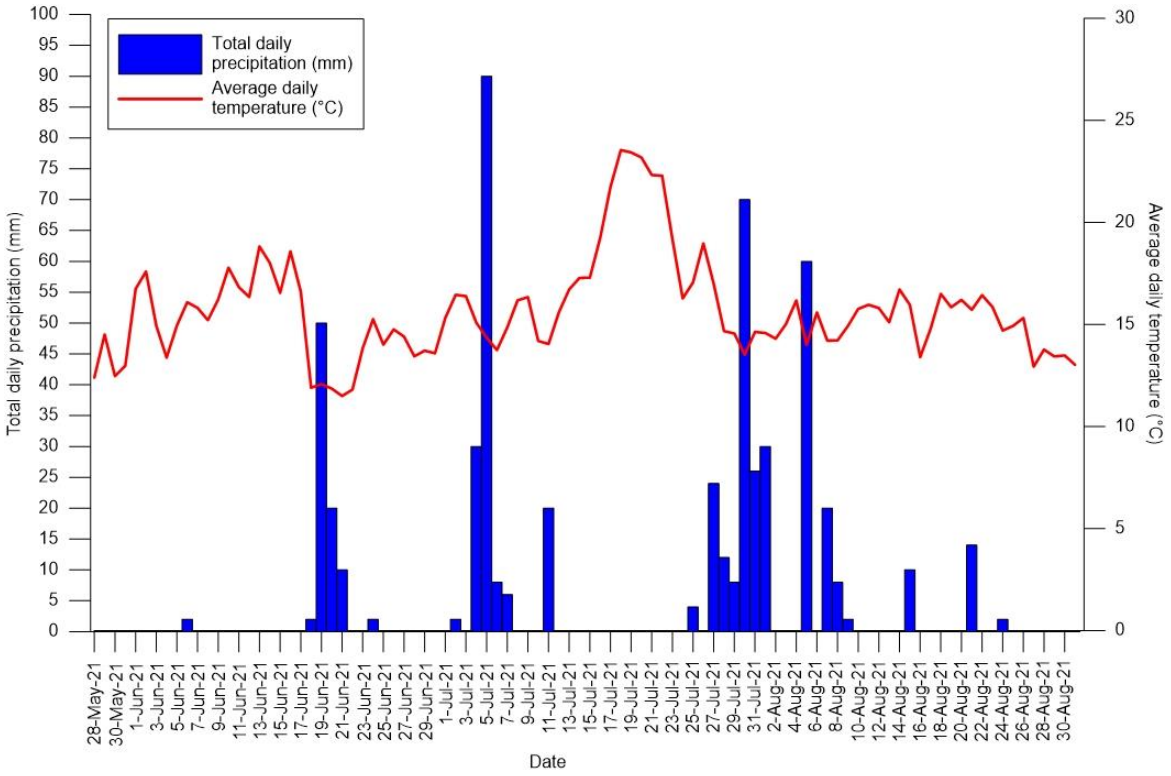

Figure 6.1: Average daily precipitation and total daily rainfall, Little Rissington Met Station, 28 May – 31 August 2021

Temperatures recorded between 28 May – 31 August 2021 were generally warm throughout with the 24-hour average temperatures ranging between 11.5 °C and 23.5 °C. The average temperature for this period was 15.7 °C.

Rainfall was recorded on approximately quarter of the days (27%) over the monitoring period. Dry periods were also recorded in early-mid and late June, mid-July and towards the end of August. These dry and warm conditions recorded would likely have increased the potential for dust to propagate beyond the site's boundary, potentially impacting receptors at Wroxton Village.

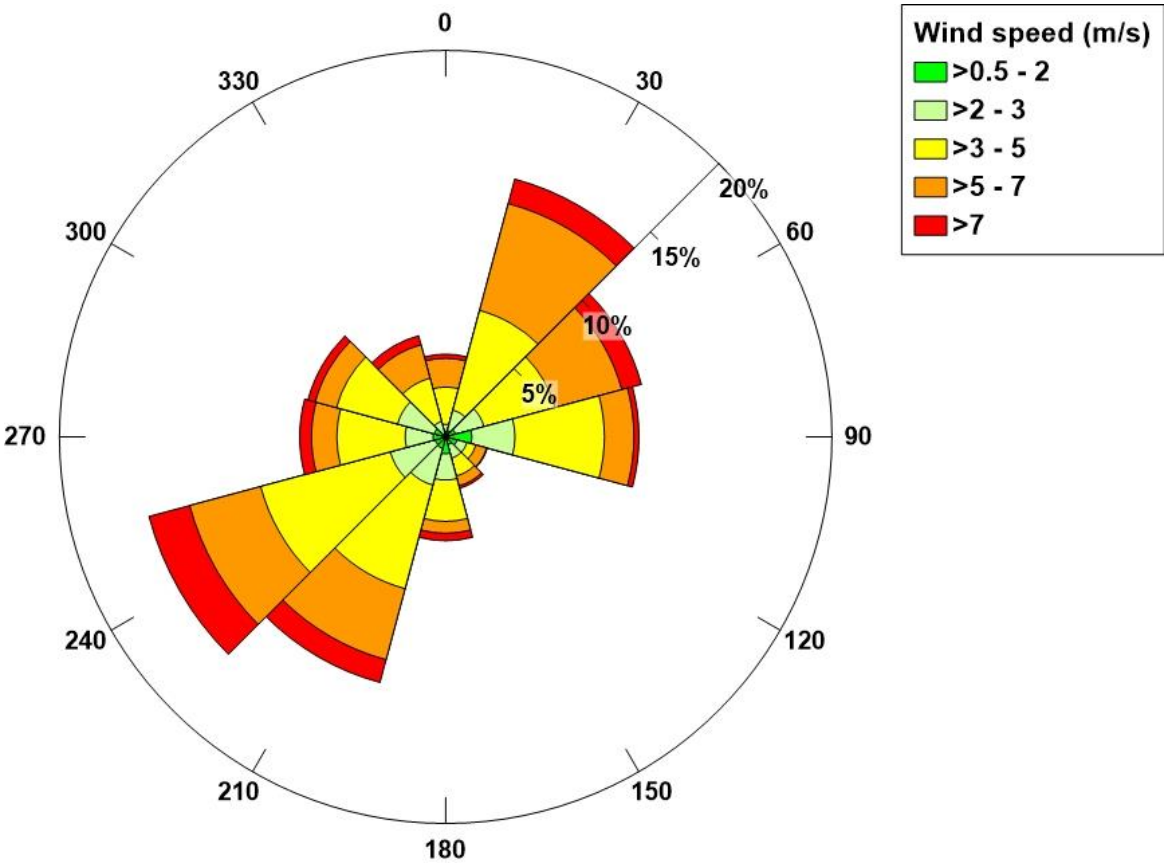

Figure 6.2: Wind speed and wind direction, Little Rissington Met Station, 28 May – 31 August 2021

Figure 6.2 shows that winds were predominantly recorded from southwest and were typically moderate in speed (>3 – 5 m/s), however, approximately 11% of winds recorded from the southwest were high (>5 m/s). Winds were also frequently recorded from the northeast with a higher proportion of the winds being high (>5 m/s).

This pattern of wind speed and direction (from the southwest) may have led to increased dust propagation to the northeast which could have had a slight impact of Wroxton village. However the high frequency of winds from the northeast also suggests a lot of the time dust from the site would have been propagating away from Wroxton village.

6.2 PM_{10} monitoring

Daily average PM_{10} concentrations have been calculated between 28 May – 31 August 2021 and presented in Figure 6.3.

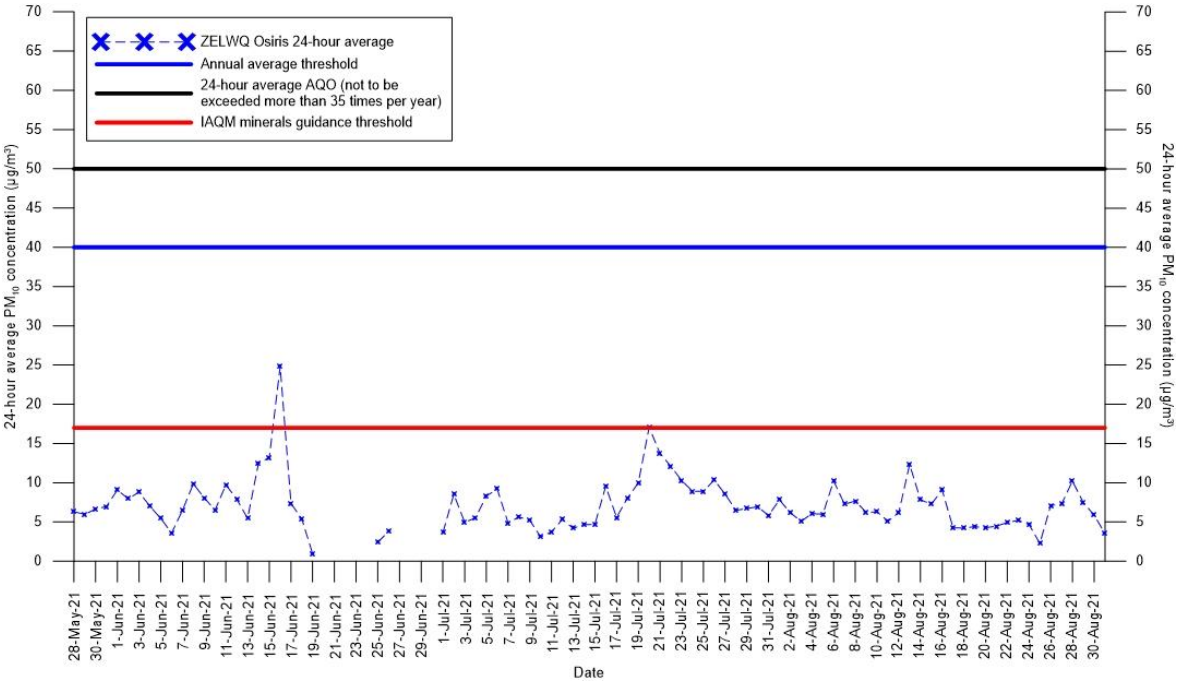

Figure 6.3: Daily average PM_{10} concentrations, 28 May – 31 August 2021

It is important to note that no data was available from the Osiris monitor on-site for the 20 – 24 June due to a blockage of the monitor, and between 27 – 30 June due the monitor malfunctioning and was subsequently replaced with another Osiris monitor.

PM_{10} concentrations were well below the annual and 24-hour AQOs throughout this monitoring period with no exceedances recorded of either of these, as seen in Figure 6.3. The average PM_{10} concentration for this monitoring period was 6.45 µg/m^3, which is approximately 16 % of the annual AQO. Concentrations recorded increased slightly during dry periods, however mostly remained well below the relevant thresholds.

During the majority of sampling PM_{10} concentrations remained lower than the Defra modelled background concentrations for 2021 (13.9 µg/m^3) and the 2016 IAQM minerals guidance value (17 µg/m^3). However, PM_{10} concentrations greater than these were recorded on just two days, 16 June 2021 (24.81 µg/m^3) and 20 July 2021 (17.05 µg/m^3). It was confirmed with the headteacher of the school that the elevated levels recorded on 16 June were caused by an extended dry period, followed by mowing of the grass lawn close to the monitor.

It should be reiterated that the IAQM minerals guidance threshold (17 µg/m^3) is for long-term background concentrations. Therefore, the overall average for this period (6.45 µg/m^3) is well within this threshold, despite exceedances of this level on two days.

6.3 $PM_{2.5}$ monitoring

Daily average $PM_{2.5}$ concentrations have been calculated between 28 May – 31 August 2021 and presented in Figure 6.4.

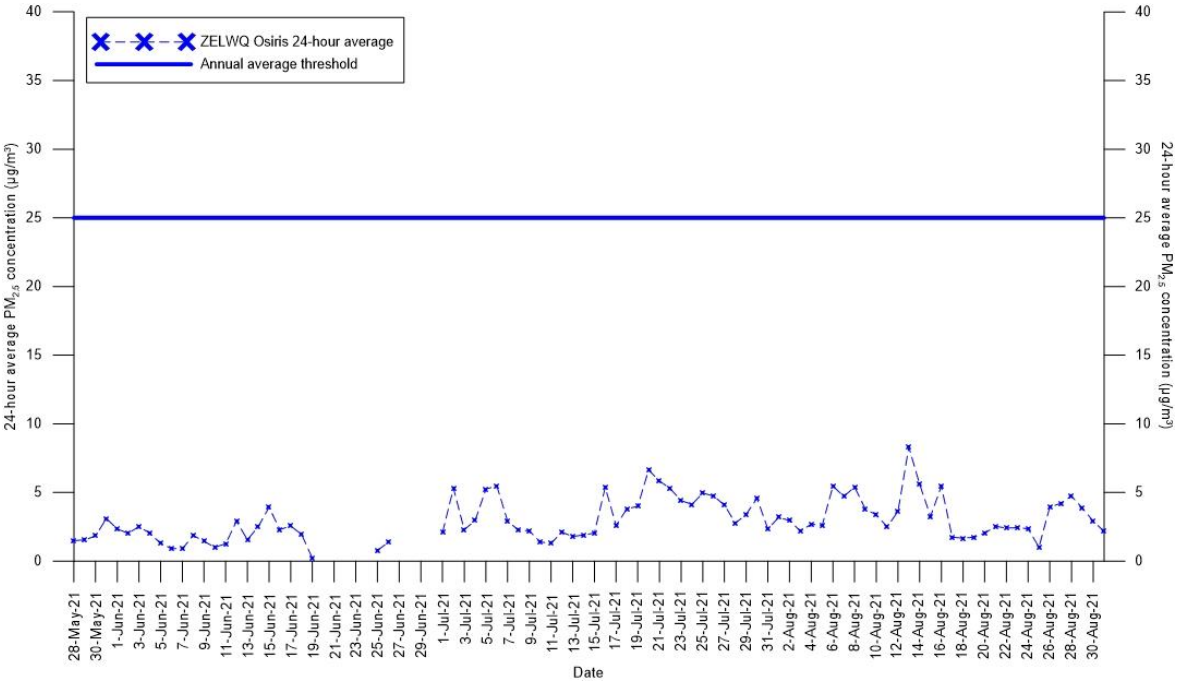

Figure 6.4: Daily average $PM_{2.5}$ concentrations, 28 May – 31 August 2021

As stated above no data was available from the Osiris monitor on-site for the 20 – 24 June and 27 – 30 June.

As seen in Figure 6.4, no exceedances of the annual AQO for $PM_{2.5}$ were recorded on-site during this monitoring period. The average $PM_{2.5}$ concentration for this monitoring period was 2.72 µg/m^3, which is approximately 11 % of the annual AQO. Concentrations recorded increased slightly during dry periods, however mostly remained well below the relevant thresholds.

No exceedances of 2021 Defra modelled background concentrations (8.6 µg/m^3) were recorded during the monitoring period.

7 Discussion and summary

Particulate matter monitoring was carried out at Wroxton School between 28 May and 31 August 2021 in order to compare levels of PM_{10} and $PM_{2.5}$ with modelled background concentrations and relevant objectives and thresholds.

Despite monitoring during summer months, with prevailing southwesterly winds and generally warm, dry conditions, the overall average PM_{10} concentration recorded during this period was just 6.45 µg/m^3, which was lower than the Defra modelled background concentration for 2021, as well as well within the relevant Air Quality Objectives and the 17 µg/m^3 threshold published in the IAQM minerals guidance.

The overall average $PM_{2.5}$ concentration recorded over the same period was just 2.72 µg/m^3, well below the Defra modelled background concentrations for 2021, and well within the relevant Air Quality Objective for $PM_{2.5}$.

As outlined in the Dust Management Plan for Wroxton Quarry, given that the measured PM_{10} and $PM_{2.5}$ levels were well below the relevant background concentrations and thresholds, the need for further particulate matter monitoring can be scoped out.

DustScanAQ
November 2021

Appendix A: Raw PM_{10} and $PM_{2.5}$ data

Date	Daily Average PM_{10} concentration (µg/m^3)	Daily Average $PM_{2.5}$ concentration (µg/m^3)
28/05/2021	6.30	1.52
29/05/2021	5.97	1.53
30/05/2021	6.65	1.86
31/05/2021	6.97	3.11
01/06/2021	9.08	2.35
02/06/2021	7.95	2.03
03/06/2021	8.81	2.52
04/06/2021	6.99	2.04
05/06/2021	5.45	1.29
06/06/2021	3.59	0.92
07/06/2021	6.49	0.90
08/06/2021	9.86	1.88
09/06/2021	8.08	1.44
10/06/2021	6.52	1.01
11/06/2021	9.73	1.28
12/06/2021	7.91	2.91
13/06/2021	5.46	1.56
14/06/2021	12.47	2.51
15/06/2021	13.22	3.92
16/06/2021	24.81	2.31
17/06/2021	7.36	2.56
18/06/2021	5.38	1.94
19/06/2021	0.90	0.20
20/06/2021	N/A	N/A
21/06/2021	N/A	N/A
22/06/2021	N/A	N/A
23/06/2021	N/A	N/A
24/06/2021	N/A	N/A
25/06/2021	2.42	0.79
26/06/2021	3.79	1.38
27/06/2021	N/A	N/A
28/06/2021	N/A	N/A

Date	Daily Average PM_{10} concentration (µg/m^3)	Daily Average $PM_{2.5}$ concentration (µg/m^3)
29/06/2021	N/A	N/A
30/06/2021	N/A	N/A
01/07/2021	3.66	2.09
02/07/2021	8.52	5.32
03/07/2021	4.97	2.30
04/07/2021	5.51	2.95
05/07/2021	8.30	5.25
06/07/2021	9.20	5.49
07/07/2021	4.87	2.91
08/07/2021	5.64	2.27
09/07/2021	5.21	2.21
10/07/2021	3.10	1.40
11/07/2021	3.74	1.30
12/07/2021	5.31	2.11
13/07/2021	4.20	1.80
14/07/2021	4.67	1.91
15/07/2021	4.69	2.05
16/07/2021	9.56	5.38
17/07/2021	5.57	2.60
18/07/2021	8.04	3.82
19/07/2021	9.98	4.00
20/07/2021	17.05	6.64
21/07/2021	13.73	5.85
22/07/2021	12.09	5.27
23/07/2021	10.27	4.42
24/07/2021	8.92	4.13
25/07/2021	8.90	4.97
26/07/2021	10.36	4.74
27/07/2021	8.53	4.09
28/07/2021	6.48	2.77
29/07/2021	6.71	3.41
30/07/2021	6.93	4.58
31/07/2021	5.83	2.35

Date	Daily Average PM_{10} concentration ($\mu g/m^3$)	Daily Average $PM_{2.5}$ concentration ($\mu g/m^3$)
01/08/2021	7.81	3.19
02/08/2021	6.19	2.96
03/08/2021	5.08	2.19
04/08/2021	6.06	2.69
05/08/2021	5.98	2.58
06/08/2021	10.23	5.47
07/08/2021	7.26	4.72
08/08/2021	7.67	5.40
09/08/2021	6.22	3.79
10/08/2021	6.28	3.38
11/08/2021	5.09	2.51
12/08/2021	6.19	3.63
13/08/2021	12.32	8.32
14/08/2021	7.84	5.60
15/08/2021	7.26	3.27
16/08/2021	9.07	5.46
17/08/2021	4.27	1.75
18/08/2021	4.22	1.68
19/08/2021	4.41	1.74
20/08/2021	4.26	2.04
21/08/2021	4.47	2.54
22/08/2021	4.93	2.41
23/08/2021	5.20	2.45
24/08/2021	4.69	2.36
25/08/2021	2.26	1.02
26/08/2021	7.10	3.95
27/08/2021	7.27	4.20
28/08/2021	10.22	4.74
29/08/2021	7.50	3.87
30/08/2021	5.88	2.92
31/08/2021	3.53	2.17
Average	**6.45**	**2.72**

Appendix C: Anti-idling policy

JCS TRANSPORT CONSULTANCY

EARTHLINE LTD

Engine Idling

Purpose
The purpose of this procedure is to minimise vehicle emissions that negatively impact on the environment and health, the company is committed to reducing vehicle idling times at depots, in stationary traffic queues and at any other times unnecessary idling takes place. The company actively encourages drivers to reduce levels of idling.

Scope
This procedure applies to all management and drivers who have a responsibility for driving company vehicles.

Procedure
Engine idling is the running of an engine which is not required for the examination or operation of machinery other than that used for driving the vehicle. The Highway Code states that you must not leave a parked vehicle unattended with the engine running or leave a vehicle engine running unnecessarily while the vehicle is stationary on a public road.

We will ensure drivers follow these anti-idling rules:

- Don't leave an unattended vehicle's engine running
- Do not leave the engine running during loading and unloading (except where specific machinery requires it)
- Don't leave the engine running in the depot
- Don't leave the engine running when you are parked up, or when you are on a break
- Do not leave the engine running during loading and unloading
- Cab heaters are provided for cold starts and defrosting – use them rather than the engine to warm the cab
- If you anticipate being stationary for more than one minute in traffic, consider turning your engine off

Signed .....

Malachi Chambers – Transport Manager

Dated ..... 26/6/20 .....

 Earthline Ltd JCS – 001 v2.2 12th June 2020 74

Appendix D: Proposed complaints log format, Wroxton Quarry

Customer Details	
Name	
Address Postcode	
Contact Details	
Tel	
Email	
Date	
Complaint Ref No.	
Complaint Details	

Investigation Details	
Investigation carried out by	
Position	
Date & time investigation carried out	
Weather conditions	
Wind direction and speed	
Investigation findings	
Feedback given to Environment Agency and/or local authority	
Date feedback given	
Feedback given to public	
Date feedback given	

Review and Improve	
Improvements needed to prevent a reoccurrence	
Proposed date for completion of the improvements	
Actual date for completion	
If different insert reason for delay	
DEMP update required?	
Date of DEMP update	

Closure	
Site manager review date	
Site manager signature to confirm no further action required	